Eaton Court, 104-112 Oxford Road Reading

Energy Statement for Planning

Job No: 6510

Issue July, 2025

Issue No: 1

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Dated:	**Dated:**
30.07.25	30.07.25
Signed:	**Signed:**

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1.0 Introduction

1.1 This Energy Statement has been prepared in relation to a planning application for the proposed development at Eaton Court, 104-112 Oxford Road, Reading, RG1 7LL.

1.2 The report assesses the predicted energy performance and carbon dioxide emissions of the proposed development.

1.3 The methodology used to demonstrate the effects of the proposed energy efficiency measures through passive design and renewable technologies.

1.4 The overall effect of these policies is:

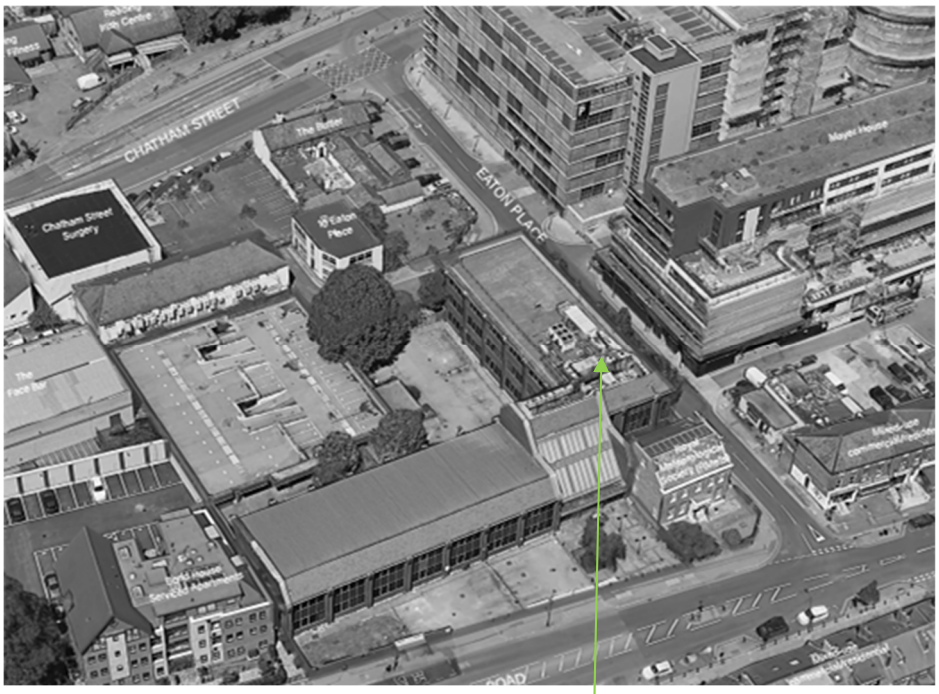
- A minimum of 35% reduction in carbon emissions over Building Regulations standards.

2.0 Project Summary

2.1 The proposal site is at Eaton Court, 104-112 Oxford Road, Reading, RG1 7LL. There is currently a two to three-storey vacant office building on the site and a car parking block.

2.2 The proposal is for a three-storey extension to the existing building to create eighteen new dwellings.

2.3 The site location is shown below.



Site Location

3.0 Policy Requirements and Drivers

3.1 The relevant planning policy documents for this site, relating to energy are:

- Policy CC2 'Sustainable Design & Construction'
- Policy CC4 'Decentralised Energy'.
- Policy H5 'Housing Standards'.
- Reading Borough Local Plan (2019).

3.2 Local Plan policies states that all major new-build residential development should achieve a minimum of 35% reduction in on-site CO2 emissions.

3.3 In light of these policy requirements. and through the developer and design team's commitment to reducing the impact of the development on the environment, this report sets out the measures that will be adopted to meet the policy targets.

4.0 Energy Strategy and Approach

4.1 The energy strategy for the development is to firstly introduce energy efficient measures, and secondly to provide on-site renewable technology.

4.2 This is done using SAP (Standard Assessment Procedure) for residential elements.

4.3 The energy efficient measures show how proposed development will reduce the energy demand of the building through architectural and building fabric measures (passive design) and energy efficient services (active design).

4.4 The introduction of renewable technology will provide the majority of the reduction in emissions. This will involve the consideration of PV panels, Air source heat pumps (ASHPs) or Ground source heat pumps (GSHPs) and wind.

5.0 Baseline Emissions

5.1 The baseline emissions on which reduction figures are based are calculated using SAP for residential dwellings.

5.2 The emissions are based upon the minimum target U-values set out in Part L of the building regulations.

5.3 The baseline emissions are as follows.

Baseline Emissions	
	SAP 10 (Tonnes CO_2/Year)
Regulated Emissions	16.2 Tonnes CO_2

Table 1 – Baseline Emissions

6.0 Energy Efficiency Strategy

6.1 The next stage, once the baseline has been established, is to make improvements through energy efficiency measures. This includes improving the U Values and the reduction of thermal bridging.

6.2 The U value improvements for each element, with the relevant Part L notional value are shown below.

6.3 Improved thermal bridging is also proposed.

6.4 Lighting will be provided by energy efficient lighting with an efficacy of 110 lumen per circuit watt.

Fabric Specification		
Element or system	Backstop Value	Proposed Value
External Walls	U = 0.18 W/(m²k)	U = 0.18 W/(m²k)
Roof	U = 0.11 W/(m²k)	U = 0.10 W/(m²k)
Glazing	U = 1.2 W/(m²k)	U = 1.2 W/(m²k)
Air Permeability	5m³/(hm²) at 50 Pa	5m³/(hm²) at 50 Pa

Table 2 – Be Lean Fabric Specification

7.0 Decentralised Energy

7.1 Policy CC4 'Decentralised Energy' states that where there is existing decentralised energy provision present within the vicinity of an application site, developments of more than 10 dwellings will be expected to connect to it or demonstrate why this is not feasible.

7.2 From the information we have the proposal site is not near any existing or proposed decentralised energy network.

7.3 It is not considered feasible for the proposed development to connect to a decentralised energy network as it is not located on the ground floor and there is no available space for a plant room.

8.0 Renewable Energy Strategy

8.1 The renewables section of the energy strategy requires the consideration of renewable technologies to reduce emissions.

8.2 The technologies that are considered here are wind power and solar panels photovoltaic (PV) and renewable heating technology.

8.3 Wind power is not suitable in a location such as this. Wind turbines tend to perform poorly in built-up areas.

8.4 Any wind that is received on the site would be too intermittent and turbulent to provide any meaningful reduction in emissions.

8.5 Air Source Heat Pumps are considered suitable here. It is proposed that individual ASHPs with an efficiency of 252% will be installed at each apartment, providing heating and hot water.

8.6 PV panels may be considered suitable here but are not required to achieve a substantial reduction in emissions.

9.0 Summary Of Results

9.1 The table below give the percentage improvement in emissions at each stage of the hierarchy and the overall savings made over Part L of the Building Regulations.

9.2 The building will be provided with increased U values (as shown above) and individual Air Source Heat Pumps.

Eaton Court	Carbon Dioxide Emissions (tonnes)	% Reduction
Baseline: Part L 2021 of the Building Regulations Compliant Development	16.2	
After renewable energy	5.1	68.1%
Total Savings	11.1	68.1%

Table 3- Summary of Results

10.0 Conclusions

10.1 This report has been set out to demonstrate how the proposed development at Eaton Court, 104-112 Oxford Road, Reading, will meet the policy requirement of achieving a minimum of 35% reduction in emissions.

10.2 In doing so, preliminary SAP calculations have been undertaken using the information available and sensible assumptions on construction and M&E parameters.

10.3 The baseline figures have been calculated and improvements made to the fabric of the scheme, in addition to other measures listed below.

10.4 The measures proposed are detailed above but summarise as:

- Improved fabric
- Individual ASHPs

10.5 The results in Section 9 show that there will be a 68% reduction in CO2 emissions.

10.6 The total remaining regulated emissions for the site are 5.1 tonnes.

10.7 The offset payment requires £60 per tonne over 30 years. Therefore, the total offset payment is (5.1 x 30 x 60 = **£9.180.**

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Appendix A – SAP Calculations

Block Compliance

Block Reference	Default	**Issued on Date**	27/07/2025
Block Name			
Calculation Type	New Build (As Designed)		
Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

Block Compliance Report - DER

Block Reference: Default | **Block Name:**

Property-Assessment Reference	Floor area (m^2)	DER ($kgCO_2/m^2$)	TER ($kgCO_2/m^2$)	% DER/TER
Flat 01 - Flat 01	74.40	4.17	12.69	67.14 %
Flat 02 - Flat 02	54.00	4.53	14.01	67.67 %
Flat 03 - Flat 03	72.60	4.06	12.32	67.05 %
Flat 04 - Flat 04	54.00	4.53	14.01	67.67 %
Flat 05 - Flat 05	72.60	4.06	12.32	67.05 %
Flat 06 - Flat 06	53.90	5.07	15.92	68.15 %
Flat 07 - Flat 07	74.40	4.17	12.69	67.14 %
Flat 13 - Flat 13	74.40	4.62	15.03	69.26 %
Flat 08 - Flat 08	54.00	4.53	14.01	67.67 %
Flat 14 - Flat 14	54.00	4.97	16.09	69.11 %
Flat 16 - Flat 16	54.00	4.97	16.09	69.11 %
Flat 10 - Flat 10	54.00	4.53	14.01	67.67 %
Flat 09 - Flat 09	72.60	4.06	12.32	67.05 %
Flat 11 - Flat 11	72.60	4.06	12.32	67.05 %
Flat 15 - Flat 15	72.60	4.50	14.36	68.66 %
Flat 17 - Flat 17	72.60	4.50	14.36	68.66 %
Flat 12 - Flat 12	53.90	5.07	15.92	68.15 %
Flat 18 - Flat 18	53.90	5.51	19.19	71.29 %
Totals:	1144.50	81.91	257.66	
Average DER = 4.50 $kgCO_2/m^2$	**% DER/TER**	PASS		
Average TER = 14.14 $kgCO_2/m^2$	68.14 %			

Block Compliance Report - DFEE

Block Reference: Default | **Block Name:**

Block Compliance

Property-Assessment Reference	Floor area (m^2)	DFEE ($kWh/m^2/yr$)	TFEE ($kWh/m^2/yr$)	% DFEE/TFEE
Flat 01 - Flat 01	74.40	30.82	32.15	4.15 %
Flat 02 - Flat 02	54.00	29.52	30.17	2.14 %
Flat 03 - Flat 03	72.60	28.05	29.62	5.27 %
Flat 04 - Flat 04	54.00	29.52	30.17	2.14 %
Flat 05 - Flat 05	72.60	28.05	29.62	5.27 %
Flat 06 - Flat 06	53.90	37.69	38.86	3.02 %
Flat 07 - Flat 07	74.40	30.82	32.15	4.15 %
Flat 13 - Flat 13	74.40	37.74	42.97	12.16 %
Flat 08 - Flat 08	54.00	29.52	30.17	2.14 %
Flat 14 - Flat 14	54.00	36.10	39.70	9.08 %
Flat 16 - Flat 16	54.00	36.10	39.70	9.08 %
Flat 10 - Flat 10	54.00	29.52	30.17	2.14 %
Flat 09 - Flat 09	72.60	28.05	29.62	5.27 %
Flat 11 - Flat 11	72.60	28.05	29.62	5.27 %
Flat 15 - Flat 15	72.60	34.77	39.06	10.98 %
Flat 17 - Flat 17	72.60	34.77	39.06	10.98 %
Flat 12 - Flat 12	53.90	37.69	38.86	3.02 %
Flat 18 - Flat 18	53.90	44.26	53.83	17.78 %
Totals:	1144.50	591.04	635.47	
Average DFEE = 32.60 kWh/m²/yr	% DFEE/TFEE	PASS		
Average TFEE = 35.08 kWh/m²/yr	7.06 %			

Block Compliance Report - DPER

Block Reference: Default	Block Name:			
Property-Assessment Reference	**Floor area (m^2)**	**DPER ($kWh/m^2/yr$)**	**TPER ($kWh/m^2/yr$)**	**% DPER/TPER**
Flat 01 - Flat 01	74.40	43.79	67.56	35.18 %
Flat 02 - Flat 02	54.00	47.75	74.97	36.31 %

Block Compliance

Flat 03 - Flat 03	72.60	42.72	65.60	34.88 %
Flat 04 - Flat 04	54.00	47.75	74.97	36.31 %
Flat 05 - Flat 05	72.60	42.72	65.60	34.88 %
Flat 06 - Flat 06	53.90	53.30	85.22	37.46 %
Flat 07 - Flat 07	74.40	43.79	67.56	35.18 %
Flat 13 - Flat 13	74.40	48.43	80.17	39.59 %
Flat 08 - Flat 08	54.00	47.75	74.97	36.31 %
Flat 14 - Flat 14	54.00	52.20	86.15	39.41 %
Flat 16 - Flat 16	54.00	52.20	86.15	39.41 %
Flat 10 - Flat 10	54.00	47.75	74.97	36.31 %
Flat 09 - Flat 09	72.60	42.72	65.60	34.88 %
Flat 11 - Flat 11	72.60	42.72	65.60	34.88 %
Flat 15 - Flat 15	72.60	47.19	76.59	38.39 %
Flat 17 - Flat 17	72.60	47.19	76.59	38.39 %
Flat 12 - Flat 12	53.90	53.30	85.22	37.46 %
Flat 18 - Flat 18	53.90	57.77	102.84	43.83 %
Totals:	1144.50	861.04	1376.33	
Average DPER = 47.35 kWh/m²/yr	**% DPER/TPER**	PASS		
Average TPER = 75.51 kWh/m²/yr	37.29 %			

Summary for Input Data

Property Reference	Flat 01	**Issued on Date**	27/07/2025
Assessment Reference	Flat 01	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.17	**TER**	12.69
Environmental	97 A	**% DER < TER**			67.14
CO_2 Emissions (t/year)	0.28	**DFEE**	30.82	**TFEE**	32.15
Compliance Check	See BREL	**% DFEE < TFEE**			4.15
% DPER < TPER	35.18	**DPER**	43.79	**TPER**	67.56

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, End-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	18.50 m	74.40 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	60.13	39.48	0.00	None	20.65	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	12.53	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		11.27	0.00	0.00	Yes
E3 Sill		10.46	0.00	0.00	Yes
E4 Jamb		15.30	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		37.00	0.00	0.00	No
E16 Corner (normal)		6.50	0.00	0.00	Yes
E18 Party wall between dwellings		6.50	0.00	0.00	Yes

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	

Summary for Input Data

Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 01	**Issued on Date**	27/07/2025
Assessment Reference	Flat 01	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.17	**TER**	12.69
Environmental	97 A	**% DER < TER**			67.14
CO_2 Emissions (t/year)	0.28	**DFEE**	30.82	**TFEE**	32.15
Compliance Check	See BREL	**% DFEE < TFEE**			4.15
% DPER < TPER	35.18	**DPER**	43.79	**TPER**	67.56

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	241.8000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0827	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3332	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2832	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3611	0.3540	0.3470	0.3116	0.3045	0.2691	0.2691	0.2620	0.2832	0.3045	0.3186	0.3328	(22b)
Effective ac	0.5652	0.5627	0.5602	0.5485	0.5464	0.5362	0.5362	0.5343	0.5401	0.5464	0.5508	0.5554	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			18.8300	1.1450	21.5611			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	60.1250	20.6500	39.4750	0.1800	7.1055			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.4866			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	2.4050	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	32.8916	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.0999	44.8978	44.6998	43.7696	43.5956	42.7855	42.7855	42.6355	43.0975	43.5956	43.9477	44.3157	(38)
Heat transfer coeff	77.9914	77.7894	77.5914	76.6612	76.4872	75.6770	75.6770	75.5270	75.9891	76.4872	76.8392	77.2073	(39)
Average = Sum(39)m / 12 =												76.6604	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0483	1.0456	1.0429	1.0304	1.0281	1.0172	1.0172	1.0151	1.0214	1.0281	1.0328	1.0377	(40)
HLP (average)												1.0304	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480	(42)
Hot water usage for mixer showers													
	71.5372	70.4622	68.8956	65.8982	63.6862	61.2194	59.8173	61.3720	63.0763	65.7249	68.7866	71.2631	(42a)
Hot water usage for baths													
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)
Hot water usage for other uses													
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)
Average daily hot water use (litres/day)												126.5828	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	137.6820	134.7926	131.2451	125.7821	121.3706	116.6179	114.7407	118.2723	122.0041	127.0002	132.5494	137.3150	(44)
Energy conte	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(45)
Energy content (annual)										Total = Sum(45)m =		2102.5281	
Distribution loss (46)m = 0.15 x (45)m													
	32.7082	28.7914	30.2578	25.8284	24.5082	21.5093	20.8153	21.9669	22.5665	25.8507	28.3261	32.2503	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
										Total per year (kWh/year) = Sum(64)m =		2102.5281	(64)
12Total per year (kWh/year)												2103	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	72.5032	63.8210	67.0715	57.2530	54.3265	47.6789	46.1407	48.6932	50.0224	57.3024	62.7896	71.4882	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5799	115.7849	104.5799	108.0659	104.5799	108.0659	104.5799	104.5799	108.0659	104.5799	108.0659	104.5799	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	97.4505	94.9717	90.1499	79.5180	73.0195	66.2208	62.0171	65.4479	69.4755	77.0193	87.2078	96.0863	(72)
Total internal gains													
	470.5923	481.4701	460.0214	441.3331	416.7783	396.7715	379.9334	381.2127	394.1482	412.7484	440.9931	460.0797	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	12.5300	46.7521	0.6300	0.7000	0.7700	179.0291	(78)

Solar gains	199.5023	332.3288	439.9726	528.9132	583.7342	577.3249	557.3928	515.7465	470.0882	362.8210	237.4668	171.7651	(83)
Total gains	670.0946	813.7989	899.9941	970.2463	1000.5125	974.0964	937.3262	896.9592	864.2363	775.5694	678.4600	631.8448	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.1485	29.2242	29.2988	29.6543	29.7218	30.0399	30.0399	30.0996	29.9166	29.7218	29.5856	29.4445	
alpha	2.9432	2.9483	2.9533	2.9770	2.9815	3.0027	3.0027	3.0066	2.9944	2.9815	2.9724	2.9630	
util living area													
	0.9260	0.8798	0.8235	0.7315	0.6109	0.4645	0.3448	0.3733	0.5449	0.7582	0.8866	0.9354	(86)
MIT	19.5279	19.8191	20.1246	20.4572	20.6949	20.8332	20.8780	20.8724	20.7893	20.4782	19.9561	19.4752	(87)
Th 2	20.0433	20.0455	20.0477	20.0581	20.0600	20.0691	20.0691	20.0707	20.0656	20.0600	20.0561	20.0520	(88)
util rest of house													
	0.9159	0.8647	0.8018	0.6996	0.5661	0.4056	0.2756	0.3028	0.4854	0.7223	0.8697	0.9264	(89)
MIT 2	18.3289	18.6897	19.0646	19.4685	19.7386	19.8889	19.9270	19.9249	19.8462	19.5045	18.8745	18.2698	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	18.8929	19.2210	19.5632	19.9336	20.1885	20.3331	20.3744	20.3706	20.2899	19.9625	19.3833	18.8368	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8929	19.2210	19.5632	19.9336	20.1885	20.3331	20.3744	20.3706	20.2899	19.9625	19.3833	18.8368	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9013	0.8497	0.7896	0.6951	0.5725	0.4227	0.2987	0.3260	0.5003	0.7182	0.8557	0.9125	(94)
Useful gains	603.9440	691.5104	710.6196	674.4504	572.8031	411.7826	279.9819	292.3903	432.3400	557.0411	580.5837	576.5756	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1138.1227	1114.0216	1013.5949	845.8523	649.2601	433.8655	285.6324	299.8900	470.3636	716.1140	943.8405	1130.0711	(97)
Space heating kWh	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98a)
Space heating requirement - total per year (kWh/year)												1878.7593	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1878.7593	
Space heating per m2											(98c) / (4) =	25.2521	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	159.0352	113.6165	90.2015	49.3835	22.7627	0.0000	0.0000	0.0000	0.0000	47.3590	104.6598	164.7862	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	124.5315	109.6190	115.2021	98.3377	93.3113	81.8934	79.2513	83.6355	85.9185	98.4226	107.8474	122.7882	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.6704	15.7803	14.2085	10.4097	8.0408	6.5694	7.3351	9.5344	12.3842	16.2488	18.3530	20.2171	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	751.8044	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1200.7585	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	158.7516	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2111.3146	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	751.8044	0.1557	117.0733	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1200.7585	0.1416	170.0012	(264)
Space and water heating			287.0746	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	158.7516	0.1443	22.9128	(268)
Total CO2, kg/year			309.9873	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.1700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	751.8044	1.5765	1185.2113	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1200.7585	1.5235	1829.4017	(278)
Space and water heating			3014.6131	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	158.7516	1.5338	243.4985	(282)
Total Primary energy kWh/year			3258.1116	(286)
Dwelling Primary energy Rate (DPER)			43.7900	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b) x	3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.8000	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3741	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3180	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4054	0.3974	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736	(22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5505	0.5584	0.5640	0.5698	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			16.7800	1.1450	19.2137			(27)
External Wall 1	60.1250	18.6000	41.5250	0.1800	7.4745			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.5082			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	11.2700	0.0500	0.5635	
E3 Sill	10.4600	0.0500	0.5230	
E4 Jamb	15.3000	0.0500	0.7650	
E7 Party floor between dwellings (in blocks of flats)	37.0000	0.0700	2.5900	
E16 Corner (normal)	6.5000	0.0900	0.5850	
E18 Party wall between dwellings	6.5000	0.0600	0.3900	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.4165	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		33.9247	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4540	46.1994	45.9498	44.7775	44.5582	43.5372	43.5372	43.3482	43.9305	44.5582	45.0019	45.4658	(38)
Heat transfer coeff	80.3787	80.1241	79.8745	78.7023	78.4830	77.4620	77.4620	77.2729	77.8552	78.4830	78.9266	79.3905	(39)
Average = Sum(39)m / 12 =												78.7012	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0804	1.0769	1.0736	1.0578	1.0549	1.0412	1.0412	1.0386	1.0464	1.0549	1.0608	1.0671	(40)
HLP (average)												1.0578	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480	(42)
Hot water usage for mixer showers													
	63.5887	62.6330	61.2405	58.5762	56.6100	54.4173	53.1710	54.5529	56.0678	58.4221	61.1437	63.3450	(42a)
Hot water usage for baths													
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)
Hot water usage for other uses													
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)
Average daily hot water use (litres/day)												119.2545	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	129.7334	126.9634	123.5900	118.4601	114.2943	109.8157	108.0944	111.4532	114.9956	119.6974	124.9064	129.3969	(44)
Energy conte	205.4660	180.7942	189.9533	162.1659	153.8621	135.0313	130.7308	138.0024	141.8011	162.4282	177.9521	202.6043	(45)
Energy content (annual)										Total = Sum(45)m =		1980.7916	
Distribution loss (46)m = 0.15 x (45)m													
	30.8199	27.1191	28.4930	24.3249	23.0793	20.2547	19.6096	20.7004	21.2702	24.3642	26.6928	30.3906	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	252.0609	222.8799	236.5482	207.2577	200.4570	180.1231	177.3257	184.5973	186.8930	209.0231	223.0439	249.1992	(62)
WWHRS	-29.0701	-25.7098	-26.9218	-22.2923	-20.7757	-17.7779	-16.6639	-17.7204	-18.3937	-21.6841	-24.5655	-28.5317	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
										Total per year (kWh/year) = Sum(64)m =		2259.3020	(64)
12Total per year (kWh/year)												2259	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	105.5934	93.7827	100.4354	89.9936	88.4351	80.9714	80.7439	83.1617	83.2223	91.2833	95.2425	104.6418	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5626	115.7658	104.5626	108.0481	104.5626	108.0481	104.5626	104.5626	108.0481	104.5626	108.0481	104.5626	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	141.9266	139.5575	134.9938	124.9912	118.8643	112.4602	108.5268	111.7765	115.5866	122.6926	132.2813	140.6476	(72)
Total internal gains													
	515.0512	526.0368	504.8481	486.7884	462.6059	442.9932	426.4258	427.5240	440.2414	458.4045	486.0489	504.6238	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308	(74)
South	11.1700	46.7521	0.6300	0.7000	0.7700	159.5974	(78)

Solar gains	177.8282	296.2195	392.1528	471.4001	520.2343	514.5107	496.7521	459.6554	418.9863	323.3947	211.6674	153.1050	(83)
Total gains	692.8794	822.2563	897.0009	958.1886	982.8402	957.5039	923.1780	887.1794	859.2277	781.7992	697.7163	657.7288	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.2828	28.3727	28.4613	28.8852	28.9659	29.3477	29.3477	29.4195	29.1995	28.9659	28.8031	28.6348	
alpha	2.8855	2.8915	2.8974	2.9257	2.9311	2.9565	2.9565	2.9613	2.9466	2.9311	2.9202	2.9090	
util living area													
	0.9223	0.8807	0.8295	0.7430	0.6268	0.4792	0.3567	0.3842	0.5556	0.7615	0.8831	0.9308	(86)
MIT	19.1394	19.5014	19.9018	20.3592	20.6961	20.9012	20.9691	20.9609	20.8399	20.4105	19.7193	19.0826	(87)
Th 2	20.0169	20.0197	20.0225	20.0354	20.0379	20.0492	20.0492	20.0513	20.0448	20.0379	20.0329	20.0278	(88)
util rest of house													
	0.9116	0.8655	0.8079	0.7111	0.5812	0.4181	0.2841	0.3107	0.4947	0.7252	0.8656	0.9212	(89)
MIT 2	17.8726	18.3210	18.8132	19.3685	19.7530	19.9742	20.0323	20.0288	19.9151	19.4428	18.6086	17.8091	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)

MIT	18.4685	18.8763	19.3253	19.8345	20.1967	20.4102	20.4730	20.4673	20.3501	19.8980	19.1311	18.4082	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4685	18.8763	19.3253	19.8345	20.1967	20.4102	20.4730	20.4673	20.3501	19.8980	19.1311	18.4082	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8908	0.8445	0.7905	0.7040	0.5890	0.4419	0.3170	0.3435	0.5149	0.7194	0.8462	0.9012	(94)
Useful gains	617.2257	694.3674	709.0995	674.5327	578.9282	423.1155	292.6273	304.7395	442.4085	562.4155	590.4284	592.7399	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	1138.8473	1119.8350	1024.4157	860.5718	666.8432	450.0732	300.0125	314.2886	486.6068	729.7384	949.5742	1127.9967	(97)
Space heating kWh													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98a)
Space heating requirement - total per year (kWh/year)												1889.2572	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1889.2572	
Space heating per m2											(98c) / (4) =	25.3932	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98)
Space heating efficiency (main heating system 1)													
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)													
	420.4620	309.7662	254.1660	145.1226	70.8654	0.0000	0.0000	0.0000	0.0000	134.8735	280.1571	431.4529	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2898	84.8923	84.3128	83.3480	82.0185	79.8000	79.8000	79.8000	79.8000	83.1650	84.6540	85.3672	(217)
Fuel for water heating, kWh/month													
	261.4506	232.2593	248.6294	221.9193	219.0743	203.4401	201.3305	209.1188	211.1520	225.2619	234.4583	258.4921	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.7260	17.4294	15.6933	11.4976	8.8811	7.2559	8.1016	10.5308	13.6784	17.9468	20.2709	22.3299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.4607	-24.6716	-37.6751	-45.0891	-51.0410	-48.5313	-47.9380	-44.0442	-37.6205	-29.3823	-18.6085	-14.0654	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.3266	-11.5023	-23.4280	-36.0371	-48.4965	-49.0418	-48.4678	-40.6495	-29.2887	-16.7260	-7.1987	-4.1905	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2046.8658	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2726.5866	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	175.3417	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-735.4813	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4299.3128	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2046.8658	0.2100	429.8418	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2726.5866	0.2100	572.5832	(264)
Space and water heating			1002.4250	(265)

Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	175.3417	0.1443	25.3072	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	0.1333	-55.3461	
PV Unit electricity exported	-320.3536	0.1252	-40.1090	
Total			-95.4551	(269)
Total CO2, kg/year			944.2064	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2046.8658	1.1300	2312.9584	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2726.5866	1.1300	3081.0429	(278)
Space and water heating			5394.0012	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	175.3417	1.5338	268.9449	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	1.4927	-619.6474	
PV Unit electricity exported	-320.3536	0.4595	-147.2169	
Total			-766.8643	(283)
Total Primary energy kWh/year			5026.1826	(286)
Target Primary Energy Rate (TPER)			67.5600	(287)

Full SAP Calculation Printout

Property Reference	Flat 01	**Issued on Date**	27/07/2025
Assessment Reference	Flat 01	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.17	**TER**	12.69
Environmental	97 A	**% DER < TER**			67.14
CO_2 Emissions (t/year)	0.28	**DFEE**	30.82	**TFEE**	32.15
Compliance Check	See BREL	**% DFEE < TFEE**			4.15
% DPER < TPER	35.18	**DPER**	43.79	**TPER**	67.56

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000 (1b)	x	3.2500 (2b)	=	241.8000	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	241.8000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3746	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3184	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4059	0.3980	0.3900	0.3502	0.3423	0.3025	0.3025	0.2945	0.3184	0.3423	0.3582	0.3741	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5824	0.5792	0.5761	0.5613	0.5586	0.5457	0.5457	0.5434	0.5507	0.5586	0.5641	0.5700	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			18.8300	1.1450	21.5611			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	60.1250	20.6500	39.4750	0.1800	7.1055			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.4866			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	2.4050	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	32.8916	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4715	46.2162	45.9660	44.7906	44.5707	43.5470	43.5470	43.3574	43.9413	44.5707	45.0156	45.4807	(38)
Heat transfer coeff													

	79.3631	79.1078	78.8575	77.6822	77.4623	76.4385	76.4385	76.2490	76.8329	77.4623	77.9071	78.3722 (39)
Average = Sum(39)m / 12 =												77.6811

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0667	1.0633	1.0599	1.0441	1.0412	1.0274	1.0274	1.0249	1.0327	1.0412	1.0471	1.0534	(40)
HLP (average)												1.0441	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756 (42b)
Hot water usage for other uses												
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763 (42c)
Average daily hot water use (litres/day)												60.6278 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	66.1447	64.3304	62.3495	59.8839	57.6843	55.3985	54.9234	56.9003	58.9278	61.2753	63.7627	66.0519	(44)
Energy conte	104.7571	91.6056	95.8289	81.9780	77.6542	68.1189	66.4251	70.4544	72.6639	83.1500	90.8417	103.4213	(45)
Energy content (annual)										Total = Sum(45)m =		1006.8990	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(64)
										Total per year (kWh/year) = Sum(64)m =		855.8642	(64)
12Total per year (kWh/year)												856	(64)
Electric shower(s)													
	50.9239	45.3736	49.5463	47.2814	48.1686	45.9482	47.4798	48.1686	47.2814	49.5463	48.6146	50.9239	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												579.2565	(64a)
Heat gains from water heating, kWh/month													
	34.9919	30.8096	32.7502	29.2407	28.5437	25.9623	25.9853	27.0137	27.2614	30.0559	31.4575	34.7080	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5799	115.7849	104.5799	108.0659	104.5799	108.0659	104.5799	104.5799	108.0659	104.5799	108.0659	104.5799	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	47.0321	45.8476	44.0191	40.6121	38.3651	36.0588	34.9265	36.3088	37.8631	40.3978	43.6910	46.6505	(72)
Total internal gains													
	417.1739	429.3460	410.8907	399.4271	379.1239	366.6095	352.8428	352.0735	362.5357	373.1269	394.4764	407.6440	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	12.5300	46.7521	0.6300	0.7000	0.7700	179.0291	(78)

Solar gains	199.5023	332.3288	439.9726	528.9132	583.7342	577.3249	557.3928	515.7465	470.0882	362.8210	237.4668	171.7651 (83)
Total gains	616.6762	761.6748	850.8633	928.3404	962.8581	943.9344	910.2356	867.8201	832.6239	735.9479	631.9432	579.4090 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	28.6447	28.7372	28.8284	29.2645	29.3476	29.7407	29.7407	29.8146	29.5880	29.3476	29.1800	29.0069
alpha	2.9096	2.9158	2.9219	2.9510	2.9565	2.9827	2.9827	2.9876	2.9725	2.9565	2.9453	2.9338
util living area												
	0.9392	0.8964	0.8428	0.7515	0.6311	0.4803	0.3573	0.3876	0.5642	0.7800	0.9032	0.9475 (86)
MIT	19.0169	19.4278	19.8643	20.3511	20.6979	20.9036	20.9701	20.9613	20.8377	20.3792	19.6299	18.9507 (87)
Th 2	20.0281	20.0309	20.0337	20.0467	20.0492	20.0606	20.0606	20.0627	20.0562	20.0492	20.0442	20.0391 (88)
util rest of house												
	0.9306	0.8827	0.8224	0.7203	0.5859	0.4197	0.2854	0.3144	0.5036	0.7452	0.8880	0.9400 (89)
MIT 2	18.2358	18.6349	19.0548	19.5187	19.8278	20.0034	20.0478	20.0452	19.9531	19.5572	18.8477	18.1791 (90)
Living area fraction										fLA = Living area / (4) =		0.4704 (91)
MIT	18.6033	19.0079	19.4356	19.9103	20.2371	20.4269	20.4817	20.4762	20.3692	19.9439	19.2157	18.5421 (92)

Temperature adjustment												0.0000	
adjusted MIT	18.6033	19.0079	19.4356	19.9103	20.2371	20.4269	20.4817	20.4762	20.3692	19.9439	19.2157	18.5421	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9148	0.8657	0.8082	0.7155	0.5953	0.4439	0.3181	0.3473	0.5244	0.7410	0.8724	0.9251	(94)
Useful gains	564.1210	659.3608	687.6471	664.2587	573.1635	419.0373	289.5656	301.3672	436.6594	545.3371	551.3190	536.0311	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1135.1516	1116.0459	1020.0689	855.3033	661.3042	445.3966	296.7105	310.8059	481.6820	723.7997	943.8959	1124.0189	(97)
Space heating kWh	424.8468	306.8923	247.3219	137.5521	65.5767	0.0000	0.0000	0.0000	0.0000	132.7761	282.6554	437.4630	(98a)
Space heating requirement - total per year (kWh/year)												2035.0843	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	424.8468	306.8923	247.3219	137.5521	65.5767	0.0000	0.0000	0.0000	0.0000	132.7761	282.6554	437.4630	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2035.0843	
Space heating per m2											(98c) / (4) =	27.3533	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	718.5223	565.6452	579.4922	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8726	0.9163	0.9027	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	626.9555	518.2757	523.1321	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1063.5721	1026.2251	978.6832	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	314.3640	377.9143	338.9300	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	78.5910	94.4786	84.7325	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												257.8021	(107)
Energy for space heating												27.3533	(99)
Energy for space cooling												3.4651	(108)
Total												30.8184	(109)
Fabric Energy Efficiency (DFEE)												30.8	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.8000	(5)

2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3741	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3180	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4054	0.3974	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000	(23c)

Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5505	0.5584	0.5640	0.5698	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			16.7800	1.1450	19.2137			(27)
External Wall 1	60.1250	18.6000	41.5250	0.1800	7.4745			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.5082			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	11.2700	0.0500	0.5635
E3 Sill	10.4600	0.0500	0.5230
E4 Jamb	15.3000	0.0500	0.7650
E7 Party floor between dwellings (in blocks of flats)	37.0000	0.0700	2.5900
E16 Corner (normal)	6.5000	0.0900	0.5850
E18 Party wall between dwellings	6.5000	0.0600	0.3900

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.4165 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 33.9247 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4540	46.1994	45.9498	44.7775	44.5582	43.5372	43.5372	43.3482	43.9305	44.5582	45.0019	45.4658	(38)
Heat transfer coeff	80.3787	80.1241	79.8745	78.7023	78.4830	77.4620	77.4620	77.2729	77.8552	78.4830	78.9266	79.3905	(39)
Average = Sum(39)m / 12 =												78.7012	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0804	1.0769	1.0736	1.0578	1.0549	1.0412	1.0412	1.0386	1.0464	1.0549	1.0608	1.0671	(40)
HLP (average)												1.0578	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3480 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)

Hot water usage for other uses

38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)

Average daily hot water use (litres/day) 60.6278 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	66.1447	64.3304	62.3495	59.8839	57.6843	55.3985	54.9234	56.9003	58.9278	61.2753	63.7627	66.0519	(44)
Energy conte	104.7571	91.6056	95.8289	81.9780	77.6542	68.1189	66.4251	70.4544	72.6639	83.1500	90.8417	103.4213	(45)
Energy content (annual)										Total = Sum(45)m =		1006.8990	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(64)
										Total per year (kWh/year) = Sum(64)m =		855.8642	(64)
12Total per year (kWh/year)												856	(64)
Electric shower(s)													
	50.9239	45.3736	49.5463	47.2814	48.1686	45.9482	47.4798	48.1686	47.2814	49.5463	48.6146	50.9239	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 579.2565 (64a)													
Heat gains from water heating, kWh/month													
	34.9919	30.8096	32.7502	29.2407	28.5437	25.9623	25.9853	27.0137	27.2614	30.0559	31.4575	34.7080	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5626	115.7658	104.5626	108.0481	104.5626	108.0481	104.5626	104.5626	108.0481	104.5626	108.0481	104.5626	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	47.0321	45.8476	44.0191	40.6121	38.3651	36.0588	34.9265	36.3088	37.8631	40.3978	43.6910	46.6505	(72)
Total internal gains													
	417.1567	429.3269	410.8734	399.4093	379.1067	366.5917	352.8255	352.0563	362.5179	373.1096	394.4585	407.6267	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308	(74)
South	11.1700	46.7521	0.6300	0.7000	0.7700	159.5974	(78)

Solar gains	177.8282	296.2195	392.1528	471.4001	520.2343	514.5107	496.7521	459.6554	418.9863	323.3947	211.6674	153.1050	(83)
Total gains	594.9849	725.5464	803.0262	870.8094	899.3410	881.1024	849.5777	811.7116	781.5042	696.5043	606.1260	560.7317	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.2828	28.3727	28.4613	28.8852	28.9659	29.3477	29.3477	29.4195	29.1995	28.9659	28.8031	28.6348	
alpha	2.8855	2.8915	2.8974	2.9257	2.9311	2.9565	2.9565	2.9613	2.9466	2.9311	2.9202	2.9090	
util living area	0.9444	0.9073	0.8604	0.7776	0.6635	0.5126	0.3846	0.4157	0.5952	0.8014	0.9123	0.9518	(86)
MIT	18.9354	19.3268	19.7610	20.2665	20.6445	20.8817	20.9622	20.9517	20.8072	20.3115	19.5511	18.8739	(87)
Th 2	20.0169	20.0197	20.0225	20.0354	20.0379	20.0492	20.0492	20.0513	20.0448	20.0379	20.0329	20.0278	(88)
util rest of house	0.9363	0.8946	0.8414	0.7476	0.6182	0.4491	0.3074	0.3375	0.5332	0.7681	0.8981	0.9447	(89)
MIT 2	18.1486	18.5301	18.9500	19.4348	19.7754	19.9784	20.0330	20.0293	19.9213	19.4889	18.7644	18.0963	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	18.5187	18.9049	19.3315	19.8260	20.1843	20.4033	20.4701	20.4632	20.3380	19.8758	19.1345	18.4621	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5187	18.9049	19.3315	19.8260	20.1843	20.4033	20.4701	20.4632	20.3380	19.8758	19.1345	18.4621	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9208	0.8774	0.8260	0.7406	0.6255	0.4735	0.3422	0.3722	0.5531	0.7619	0.8823	0.9302	(94)
Useful gains	547.8889	636.5694	663.2959	644.8797	562.5380	417.1696	290.7205	302.1437	432.2314	530.6385	534.7883	521.5738	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1142.8830	1122.1287	1024.9091	859.9035	665.8699	449.5383	299.7863	313.9783	485.6645	727.9956	949.8396	1132.2736	(97)
Space heating kWh	442.6756	326.2959	269.0402	154.8171	76.8790	0.0000	0.0000	0.0000	0.0000	146.8337	298.8369	454.3606	(98a)
Space heating requirement - total per year (kWh/year)												2169.7391	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	442.6756	326.2959	269.0402	154.8171	76.8790	0.0000	0.0000	0.0000	0.0000	146.8337	298.8369	454.3606	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2169.7391	
Space heating per m2											(98c) / (4) =	29.1632	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	728.1426	573.2187	587.2741	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8484	0.8982	0.8831	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	617.7734	514.8425	518.6104	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	990.1514	955.3447	913.1200	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	268.1122	327.7337	293.5152	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	67.0280	81.9334	73.3788	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												222.3402	(107)
Energy for space heating												29.1632	(99)
Energy for space cooling												2.9884	(108)
Total												32.1516	(109)
Fabric Energy Efficiency (TFEE)												32.2	(109)

Full SAP Calculation Printout

Property Reference	Flat 01	**Issued on Date**	27/07/2025
Assessment Reference	Flat 01	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.17	**TER**	12.69
Environmental	97 A	**% DER < TER**			67.14
CO_2 Emissions (t/year)	0.28	**DFEE**	30.82	**TFEE**	32.15
Compliance Check	See BREL	**% DFEE < TFEE**			4.15
% DPER < TPER	35.18	**DPER**	43.79	**TPER**	67.56

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	241.8000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0827	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3332	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2832	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3611	0.3540	0.3470	0.3116	0.3045	0.2691	0.2691	0.2620	0.2832	0.3045	0.3186	0.3328	(22b)
Effective ac	0.5652	0.5627	0.5602	0.5485	0.5464	0.5362	0.5362	0.5343	0.5401	0.5464	0.5508	0.5554	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			18.8300	1.1450	21.5611			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	60.1250	20.6500	39.4750	0.1800	7.1055			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.4866			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	2.4050	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	32.8916	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.0999	44.8978	44.6998	43.7696	43.5956	42.7855	42.7855	42.6355	43.0975	43.5956	43.9477	44.3157	(38)
Heat transfer coeff	77.9914	77.7894	77.5914	76.6612	76.4872	75.6770	75.6770	75.5270	75.9891	76.4872	76.8392	77.2073	(39)
Average = Sum(39)m / 12 =												76.6604	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0483	1.0456	1.0429	1.0304	1.0281	1.0172	1.0172	1.0151	1.0214	1.0281	1.0328	1.0377	(40)
HLP (average)												1.0304	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480	(42)
Hot water usage for mixer showers													
	71.5372	70.4622	68.8956	65.8982	63.6862	61.2194	59.8173	61.3720	63.0763	65.7249	68.7866	71.2631	(42a)
Hot water usage for baths													
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)
Hot water usage for other uses													
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)
Average daily hot water use (litres/day)												126.5828	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	137.6820	134.7926	131.2451	125.7821	121.3706	116.6179	114.7407	118.2723	122.0041	127.0002	132.5494	137.3150	(44)
Energy conte	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(45)
Energy content (annual)										Total = Sum(45)m =		2102.5281	
Distribution loss (46)m = 0.15 x (45)m													
	32.7082	28.7914	30.2578	25.8284	24.5082	21.5093	20.8153	21.9669	22.5665	25.8507	28.3261	32.2503	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
										Total per year (kWh/year) = Sum(64)m =		2102.5281	(64)
12Total per year (kWh/year)												2103	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	72.5032	63.8210	67.0715	57.2530	54.3265	47.6789	46.1407	48.6932	50.0224	57.3024	62.7896	71.4882	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5799	115.7849	104.5799	108.0659	104.5799	108.0659	104.5799	104.5799	108.0659	104.5799	108.0659	104.5799	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	97.4505	94.9717	90.1499	79.5180	73.0195	66.2208	62.0171	65.4479	69.4755	77.0193	87.2078	96.0863	(72)
Total internal gains													
	470.5923	481.4701	460.0214	441.3331	416.7783	396.7715	379.9334	381.2127	394.1482	412.7484	440.9931	460.0797	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	12.5300	46.7521	0.6300	0.7000	0.7700	179.0291	(78)

Solar gains	199.5023	332.3288	439.9726	528.9132	583.7342	577.3249	557.3928	515.7465	470.0882	362.8210	237.4668	171.7651	(83)
Total gains	670.0946	813.7989	899.9941	970.2463	1000.5125	974.0964	937.3262	896.9592	864.2363	775.5694	678.4600	631.8448	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.1485	29.2242	29.2988	29.6543	29.7218	30.0399	30.0399	30.0996	29.9166	29.7218	29.5856	29.4445	
alpha	2.9432	2.9483	2.9533	2.9770	2.9815	3.0027	3.0027	3.0066	2.9944	2.9815	2.9724	2.9630	
util living area													
	0.9260	0.8798	0.8235	0.7315	0.6109	0.4645	0.3448	0.3733	0.5449	0.7582	0.8866	0.9354	(86)
MIT	19.5279	19.8191	20.1246	20.4572	20.6949	20.8332	20.8780	20.8724	20.7893	20.4782	19.9561	19.4752	(87)
Th 2	20.0433	20.0455	20.0477	20.0581	20.0600	20.0691	20.0691	20.0707	20.0656	20.0600	20.0561	20.0520	(88)
util rest of house													
	0.9159	0.8647	0.8018	0.6996	0.5661	0.4056	0.2756	0.3028	0.4854	0.7223	0.8697	0.9264	(89)
MIT 2	18.3289	18.6897	19.0646	19.4685	19.7386	19.8889	19.9270	19.9249	19.8462	19.5045	18.8745	18.2698	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	18.8929	19.2210	19.5632	19.9336	20.1885	20.3331	20.3744	20.3706	20.2899	19.9625	19.3833	18.8368	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8929	19.2210	19.5632	19.9336	20.1885	20.3331	20.3744	20.3706	20.2899	19.9625	19.3833	18.8368	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9013	0.8497	0.7896	0.6951	0.5725	0.4227	0.2987	0.3260	0.5003	0.7182	0.8557	0.9125	(94)
Useful gains	603.9440	691.5104	710.6196	674.4504	572.8031	411.7826	279.9819	292.3903	432.3400	557.0411	580.5837	576.5756	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1138.1227	1114.0216	1013.5949	845.8523	649.2601	433.8655	285.6324	299.8900	470.3636	716.1140	943.8405	1130.0711	(97)
Space heating kWh	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98a)
Space heating requirement - total per year (kWh/year)												1878.7593	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1878.7593	
Space heating per m2											(98c) / (4) =	25.2521	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	159.0352	113.6165	90.2015	49.3835	22.7627	0.0000	0.0000	0.0000	0.0000	47.3590	104.6598	164.7862	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	124.5315	109.6190	115.2021	98.3377	93.3113	81.8934	79.2513	83.6355	85.9185	98.4226	107.8474	122.7882	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.6704	15.7803	14.2085	10.4097	8.0408	6.5694	7.3351	9.5344	12.3842	16.2488	18.3530	20.2171	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	751.8044	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1200.7585	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	158.7516	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2111.3146	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	751.8044	0.1557	117.0733	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1200.7585	0.1416	170.0012	(264)
Space and water heating			287.0746	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	158.7516	0.1443	22.9128	(268)
Total CO2, kg/year			309.9873	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.1700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	751.8044	1.5765	1185.2113	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1200.7585	1.5235	1829.4017	(278)
Space and water heating			3014.6131	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	158.7516	1.5338	243.4985	(282)
Total Primary energy kWh/year			3258.1116	(286)
Dwelling Primary energy Rate (DPER)			43.7900	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b) x	3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.8000	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3741	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3180	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4054	0.3974	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736	(22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5505	0.5584	0.5640	0.5698	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			16.7800	1.1450	19.2137			(27)
External Wall 1	60.1250	18.6000	41.5250	0.1800	7.4745			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.5082			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	11.2700	0.0500	0.5635	
E3 Sill	10.4600	0.0500	0.5230	
E4 Jamb	15.3000	0.0500	0.7650	
E7 Party floor between dwellings (in blocks of flats)	37.0000	0.0700	2.5900	
E16 Corner (normal)	6.5000	0.0900	0.5850	
E18 Party wall between dwellings	6.5000	0.0600	0.3900	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.4165	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		33.9247	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4540	46.1994	45.9498	44.7775	44.5582	43.5372	43.5372	43.3482	43.9305	44.5582	45.0019	45.4658	(38)
Heat transfer coeff	80.3787	80.1241	79.8745	78.7023	78.4830	77.4620	77.4620	77.2729	77.8552	78.4830	78.9266	79.3905	(39)
Average = Sum(39)m / 12 =												78.7012	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0804	1.0769	1.0736	1.0578	1.0549	1.0412	1.0412	1.0386	1.0464	1.0549	1.0608	1.0671	(40)
HLP (average)												1.0578	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480	(42)
Hot water usage for mixer showers													
	63.5887	62.6330	61.2405	58.5762	56.6100	54.4173	53.1710	54.5529	56.0678	58.4221	61.1437	63.3450	(42a)
Hot water usage for baths													
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)
Hot water usage for other uses													
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)
Average daily hot water use (litres/day)												119.2545	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	129.7334	126.9634	123.5900	118.4601	114.2943	109.8157	108.0944	111.4532	114.9956	119.6974	124.9064	129.3969	(44)
Energy conte	205.4660	180.7942	189.9533	162.1659	153.8621	135.0313	130.7308	138.0024	141.8011	162.4282	177.9521	202.6043	(45)
Energy content (annual)										Total = Sum(45)m =		1980.7916	
Distribution loss (46)m = 0.15 x (45)m													
	30.8199	27.1191	28.4930	24.3249	23.0793	20.2547	19.6096	20.7004	21.2702	24.3642	26.6928	30.3906	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	252.0609	222.8799	236.5482	207.2577	200.4570	180.1231	177.3257	184.5973	186.8930	209.0231	223.0439	249.1992	(62)
WWHRS	-29.0701	-25.7098	-26.9218	-22.2923	-20.7757	-17.7779	-16.6639	-17.7204	-18.3937	-21.6841	-24.5655	-28.5317	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
										Total per year (kWh/year) = Sum(64)m =		2259.3020	(64)
12Total per year (kWh/year)												2259	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	105.5934	93.7827	100.4354	89.9936	88.4351	80.9714	80.7439	83.1617	83.2223	91.2833	95.2425	104.6418	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5626	115.7658	104.5626	108.0481	104.5626	108.0481	104.5626	104.5626	108.0481	104.5626	108.0481	104.5626	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	141.9266	139.5575	134.9938	124.9912	118.8643	112.4602	108.5268	111.7765	115.5866	122.6926	132.2813	140.6476	(72)
Total internal gains													
	515.0512	526.0368	504.8481	486.7884	462.6059	442.9932	426.4258	427.5240	440.2414	458.4045	486.0489	504.6238	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308	(74)
South	11.1700	46.7521	0.6300	0.7000	0.7700	159.5974	(78)

Solar gains	177.8282	296.2195	392.1528	471.4001	520.2343	514.5107	496.7521	459.6554	418.9863	323.3947	211.6674	153.1050	(83)
Total gains	692.8794	822.2563	897.0009	958.1886	982.8402	957.5039	923.1780	887.1794	859.2277	781.7992	697.7163	657.7288	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.2828	28.3727	28.4613	28.8852	28.9659	29.3477	29.3477	29.4195	29.1995	28.9659	28.8031	28.6348	
alpha	2.8855	2.8915	2.8974	2.9257	2.9311	2.9565	2.9565	2.9613	2.9466	2.9311	2.9202	2.9090	
util living area													
	0.9223	0.8807	0.8295	0.7430	0.6268	0.4792	0.3567	0.3842	0.5556	0.7615	0.8831	0.9308	(86)
MIT	19.1394	19.5014	19.9018	20.3592	20.6961	20.9012	20.9691	20.9609	20.8399	20.4105	19.7193	19.0826	(87)
Th 2	20.0169	20.0197	20.0225	20.0354	20.0379	20.0492	20.0492	20.0513	20.0448	20.0379	20.0329	20.0278	(88)
util rest of house													
	0.9116	0.8655	0.8079	0.7111	0.5812	0.4181	0.2841	0.3107	0.4947	0.7252	0.8656	0.9212	(89)
MIT 2	17.8726	18.3210	18.8132	19.3685	19.7530	19.9742	20.0323	20.0288	19.9151	19.4428	18.6086	17.8091	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)

MIT	18.4685	18.8763	19.3253	19.8345	20.1967	20.4102	20.4730	20.4673	20.3501	19.8980	19.1311	18.4082	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4685	18.8763	19.3253	19.8345	20.1967	20.4102	20.4730	20.4673	20.3501	19.8980	19.1311	18.4082	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8908	0.8445	0.7905	0.7040	0.5890	0.4419	0.3170	0.3435	0.5149	0.7194	0.8462	0.9012	(94)
Useful gains	617.2257	694.3674	709.0995	674.5327	578.9282	423.1155	292.6273	304.7395	442.4085	562.4155	590.4284	592.7399	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	1138.8473	1119.8350	1024.4157	860.5718	666.8432	450.0732	300.0125	314.2886	486.6068	729.7384	949.5742	1127.9967	(97)
Space heating kWh													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98a)
Space heating requirement - total per year (kWh/year)												1889.2572	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1889.2572	
Space heating per m2											(98c) / (4) =	25.3932	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98)
Space heating efficiency (main heating system 1)													
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)													
	420.4620	309.7662	254.1660	145.1226	70.8654	0.0000	0.0000	0.0000	0.0000	134.8735	280.1571	431.4529	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2898	84.8923	84.3128	83.3480	82.0185	79.8000	79.8000	79.8000	79.8000	83.1650	84.6540	85.3672	(217)
Fuel for water heating, kWh/month													
	261.4506	232.2593	248.6294	221.9193	219.0743	203.4401	201.3305	209.1188	211.1520	225.2619	234.4583	258.4921	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.7260	17.4294	15.6933	11.4976	8.8811	7.2559	8.1016	10.5308	13.6784	17.9468	20.2709	22.3299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.4607	-24.6716	-37.6751	-45.0891	-51.0410	-48.5313	-47.9380	-44.0442	-37.6205	-29.3823	-18.6085	-14.0654	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.3266	-11.5023	-23.4280	-36.0371	-48.4965	-49.0418	-48.4678	-40.6495	-29.2887	-16.7260	-7.1987	-4.1905	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2046.8658	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2726.5866	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	175.3417	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-735.4813	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4299.3128	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2046.8658	0.2100	429.8418	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2726.5866	0.2100	572.5832	(264)
Space and water heating			1002.4250	(265)

Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	175.3417	0.1443	25.3072	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	0.1333	-55.3461	
PV Unit electricity exported	-320.3536	0.1252	-40.1090	
Total			-95.4551	(269)
Total CO2, kg/year			944.2064	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2046.8658	1.1300	2312.9584	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2726.5866	1.1300	3081.0429	(278)
Space and water heating			5394.0012	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	175.3417	1.5338	268.9449	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	1.4927	-619.6474	
PV Unit electricity exported	-320.3536	0.4595	-147.2169	
Total			-766.8643	(283)
Total Primary energy kWh/year			5026.1826	(286)
Target Primary Energy Rate (TPER)			67.5600	(287)

Summary for Input Data

Property Reference	Flat 02	**Issued on Date**	27/07/2025
Assessment Reference	Flat 02	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	9.60 m	54.00 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	31.20	14.69	0.00	None	16.51	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory None

15.0 Draught Proofing 100 %

16.0 Draught Lobby No

17.0 Thermal Bridging User Input

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		19.20	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes

Y-value 0.04 W/m²K

Description RCDa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present No

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys 0

Number of open flues 0

Number of chimneys/flues attached to closed fire 0

Number of flues attached to solid fuel boiler 0

Number of flues attached to other heater 0

Number of blocked chimneys 0

Number of intermittent extract fans 2

Number of passive vents 0

Number of flueless gas fires 0

21.0 Fixed Cooling System No

22.0 Pressure Testing Yes

Designed AP_{50} 5.01 m³/(h.m²) @ 50 Pa

Property Tested? Yes

Test Method Blower Door

22.0 Lighting

No Fixed Lighting No

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1 SAP table

Percentage of Heat 100.00 %

Database Ref. No. 0

Fuel Type Electricity

SAP Code 214

Controls SAP Code 2207

Delayed Start Stat No

HETAS approved System No

Is MHS Pumped Pump in heated space

Heating Pump Age 2013 or later

Heat Emitter Underfloor

Underfloor Heating Yes - Pipes in thin screed

Flow Temperature Enter value

Summary for Input Data

Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 02	**Issued on Date**	27/07/2025
Assessment Reference	Flat 02	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.2480	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	22.5328	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272	(39)
Average = Sum(39)m / 12 =												54.8523	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246	(40)
HLP (average)												1.0158	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												108.5529	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)										Total = Sum(45)m =		1803.0542	
Distribution loss (46)m = 0.15 x (45)m													
	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains													
	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226	
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882	
util living area													
	0.9157	0.8676	0.8078	0.7086	0.5819	0.4354	0.3217	0.3511	0.5223	0.7394	0.8731	0.9256	(86)
MIT	19.6079	19.8877	20.1839	20.5069	20.7265	20.8470	20.8833	20.8785	20.8055	20.5190	20.0249	19.5618	(87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629	(88)
util rest of house													
	0.9046	0.8516	0.7852	0.6762	0.5378	0.3796	0.2575	0.2850	0.4647	0.7027	0.8549	0.9156	(89)
MIT 2	18.4347	18.7805	19.1427	19.5344	19.7820	19.9144	19.9451	19.9440	19.8739	19.5602	18.9666	18.3855	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8929	0.8410	0.7790	0.6796	0.5535	0.4065	0.2907	0.3189	0.4903	0.7073	0.8458	0.9042	(94)
Useful gains	459.0633	519.0977	530.9664	502.4090	425.6017	305.4686	209.7185	218.4902	320.3372	414.5702	437.8312	439.7165	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	834.2454	815.0506	741.2650	617.9035	475.5866	319.6116	213.4678	223.5367	346.1147	524.1335	690.4843	827.0258	(97)
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98a)
Space heating requirement - total per year (kWh/year)												1306.4062	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1306.4062	
Space heating per m2											(98c) / (4) =	24.1927	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	111.6989	79.5839	62.6099	33.2757	14.8814	0.0000	0.0000	0.0000	0.0000	32.6191	72.7932	115.3094	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												522.7716	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1029.7283	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1673.1706	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	522.7716	0.1558	81.4658	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			227.2529	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)
Total CO2, kg/year			244.6694	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.5300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	522.7716	1.5769	824.3589	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2393.1894	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2578.2782	(286)
Dwelling Primary energy Rate (DPER)			47.7500	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440
E18 Party wall between dwellings	13.0000	0.0600	0.7800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5655 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	21.9455 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												102.2682	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	
Distribution loss (46)m = 0.15 x (45)m													
	26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
WWHRS	-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
											Total per year (kWh/year) = Sum(64)m =	2015.6255	(64)
12Total per year (kWh/year)												2016	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area													
	0.9089	0.8674	0.8150	0.7239	0.6027	0.4541	0.3356	0.3632	0.5334	0.7408	0.8661	0.9177	(86)
MIT	19.3557	19.6759	20.0380	20.4553	20.7534	20.9246	20.9775	20.9709	20.8718	20.5009	19.8868	19.3066	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house													
	0.8972	0.8514	0.7930	0.6923	0.5587	0.3972	0.2696	0.2958	0.4757	0.7045	0.8473	0.9069	(89)
MIT 2	18.1697	18.5648	19.0083	19.5129	19.8506	20.0351	20.0801	20.0776	19.9842	19.5787	18.8417	18.1161	(90)
Living area fraction											fLA = Living area / (4) =	0.6481	(91)
MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8805	0.8362	0.7829	0.6939	0.5762	0.4302	0.3113	0.3380	0.5062	0.7084	0.8344	0.8905	(94)
Useful gains	467.3108	513.8383	518.5707	489.6358	418.0620	304.8196	212.4333	220.9121	319.0381	410.6113	441.5938	451.5061	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	811.0892	794.5329	725.4808	608.9595	472.6564	321.0480	216.9151	226.7690	346.7108	518.1416	675.7290	803.8498	(97)
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98a)
Space heating requirement - total per year (kWh/year)												1235.5940	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1235.5940	
Space heating per m2											(98c) / (4) =	22.8814	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	277.1085	204.3628	166.7834	93.0803	44.0067	0.0000	0.0000	0.0000	0.0000	86.6766	182.6407	284.0127	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6365	84.2273	83.6340	82.6684	81.4657	79.8000	79.8000	79.8000	79.8000	82.5052	83.9553	84.7141	(217)
Fuel for water heating, kWh/month	233.7804	207.8654	222.8809	199.6432	197.2914	182.5113	180.9699	187.6483	189.1231	202.7633	210.3846	231.2142	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1338.6718	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2446.0762	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3470.3688	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1338.6718	0.2100	281.1211	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2446.0762	0.2100	513.6760	(264)
Space and water heating			794.7971	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			756.6824	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.0100	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1338.6718	1.1300	1512.6991	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2446.0762	1.1300	2764.0661	(278)
Space and water heating			4276.7651	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4048.5927	(286)
Target Primary Energy Rate (TPER)			74.9700	(287)

Full SAP Calculation Printout

Property Reference	Flat 02	**Issued on Date**	27/07/2025
Assessment Reference	Flat 02	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000	(23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.2480	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	22.5328	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff													

	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272 (39)
Average = Sum(39)m / 12 =												54.8523
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246 (40)
HLP (average)												1.0158
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948 (42b)
Hot water usage for other uses												
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458 (42c)
Average daily hot water use (litres/day)												51.9898 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406 (44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855 (45)
Energy content (annual)										Total = Sum(45)m =		863.4398
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827 (64)
									Total per year (kWh/year) = Sum(64)m =			733.9239 (64)
12Total per year (kWh/year)												734 (64)
Electric shower(s)												
	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725 (64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							496.7719 (64a)
Heat gains from water heating, kWh/month												
	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201 (71)
Water heating gains (Table 5)												
	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051 (72)
Total internal gains												
	327.5507	336.6878	322.4815	313.4359	297.7842	288.0471	277.4722	277.0221	285.1259	293.4234	309.9724	320.2696 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519 (83)
Total gains	467.9005	572.1401	639.0506	702.8764	736.1791	725.5027	698.2043	660.0521	626.3045	551.7539	477.3233	440.9215 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882
util living area												
	0.9315	0.8860	0.8281	0.7284	0.6002	0.4487	0.3317	0.3633	0.5399	0.7620	0.8922	0.9403 (86)
MIT	19.1526	19.5487	19.9701	20.4348	20.7508	20.9250	20.9775	20.9700	20.8642	20.4465	19.7393	19.0876 (87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629 (88)
util rest of house												
	0.9220	0.8715	0.8069	0.6967	0.5559	0.3918	0.2657	0.2953	0.4814	0.7266	0.8760	0.9320 (89)
MIT 2	18.3850	18.7685	19.1721	19.6119	19.8909	20.0390	20.0737	20.0718	19.9932	19.6353	18.9692	18.3294 (90)
Living area fraction										fLA = Living area / (4) =		0.6481 (91)
MIT	18.8825	19.2742	19.6893	20.1453	20.4482	20.6132	20.6595	20.6539	20.5577	20.1611	19.4683	18.8208 (92)

Temperature adjustment												0.0000	
adjusted MIT	18.8825	19.2742	19.6893	20.1453	20.4482	20.6132	20.6595	20.6539	20.5577	20.1611	19.4683	18.8208	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9080	0.8578	0.7978	0.6994	0.5744	0.4252	0.3075	0.3380	0.5125	0.7303	0.8640	0.9186	(94)
Useful gains	424.8306	490.7984	509.8455	491.6136	422.8636	308.4638	214.7062	223.0802	320.9890	402.9191	412.3969	405.0117	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	816.7391	802.5500	734.1268	616.8360	478.5426	324.7052	219.2062	229.1522	350.4576	523.0080	680.3507	808.9287	(97)
Space heating kWh	291.5799	209.4970	166.8653	90.1601	41.4252	0.0000	0.0000	0.0000	0.0000	89.3462	192.9267	300.5143	(98a)
Space heating requirement - total per year (kWh/year)												1382.3147	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	291.5799	209.4970	166.8653	90.1601	41.4252	0.0000	0.0000	0.0000	0.0000	89.3462	192.9267	300.5143	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1382.3147	
Space heating per m2											(98c) / (4) =	25.5984	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	507.5851	399.5883	409.3979	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8961	0.9332	0.9202	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	454.8463	372.8983	376.7344	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	819.3656	789.0286	745.9590	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	262.4539	309.6009	274.7031	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	65.6135	77.4002	68.6758	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												211.6895	(107)
Energy for space heating												25.5984	(99)
Energy for space cooling												3.9202	(108)
Total												29.5186	(109)
Fabric Energy Efficiency (DFEE)												29.5	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area		Storey height		Volume	
Main dwelling	(m2)		(m)		(m3)	
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3640	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)

Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5655	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		21.9455	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												51.9898	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406	(44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855	(45)
Energy content (annual)										Total = Sum(45)m =		863.4398	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(64)
									Total per year (kWh/year) = Sum(64)m =			733.9239	(64)
12Total per year (kWh/year)												734	(64)
Electric shower(s)	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725	(64a)
									Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			496.7719	(64a)
Heat gains from water heating, kWh/month	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051	(72)
Total internal gains	327.6311	336.7768	322.5619	313.5190	297.8646	288.1301	277.5526	277.1024	285.2089	293.5037	310.0554	320.3500	(73)

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6. Solar gains

Full SAP Calculation Printout

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	439.2133	523.9695	574.2486	623.1479	646.4210	635.9423	612.0672	581.6368	556.4634	498.8863	443.1046	416.2716	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area	0.9401	0.9040	0.8572	0.7709	0.6515	0.4970	0.3710	0.4036	0.5859	0.7953	0.9068	0.9474	(86)
MIT	19.0977	19.4554	19.8610	20.3415	20.6930	20.9033	20.9703	20.9611	20.8337	20.3789	19.6757	19.0423	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house	0.9317	0.8912	0.8384	0.7415	0.6076	0.4369	0.2991	0.3302	0.5263	0.7624	0.8923	0.9400	(89)
MIT 2	18.3387	18.6870	19.0789	19.5390	19.8544	20.0344	20.0796	20.0766	19.9812	19.5852	18.9163	18.2922	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.8307	19.1850	19.5858	20.0591	20.3979	20.5976	20.6569	20.6499	20.5337	20.0996	19.4085	18.7784	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8307	19.1850	19.5858	20.0591	20.3979	20.5976	20.6569	20.6499	20.5337	20.0996	19.4085	18.7784	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9183	0.8773	0.8276	0.7408	0.6233	0.4710	0.3443	0.3758	0.5563	0.7631	0.8801	0.9272	(94)
Useful gains	403.3078	459.7009	475.2326	461.6106	402.9182	299.5167	210.7343	218.5686	309.5612	380.7225	389.9750	385.9464	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	805.1210	789.0117	720.5311	605.4546	470.6077	320.2955	216.6559	226.4105	345.3268	513.9853	669.7123	797.8668	(97)
Space heating kWh	298.9490	221.2969	182.5021	103.5677	50.3610	0.0000	0.0000	0.0000	0.0000	99.1475	201.4109	306.4688	(98a)
Space heating requirement - total per year (kWh/year)												1463.7038	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	298.9490	221.2969	182.5021	103.5677	50.3610	0.0000	0.0000	0.0000	0.0000	99.1475	201.4109	306.4688	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1463.7038	
Space heating per m2											(98c) / (4) =	27.1056	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	502.0002	395.1916	404.8852	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8674	0.9129	0.8979	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	435.4315	360.7536	363.5487	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	714.5946	688.2625	654.2208	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	200.9975	243.6666	216.2600	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	50.2494	60.9167	54.0650	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												165.2310	(107)
Energy for space heating												27.1056	(99)
Energy for space cooling												3.0598	(108)
Total												30.1655	(109)
Fabric Energy Efficiency (TFEE)												30.2	(109)

Full SAP Calculation Printout

Property Reference	Flat 02	**Issued on Date**	27/07/2025
Assessment Reference	Flat 02	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.2480	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	22.5328	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272	(39)
Average = Sum(39)m / 12 =												54.8523	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246	(40)
HLP (average)												1.0158	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												108.5529	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)										Total = Sum(45)m =		1803.0542	
Distribution loss (46)m = 0.15 x (45)m													
	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains													
	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226	
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882	
util living area													
	0.9157	0.8676	0.8078	0.7086	0.5819	0.4354	0.3217	0.3511	0.5223	0.7394	0.8731	0.9256	(86)
MIT	19.6079	19.8877	20.1839	20.5069	20.7265	20.8470	20.8833	20.8785	20.8055	20.5190	20.0249	19.5618	(87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629	(88)
util rest of house													
	0.9046	0.8516	0.7852	0.6762	0.5378	0.3796	0.2575	0.2850	0.4647	0.7027	0.8549	0.9156	(89)
MIT 2	18.4347	18.7805	19.1427	19.5344	19.7820	19.9144	19.9451	19.9440	19.8739	19.5602	18.9666	18.3855	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8929	0.8410	0.7790	0.6796	0.5535	0.4065	0.2907	0.3189	0.4903	0.7073	0.8458	0.9042	(94)
Useful gains	459.0633	519.0977	530.9664	502.4090	425.6017	305.4686	209.7185	218.4902	320.3372	414.5702	437.8312	439.7165	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	834.2454	815.0506	741.2650	617.9035	475.5866	319.6116	213.4678	223.5367	346.1147	524.1335	690.4843	827.0258	(97)
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98a)
Space heating requirement - total per year (kWh/year)												1306.4062	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1306.4062	
Space heating per m2											(98c) / (4) =	24.1927	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	111.6989	79.5839	62.6099	33.2757	14.8814	0.0000	0.0000	0.0000	0.0000	32.6191	72.7932	115.3094	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												522.7716	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1029.7283	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1673.1706	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	522.7716	0.1558	81.4658	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			227.2529	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)
Total CO2, kg/year			244.6694	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.5300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	522.7716	1.5769	824.3589	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2393.1894	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2578.2782	(286)
Dwelling Primary energy Rate (DPER)			47.7500	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440
E18 Party wall between dwellings	13.0000	0.0600	0.7800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5655 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	21.9455 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												102.2682	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	
Distribution loss (46)m = 0.15 x (45)m													
	26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
WWHRS	-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
											Total per year (kWh/year) = Sum(64)m =	2015.6255	(64)
12Total per year (kWh/year)												2016	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area													
	0.9089	0.8674	0.8150	0.7239	0.6027	0.4541	0.3356	0.3632	0.5334	0.7408	0.8661	0.9177	(86)
MIT	19.3557	19.6759	20.0380	20.4553	20.7534	20.9246	20.9775	20.9709	20.8718	20.5009	19.8868	19.3066	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house													
	0.8972	0.8514	0.7930	0.6923	0.5587	0.3972	0.2696	0.2958	0.4757	0.7045	0.8473	0.9069	(89)
MIT 2	18.1697	18.5648	19.0083	19.5129	19.8506	20.0351	20.0801	20.0776	19.9842	19.5787	18.8417	18.1161	(90)
Living area fraction											fLA = Living area / (4) =	0.6481	(91)
MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8805	0.8362	0.7829	0.6939	0.5762	0.4302	0.3113	0.3380	0.5062	0.7084	0.8344	0.8905	(94)
Useful gains	467.3108	513.8383	518.5707	489.6358	418.0620	304.8196	212.4333	220.9121	319.0381	410.6113	441.5938	451.5061	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	811.0892	794.5329	725.4808	608.9595	472.6564	321.0480	216.9151	226.7690	346.7108	518.1416	675.7290	803.8498	(97)
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98a)
Space heating requirement - total per year (kWh/year)												1235.5940	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1235.5940	
Space heating per m2											(98c) / (4) =	22.8814	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	277.1085	204.3628	166.7834	93.0803	44.0067	0.0000	0.0000	0.0000	0.0000	86.6766	182.6407	284.0127	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6365	84.2273	83.6340	82.6684	81.4657	79.8000	79.8000	79.8000	79.8000	82.5052	83.9553	84.7141	(217)
Fuel for water heating, kWh/month	233.7804	207.8654	222.8809	199.6432	197.2914	182.5113	180.9699	187.6483	189.1231	202.7633	210.3846	231.2142	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1338.6718	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2446.0762	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3470.3688	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1338.6718	0.2100	281.1211	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2446.0762	0.2100	513.6760	(264)
Space and water heating			794.7971	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			756.6824	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.0100	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1338.6718	1.1300	1512.6991	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2446.0762	1.1300	2764.0661	(278)
Space and water heating			4276.7651	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4048.5927	(286)
Target Primary Energy Rate (TPER)			74.9700	(287)

Summary for Input Data

elmhurst energy

Property Reference	Flat 03	**Issued on Date**	27/07/2025
Assessment Reference	Flat 03	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	13.00 m	72.60 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	42.25	25.74	0.00	None	16.51	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		26.40	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	

Summary for Input Data

Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 03	**Issued on Date**	27/07/2025
Assessment Reference	Flat 03	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3353	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.6900	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	69.0352	68.8357	68.6400	67.7212	67.5493	66.7490	66.7490	66.6008	67.0572	67.5493	67.8970	68.2606	(39)
Average = Sum(39)m / 12 =												67.7203	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9509	0.9481	0.9455	0.9328	0.9304	0.9194	0.9194	0.9174	0.9237	0.9304	0.9352	0.9402	(40)
HLP (average)												0.9328	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												125.2310	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)										Total = Sum(45)m =		2080.0760	
Distribution loss (46)m = 0.15 x (45)m													
	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains													
	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.1334	32.2265	32.3184	32.7569	32.8402	33.2340	33.2340	33.3079	33.0812	32.8402	32.6720	32.4980	
alpha	3.1422	3.1484	3.1546	3.1838	3.1893	3.2156	3.2156	3.2205	3.2054	3.1893	3.1781	3.1665	
util living area													
	0.9330	0.8951	0.8465	0.7588	0.6373	0.4841	0.3598	0.3906	0.5711	0.7818	0.8977	0.9409	(86)
MIT	19.6492	19.8959	20.1704	20.4883	20.7168	20.8480	20.8879	20.8828	20.8051	20.5125	20.0407	19.6082	(87)
Th 2	20.1245	20.1268	20.1290	20.1397	20.1417	20.1510	20.1510	20.1528	20.1474	20.1417	20.1377	20.1334	(88)
util rest of house													
	0.9241	0.8820	0.8276	0.7300	0.5953	0.4281	0.2939	0.3233	0.5149	0.7493	0.8827	0.9330	(89)
MIT 2	18.5412	18.8488	19.1881	19.5776	19.8398	19.9843	20.0189	20.0172	19.9418	19.6161	19.0426	18.4969	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9113	0.8687	0.8163	0.7255	0.6015	0.4450	0.3165	0.3461	0.5293	0.7455	0.8704	0.9208	(94)
Useful gains	550.2652	616.4653	628.2124	597.8827	510.5913	368.5542	251.5818	262.4873	386.0640	495.6678	523.7515	528.3531	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1020.0196	994.9233	903.4165	752.8322	578.3985	387.1913	256.1725	268.7010	419.6435	638.2219	843.5362	1012.4871	(97)
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98a)
Space heating requirement - total per year (kWh/year)												1667.0860	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1667.0860	
Space heating per m2											(98c) / (4) =	22.9626	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	139.8549	101.7702	81.9335	44.6433	20.1875	0.0000	0.0000	0.0000	0.0000	42.4411	92.1348	144.1360	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	667.1012	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1187.9361	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	156.5610	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2011.5983	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	667.1012	0.1557	103.8427	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			272.0285	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)
Total CO2, kg/year			294.6251	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.0600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	667.1012	1.5763	1051.5337	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			2861.4000	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3101.5384	(286)
Dwelling Primary energy Rate (DPER)			42.7200	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0695	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	27.3433	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												117.9810	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m													
	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
											Total per year (kWh/year) = Sum(64)m =	2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains													
	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area													
	0.9246	0.8868	0.8383	0.7509	0.6309	0.4784	0.3552	0.3845	0.5614	0.7690	0.8866	0.9324	(86)
MIT	19.2854	19.6099	19.9808	20.4177	20.7335	20.9185	20.9757	20.9685	20.8606	20.4639	19.8280	19.2392	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house													
	0.9146	0.8726	0.8182	0.7208	0.5876	0.4208	0.2874	0.3155	0.5036	0.7348	0.8700	0.9233	(89)
MIT 2	18.0967	18.4997	18.9570	19.4894	19.8505	20.0517	20.1009	20.0981	19.9952	19.5565	18.7870	18.0468	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)
MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8956	0.8536	0.8025	0.7149	0.5963	0.4444	0.3191	0.3473	0.5239	0.7303	0.8527	0.9051	(94)
Useful gains	580.6778	643.8526	653.6213	621.7010	533.5169	388.6599	268.4721	279.5078	406.3246	518.9287	551.5433	559.7131	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1045.8161	1025.1535	936.0533	784.9025	608.0402	410.2009	274.1385	286.9982	443.6097	666.0191	869.5364	1035.4553	(97)
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98a)
Space heating requirement - total per year (kWh/year)												1677.7194	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1677.7194	
Space heating per m2											(98c) / (4) =	23.1091	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	374.9328	277.6102	227.6592	127.3078	60.0707	0.0000	0.0000	0.0000	0.0000	118.5647	248.0553	383.4802	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.0601	84.6673	84.0839	83.0877	81.7661	79.8000	79.8000	79.8000	79.8000	82.9146	84.3996	85.1320	(217)
Fuel for water heating, kWh/month	259.9419	230.9203	247.2356	220.8170	218.0124	201.8711	199.8040	207.5092	209.5004	224.1294	233.2243	257.0224	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1817.6808	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2709.9880	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-717.6874	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4068.9321	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1817.6808	0.2100	381.7130	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2709.9880	0.2100	569.0975	(264)
Space and water heating			950.8105	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			894.5537	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1817.6808	1.1300	2053.9793	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2709.9880	1.1300	3062.2864	(278)
Space and water heating			5116.2658	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			4762.5318	(286)
Target Primary Energy Rate (TPER)			65.6000	(287)

Full SAP Calculation Printout

Property Reference	Flat 03	**Issued on Date**	27/07/2025
Assessment Reference	Flat 03	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000 (1b)	x	3.2500 (2b)	=	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	235.9500	(5)

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2. Ventilation rate

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			m3 per hour
Number of open chimneys		0 * 80 =	0.0000 (6a)
Number of open flues		0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000 (6d)
Number of flues attached to other heater		0 * 35 =	0.0000 (6e)
Number of blocked chimneys		0 * 20 =	0.0000 (6f)
Number of intermittent extract fans		3 * 10 =	30.0000 (7a)
Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000	/ (5) =	0.1271 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0100 (17)
Infiltration rate			0.3776 (18)
Number of sides sheltered			2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)]	=	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20)	=	0.3210 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4093	0.4012	0.3932	0.3531	0.3451	0.3049	0.3049	0.2969	0.3210	0.3451	0.3611	0.3772	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5838	0.5805	0.5773	0.5623	0.5595	0.5465	0.5465	0.5441	0.5515	0.5595	0.5652	0.5711	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K			110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)			1.6900 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a)	=	24.9638 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4530	45.1998	44.9516	43.7857	43.5676	42.5522	42.5522	42.3641	42.9433	43.5676	44.0088	44.4702	(38)
Heat transfer coeff													

	70.4168	70.1636	69.9154	68.7495	68.5314	67.5160	67.5160	67.3279	67.9071	68.5314	68.9727	69.4340	(39)
Average = Sum(39)m / 12 =												68.7485	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9699	0.9664	0.9630	0.9470	0.9440	0.9300	0.9300	0.9274	0.9354	0.9440	0.9500	0.9564	(40)
HLP (average)												0.9469	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												59.9802	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	65.4382	63.6432	61.6835	59.2442	57.0682	54.8067	54.3368	56.2925	58.2983	60.6207	63.0816	65.3463	(44)
Energy conte	103.6381	90.6271	94.8053	81.1024	76.8248	67.3913	65.7156	69.7019	71.8877	82.2617	89.8713	102.3165	(45)
Energy content (annual)											Total = Sum(45)m =	996.1436	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(64)
											Total per year (kWh/year) = Sum(64)m =	846.7221	(64)
12Total per year (kWh/year)												847	(64)
Electric shower(s)	50.3803	44.8892	49.0173	46.7766	47.6544	45.4576	46.9729	47.6544	46.7766	49.0173	48.0956	50.3803	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	573.0725	(64a)
Heat gains from water heating, kWh/month	34.6182	30.4806	32.4005	28.9284	28.2389	25.6851	25.7078	26.7252	26.9703	29.7349	31.1216	34.3373	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	46.5298	45.3580	43.5490	40.1784	37.9554	35.6737	34.5535	35.9210	37.4587	39.9663	43.2244	46.1523	(72)
Total internal gains	410.5675	422.5556	404.3804	393.1308	373.1846	360.9144	347.3867	346.6448	356.9362	367.3227	388.3041	401.2205	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	550.9173	658.0078	720.9495	782.5713	811.5795	798.3701	768.1188	729.6748	698.1149	625.6533	555.6551	521.8723	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	31.5029	31.6166	31.7288	32.2669	32.3696	32.8564	32.8564	32.9482	32.6672	32.3696	32.1625	31.9488	
alpha	3.1002	3.1078	3.1153	3.1511	3.1580	3.1904	3.1904	3.1965	3.1778	3.1580	3.1442	3.1299	
util living area	0.9470	0.9127	0.8675	0.7818	0.6613	0.5033	0.3751	0.4082	0.5945	0.8065	0.9155	0.9538	(86)
MIT	19.1582	19.5087	19.9042	20.3754	20.7142	20.9136	20.9744	20.9662	20.8475	20.4087	19.7244	19.1085	(87)
Th 2	20.1085	20.1114	20.1143	20.1278	20.1303	20.1421	20.1421	20.1443	20.1375	20.1303	20.1252	20.1198	(88)
util rest of house	0.9396	0.9011	0.8502	0.7539	0.6192	0.4455	0.3061	0.3378	0.5372	0.7756	0.9025	0.9472	(89)
MIT 2	18.4319	18.7745	19.1578	19.6114	19.9166	20.0893	20.1307	20.1283	20.0379	19.6533	19.0000	18.3915	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)
MIT	18.7820	19.1285	19.5177	19.9798	20.3011	20.4867	20.5374	20.5322	20.4282	20.0175	19.3492	18.7372	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.7820	19.1285	19.5177	19.9798	20.3011	20.4867	20.5374	20.5322	20.4282	20.0175	19.3492	18.7372	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9259	0.8861	0.8369	0.7488	0.6278	0.4693	0.3383	0.3703	0.5572	0.7712	0.8887	0.9344	(94)
Useful gains	510.1019	583.0819	603.3669	585.9566	509.5408	374.6590	259.8813	270.1803	389.0217	482.4785	493.8256	487.6534	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1019.7780	998.3191	910.1339	761.7280	589.4456	397.4455	265.8390	278.2153	429.7317	645.3928	844.8607	1009.3733	(97)
Space heating kWh	379.1990	279.0394	228.2346	126.5554	59.4492	0.0000	0.0000	0.0000	0.0000	121.2082	252.7453	388.1596	(98a)
Space heating requirement - total per year (kWh/year)												1834.5906	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	379.1990	279.0394	228.2346	126.5554	59.4492	0.0000	0.0000	0.0000	0.0000	121.2082	252.7453	388.1596	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1834.5906	
Space heating per m2											(98c) / (4) =	25.2698	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	634.6501	499.6182	511.6923	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8723	0.9175	0.9027	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	553.6191	458.4027	461.9062	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	244.8516	299.0583	264.5158	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	61.2129	74.7646	66.1290	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												202.1064	(107)
Energy for space heating												25.2698	(99)
Energy for space cooling												2.7838	(108)
Total												28.0537	(109)
Fabric Energy Efficiency (DFEE)												28.1	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		235.9500	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)

Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.0695 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 27.3433 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 59.9802 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	65.4382	63.6432	61.6835	59.2442	57.0682	54.8067	54.3368	56.2925	58.2983	60.6207	63.0816	65.3463	(44)
Energy conte	103.6381	90.6271	94.8053	81.1024	76.8248	67.3913	65.7156	69.7019	71.8877	82.2617	89.8713	102.3165	(45)
Energy content (annual)										Total = Sum(45)m =		996.1436	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(64)
										Total per year (kWh/year) = Sum(64)m =		846.7221	(64)
12Total per year (kWh/year)												847	(64)
Electric shower(s)	50.3803	44.8892	49.0173	46.7766	47.6544	45.4576	46.9729	47.6544	46.7766	49.0173	48.0956	50.3803	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		573.0725	(64a)
Heat gains from water heating, kWh/month	34.6182	30.4806	32.4005	28.9284	28.2389	25.6851	25.7078	26.7252	26.9703	29.7349	31.1216	34.3373	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	46.5298	45.3580	43.5490	40.1784	37.9554	35.6737	34.5535	35.9210	37.4587	39.9663	43.2244	46.1523	(72)
Total internal gains	410.5675	422.5556	404.3804	393.1308	373.1846	360.9144	347.3867	346.6448	356.9362	367.3227	388.3041	401.2205	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	550.9173	658.0078	720.9495	782.5713	811.5795	798.3701	768.1188	729.6748	698.1149	625.6533	555.6551	521.8723	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area	0.9482	0.9153	0.8720	0.7894	0.6721	0.5156	0.3862	0.4198	0.6064	0.8134	0.9181	0.9548	(86)
MIT	19.0709	19.4242	19.8297	20.3190	20.6801	20.8995	20.9693	20.9597	20.8265	20.3583	19.6506	19.0201	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house	0.9409	0.9038	0.8547	0.7615	0.6292	0.4556	0.3135	0.3459	0.5475	0.7825	0.9051	0.9483	(89)
MIT 2	18.3270	18.6725	19.0661	19.5376	19.8639	20.0534	20.1010	20.0979	19.9970	19.5856	18.9086	18.2854	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.6856	19.0349	19.4343	19.9143	20.2574	20.4613	20.5196	20.5134	20.3969	19.9581	19.2663	18.6396	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6856	19.0349	19.4343	19.9143	20.2574	20.4613	20.5196	20.5134	20.3969	19.9581	19.2663	18.6396	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9269	0.8883	0.8406	0.7552	0.6370	0.4797	0.3472	0.3797	0.5673	0.7770	0.8909	0.9352	(94)
Useful gains	510.6349	584.4992	606.0291	591.0160	516.9682	382.9833	266.7290	277.0679	396.0149	486.1025	495.0176	488.0602	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1046.9694	1025.1523	934.8748	783.2954	606.7094	409.6214	273.9228	286.6938	442.5206	663.4770	867.9291	1036.7474	(97)
Space heating kWh	399.0328	296.1189	244.6612	138.4411	66.7675	0.0000	0.0000	0.0000	0.0000	131.9666	268.4963	408.2233	(98a)
Space heating requirement - total per year (kWh/year)												1953.7077	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	399.0328	296.1189	244.6612	138.4411	66.7675	0.0000	0.0000	0.0000	0.0000	131.9666	268.4963	408.2233	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1953.7077	
Space heating per m2											(98c) / (4) =	26.9106	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	656.9274	517.1556	529.7074	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8587	0.9069	0.8909	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	564.0721	468.9980	471.9192	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	237.3255	291.1754	257.0661	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	59.3314	72.7939	64.2665	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												196.3917	(107)
Energy for space heating												26.9106	(99)
Energy for space cooling												2.7051	(108)
Total												29.6157	(109)
Fabric Energy Efficiency (TFEE)												29.6	(109)

Full SAP Calculation Printout

Property Reference	Flat 03	**Issued on Date**	27/07/2025
Assessment Reference	Flat 03	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3353	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.6900	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	69.0352	68.8357	68.6400	67.7212	67.5493	66.7490	66.7490	66.6008	67.0572	67.5493	67.8970	68.2606	(39)
Average = Sum(39)m / 12 =												67.7203	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9509	0.9481	0.9455	0.9328	0.9304	0.9194	0.9194	0.9174	0.9237	0.9304	0.9352	0.9402	(40)
HLP (average)												0.9328	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												125.2310	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)										Total = Sum(45)m =		2080.0760	
Distribution loss (46)m = 0.15 x (45)m													
	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains													
	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.1334	32.2265	32.3184	32.7569	32.8402	33.2340	33.2340	33.3079	33.0812	32.8402	32.6720	32.4980	
alpha	3.1422	3.1484	3.1546	3.1838	3.1893	3.2156	3.2156	3.2205	3.2054	3.1893	3.1781	3.1665	
util living area													
	0.9330	0.8951	0.8465	0.7588	0.6373	0.4841	0.3598	0.3906	0.5711	0.7818	0.8977	0.9409	(86)
MIT	19.6492	19.8959	20.1704	20.4883	20.7168	20.8480	20.8879	20.8828	20.8051	20.5125	20.0407	19.6082	(87)
Th 2	20.1245	20.1268	20.1290	20.1397	20.1417	20.1510	20.1510	20.1528	20.1474	20.1417	20.1377	20.1334	(88)
util rest of house													
	0.9241	0.8820	0.8276	0.7300	0.5953	0.4281	0.2939	0.3233	0.5149	0.7493	0.8827	0.9330	(89)
MIT 2	18.5412	18.8488	19.1881	19.5776	19.8398	19.9843	20.0189	20.0172	19.9418	19.6161	19.0426	18.4969	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9113	0.8687	0.8163	0.7255	0.6015	0.4450	0.3165	0.3461	0.5293	0.7455	0.8704	0.9208	(94)
Useful gains	550.2652	616.4653	628.2124	597.8827	510.5913	368.5542	251.5818	262.4873	386.0640	495.6678	523.7515	528.3531	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1020.0196	994.9233	903.4165	752.8322	578.3985	387.1913	256.1725	268.7010	419.6435	638.2219	843.5362	1012.4871	(97)
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98a)
Space heating requirement - total per year (kWh/year)												1667.0860	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1667.0860	
Space heating per m2											(98c) / (4) =	22.9626	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	139.8549	101.7702	81.9335	44.6433	20.1875	0.0000	0.0000	0.0000	0.0000	42.4411	92.1348	144.1360	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	667.1012	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1187.9361	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	156.5610	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2011.5983	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	667.1012	0.1557	103.8427	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			272.0285	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)
Total CO2, kg/year			294.6251	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.0600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	667.1012	1.5763	1051.5337	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			2861.4000	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3101.5384	(286)
Dwelling Primary energy Rate (DPER)			42.7200	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0695	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	27.3433	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												117.9810	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m													
	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
											Total per year (kWh/year) = Sum(64)m =	2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains													
	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area													
	0.9246	0.8868	0.8383	0.7509	0.6309	0.4784	0.3552	0.3845	0.5614	0.7690	0.8866	0.9324	(86)
MIT	19.2854	19.6099	19.9808	20.4177	20.7335	20.9185	20.9757	20.9685	20.8606	20.4639	19.8280	19.2392	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house													
	0.9146	0.8726	0.8182	0.7208	0.5876	0.4208	0.2874	0.3155	0.5036	0.7348	0.8700	0.9233	(89)
MIT 2	18.0967	18.4997	18.9570	19.4894	19.8505	20.0517	20.1009	20.0981	19.9952	19.5565	18.7870	18.0468	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)
MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8956	0.8536	0.8025	0.7149	0.5963	0.4444	0.3191	0.3473	0.5239	0.7303	0.8527	0.9051	(94)
Useful gains	580.6778	643.8526	653.6213	621.7010	533.5169	388.6599	268.4721	279.5078	406.3246	518.9287	551.5433	559.7131	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1045.8161	1025.1535	936.0533	784.9025	608.0402	410.2009	274.1385	286.9982	443.6097	666.0191	869.5364	1035.4553	(97)
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98a)
Space heating requirement - total per year (kWh/year)												1677.7194	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1677.7194	
Space heating per m2											(98c) / (4) =	23.1091	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	374.9328	277.6102	227.6592	127.3078	60.0707	0.0000	0.0000	0.0000	0.0000	118.5647	248.0553	383.4802	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.0601	84.6673	84.0839	83.0877	81.7661	79.8000	79.8000	79.8000	79.8000	82.9146	84.3996	85.1320	(217)
Fuel for water heating, kWh/month	259.9419	230.9203	247.2356	220.8170	218.0124	201.8711	199.8040	207.5092	209.5004	224.1294	233.2243	257.0224	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1817.6808	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2709.9880	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-717.6874	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4068.9321	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1817.6808	0.2100	381.7130	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2709.9880	0.2100	569.0975	(264)
Space and water heating			950.8105	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			894.5537	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1817.6808	1.1300	2053.9793	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2709.9880	1.1300	3062.2864	(278)
Space and water heating			5116.2658	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			4762.5318	(286)
Target Primary Energy Rate (TPER)			65.6000	(287)

Summary for Input Data

Property Reference	Flat 04	**Issued on Date**	27/07/2025
Assessment Reference	Flat 04	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	9.60 m	54.00 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	31.20	14.69	0.00	None	16.51	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory None

15.0 Draught Proofing 100 %

16.0 Draught Lobby No

17.0 Thermal Bridging User Input

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		19.20	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes

Y-value 0.04 W/m²K

Description RCDa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present No

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys 0

Number of open flues 0

Number of chimneys/flues attached to closed fire 0

Number of flues attached to solid fuel boiler 0

Number of flues attached to other heater 0

Number of blocked chimneys 0

Number of intermittent extract fans 2

Number of passive vents 0

Number of flueless gas fires 0

21.0 Fixed Cooling System No

22.0 Pressure Testing Yes

Designed AP_{50} 5.01 m³/(h.m²) @ 50 Pa

Property Tested? Yes

Test Method Blower Door

22.0 Lighting

No Fixed Lighting No

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1 SAP table

Percentage of Heat 100.00 %

Database Ref. No. 0

Fuel Type Electricity

SAP Code 214

Controls SAP Code 2207

Delayed Start Stat No

HETAS approved System No

Is MHS Pumped Pump in heated space

Heating Pump Age 2013 or later

Heat Emitter Underfloor

Underfloor Heating Yes - Pipes in thin screed

Flow Temperature Enter value

Summary for Input Data

Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 04	**Issued on Date**	27/07/2025
Assessment Reference	Flat 04	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.2480	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	22.5328	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272	(39)
Average = Sum(39)m / 12 =												54.8523	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246	(40)
HLP (average)												1.0158	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												108.5529	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)										Total = Sum(45)m =		1803.0542	
Distribution loss (46)m = 0.15 x (45)m													
	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains													
	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226	
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882	
util living area													
	0.9157	0.8676	0.8078	0.7086	0.5819	0.4354	0.3217	0.3511	0.5223	0.7394	0.8731	0.9256	(86)
MIT	19.6079	19.8877	20.1839	20.5069	20.7265	20.8470	20.8833	20.8785	20.8055	20.5190	20.0249	19.5618	(87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629	(88)
util rest of house													
	0.9046	0.8516	0.7852	0.6762	0.5378	0.3796	0.2575	0.2850	0.4647	0.7027	0.8549	0.9156	(89)
MIT 2	18.4347	18.7805	19.1427	19.5344	19.7820	19.9144	19.9451	19.9440	19.8739	19.5602	18.9666	18.3855	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8929	0.8410	0.7790	0.6796	0.5535	0.4065	0.2907	0.3189	0.4903	0.7073	0.8458	0.9042	(94)
Useful gains	459.0633	519.0977	530.9664	502.4090	425.6017	305.4686	209.7185	218.4902	320.3372	414.5702	437.8312	439.7165	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	834.2454	815.0506	741.2650	617.9035	475.5866	319.6116	213.4678	223.5367	346.1147	524.1335	690.4843	827.0258	(97)
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98a)
Space heating requirement - total per year (kWh/year)												1306.4062	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1306.4062	
Space heating per m2											(98c) / (4) =	24.1927	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	111.6989	79.5839	62.6099	33.2757	14.8814	0.0000	0.0000	0.0000	0.0000	32.6191	72.7932	115.3094	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												522.7716	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1029.7283	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1673.1706	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	522.7716	0.1558	81.4658	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			227.2529	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)
Total CO2, kg/year			244.6694	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.5300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	522.7716	1.5769	824.3589	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2393.1894	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2578.2782	(286)
Dwelling Primary energy Rate (DPER)			47.7500	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440
E18 Party wall between dwellings	13.0000	0.0600	0.7800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5655 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	21.9455 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												102.2682	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	
Distribution loss (46)m = 0.15 x (45)m													
	26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
WWHRS	-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
											Total per year (kWh/year) = Sum(64)m =	2015.6255	(64)
12Total per year (kWh/year)												2016	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area													
	0.9089	0.8674	0.8150	0.7239	0.6027	0.4541	0.3356	0.3632	0.5334	0.7408	0.8661	0.9177	(86)
MIT	19.3557	19.6759	20.0380	20.4553	20.7534	20.9246	20.9775	20.9709	20.8718	20.5009	19.8868	19.3066	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house													
	0.8972	0.8514	0.7930	0.6923	0.5587	0.3972	0.2696	0.2958	0.4757	0.7045	0.8473	0.9069	(89)
MIT 2	18.1697	18.5648	19.0083	19.5129	19.8506	20.0351	20.0801	20.0776	19.9842	19.5787	18.8417	18.1161	(90)
Living area fraction											fLA = Living area / (4) =	0.6481	(91)
MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8805	0.8362	0.7829	0.6939	0.5762	0.4302	0.3113	0.3380	0.5062	0.7084	0.8344	0.8905	(94)
Useful gains	467.3108	513.8383	518.5707	489.6358	418.0620	304.8196	212.4333	220.9121	319.0381	410.6113	441.5938	451.5061	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	811.0892	794.5329	725.4808	608.9595	472.6564	321.0480	216.9151	226.7690	346.7108	518.1416	675.7290	803.8498	(97)
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98a)
Space heating requirement - total per year (kWh/year)												1235.5940	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1235.5940	
Space heating per m2											(98c) / (4) =	22.8814	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	277.1085	204.3628	166.7834	93.0803	44.0067	0.0000	0.0000	0.0000	0.0000	86.6766	182.6407	284.0127	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6365	84.2273	83.6340	82.6684	81.4657	79.8000	79.8000	79.8000	79.8000	82.5052	83.9553	84.7141	(217)
Fuel for water heating, kWh/month	233.7804	207.8654	222.8809	199.6432	197.2914	182.5113	180.9699	187.6483	189.1231	202.7633	210.3846	231.2142	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1338.6718	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2446.0762	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3470.3688	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1338.6718	0.2100	281.1211	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2446.0762	0.2100	513.6760	(264)
Space and water heating			794.7971	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			756.6824	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.0100	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1338.6718	1.1300	1512.6991	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2446.0762	1.1300	2764.0661	(278)
Space and water heating			4276.7651	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4048.5927	(286)
Target Primary Energy Rate (TPER)			74.9700	(287)

Full SAP Calculation Printout

Property Reference	Flat 04	**Issued on Date**	27/07/2025
Assessment Reference	Flat 04	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a) 0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0.0000 (23c)

Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.2480	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	22.5328	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff													

	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272 (39)
Average = Sum(39)m / 12 =												54.8523
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246 (40)
HLP (average)												1.0158
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948 (42b)
Hot water usage for other uses												
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458 (42c)
Average daily hot water use (litres/day)												51.9898 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406 (44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855 (45)
Energy content (annual)										Total = Sum(45)m =		863.4398
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827 (64)
									Total per year (kWh/year) = Sum(64)m =			733.9239 (64)
12Total per year (kWh/year)												734 (64)
Electric shower(s)												
	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725 (64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							496.7719 (64a)
Heat gains from water heating, kWh/month												
	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201 (71)
Water heating gains (Table 5)												
	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051 (72)
Total internal gains												
	327.5507	336.6878	322.4815	313.4359	297.7842	288.0471	277.4722	277.0221	285.1259	293.4234	309.9724	320.2696 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519 (83)
Total gains	467.9005	572.1401	639.0506	702.8764	736.1791	725.5027	698.2043	660.0521	626.3045	551.7539	477.3233	440.9215 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882
util living area												
	0.9315	0.8860	0.8281	0.7284	0.6002	0.4487	0.3317	0.3633	0.5399	0.7620	0.8922	0.9403 (86)
MIT	19.1526	19.5487	19.9701	20.4348	20.7508	20.9250	20.9775	20.9700	20.8642	20.4465	19.7393	19.0876 (87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629 (88)
util rest of house												
	0.9220	0.8715	0.8069	0.6967	0.5559	0.3918	0.2657	0.2953	0.4814	0.7266	0.8760	0.9320 (89)
MIT 2	18.3850	18.7685	19.1721	19.6119	19.8909	20.0390	20.0737	20.0718	19.9932	19.6353	18.9692	18.3294 (90)
Living area fraction										fLA = Living area / (4) =		0.6481 (91)
MIT	18.8825	19.2742	19.6893	20.1453	20.4482	20.6132	20.6595	20.6539	20.5577	20.1611	19.4683	18.8208 (92)

Temperature adjustment												0.0000	
adjusted MIT	18.8825	19.2742	19.6893	20.1453	20.4482	20.6132	20.6595	20.6539	20.5577	20.1611	19.4683	18.8208	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9080	0.8578	0.7978	0.6994	0.5744	0.4252	0.3075	0.3380	0.5125	0.7303	0.8640	0.9186	(94)
Useful gains	424.8306	490.7984	509.8455	491.6136	422.8636	308.4638	214.7062	223.0802	320.9890	402.9191	412.3969	405.0117	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	816.7391	802.5500	734.1268	616.8360	478.5426	324.7052	219.2062	229.1522	350.4576	523.0080	680.3507	808.9287	(97)
Space heating kWh	291.5799	209.4970	166.8653	90.1601	41.4252	0.0000	0.0000	0.0000	0.0000	89.3462	192.9267	300.5143	(98a)
Space heating requirement - total per year (kWh/year)												1382.3147	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	291.5799	209.4970	166.8653	90.1601	41.4252	0.0000	0.0000	0.0000	0.0000	89.3462	192.9267	300.5143	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1382.3147	
Space heating per m2											(98c) / (4) =	25.5984	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	507.5851	399.5883	409.3979	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8961	0.9332	0.9202	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	454.8463	372.8983	376.7344	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	819.3656	789.0286	745.9590	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	262.4539	309.6009	274.7031	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	65.6135	77.4002	68.6758	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												211.6895	(107)
Energy for space heating												25.5984	(99)
Energy for space cooling												3.9202	(108)
Total												29.5186	(109)
Fabric Energy Efficiency (DFEE)												29.5	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area		Storey height		Volume	
Main dwelling	(m2)		(m)		(m3)	
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3640	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)

Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5655	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		21.9455	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												51.9898	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406	(44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855	(45)
Energy content (annual)										Total = Sum(45)m =		863.4398	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(64)
									Total per year (kWh/year) = Sum(64)m =			733.9239	(64)
12Total per year (kWh/year)												734	(64)
Electric shower(s)	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725	(64a)
									Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			496.7719	(64a)
Heat gains from water heating, kWh/month	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051	(72)
Total internal gains	327.6311	336.7768	322.5619	313.5190	297.8646	288.1301	277.5526	277.1024	285.2089	293.5037	310.0554	320.3500	(73)

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6. Solar gains

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[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	439.2133	523.9695	574.2486	623.1479	646.4210	635.9423	612.0672	581.6368	556.4634	498.8863	443.1046	416.2716	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area	0.9401	0.9040	0.8572	0.7709	0.6515	0.4970	0.3710	0.4036	0.5859	0.7953	0.9068	0.9474	(86)
MIT	19.0977	19.4554	19.8610	20.3415	20.6930	20.9033	20.9703	20.9611	20.8337	20.3789	19.6757	19.0423	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house	0.9317	0.8912	0.8384	0.7415	0.6076	0.4369	0.2991	0.3302	0.5263	0.7624	0.8923	0.9400	(89)
MIT 2	18.3387	18.6870	19.0789	19.5390	19.8544	20.0344	20.0796	20.0766	19.9812	19.5852	18.9163	18.2922	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.8307	19.1850	19.5858	20.0591	20.3979	20.5976	20.6569	20.6499	20.5337	20.0996	19.4085	18.7784	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8307	19.1850	19.5858	20.0591	20.3979	20.5976	20.6569	20.6499	20.5337	20.0996	19.4085	18.7784	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9183	0.8773	0.8276	0.7408	0.6233	0.4710	0.3443	0.3758	0.5563	0.7631	0.8801	0.9272	(94)
Useful gains	403.3078	459.7009	475.2326	461.6106	402.9182	299.5167	210.7343	218.5686	309.5612	380.7225	389.9750	385.9464	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	805.1210	789.0117	720.5311	605.4546	470.6077	320.2955	216.6559	226.4105	345.3268	513.9853	669.7123	797.8668	(97)
Space heating kWh	298.9490	221.2969	182.5021	103.5677	50.3610	0.0000	0.0000	0.0000	0.0000	99.1475	201.4109	306.4688	(98a)
Space heating requirement - total per year (kWh/year)												1463.7038	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	298.9490	221.2969	182.5021	103.5677	50.3610	0.0000	0.0000	0.0000	0.0000	99.1475	201.4109	306.4688	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1463.7038	
Space heating per m2											(98c) / (4) =	27.1056	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	502.0002	395.1916	404.8852	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8674	0.9129	0.8979	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	435.4315	360.7536	363.5487	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	714.5946	688.2625	654.2208	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	200.9975	243.6666	216.2600	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	50.2494	60.9167	54.0650	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												165.2310	(107)
Energy for space heating												27.1056	(99)
Energy for space cooling												3.0598	(108)
Total												30.1655	(109)
Fabric Energy Efficiency (TFEE)												30.2	(109)

Full SAP Calculation Printout

Property Reference	Flat 04	**Issued on Date**	27/07/2025
Assessment Reference	Flat 04	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.2480	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	22.5328	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272	(39)
Average = Sum(39)m / 12 =												54.8523	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246	(40)
HLP (average)												1.0158	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												108.5529	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)										Total = Sum(45)m =		1803.0542	
Distribution loss (46)m = 0.15 x (45)m													
	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains													
	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226	
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882	
util living area													
	0.9157	0.8676	0.8078	0.7086	0.5819	0.4354	0.3217	0.3511	0.5223	0.7394	0.8731	0.9256	(86)
MIT	19.6079	19.8877	20.1839	20.5069	20.7265	20.8470	20.8833	20.8785	20.8055	20.5190	20.0249	19.5618	(87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629	(88)
util rest of house													
	0.9046	0.8516	0.7852	0.6762	0.5378	0.3796	0.2575	0.2850	0.4647	0.7027	0.8549	0.9156	(89)
MIT 2	18.4347	18.7805	19.1427	19.5344	19.7820	19.9144	19.9451	19.9440	19.8739	19.5602	18.9666	18.3855	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8929	0.8410	0.7790	0.6796	0.5535	0.4065	0.2907	0.3189	0.4903	0.7073	0.8458	0.9042	(94)
Useful gains	459.0633	519.0977	530.9664	502.4090	425.6017	305.4686	209.7185	218.4902	320.3372	414.5702	437.8312	439.7165	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	834.2454	815.0506	741.2650	617.9035	475.5866	319.6116	213.4678	223.5367	346.1147	524.1335	690.4843	827.0258	(97)
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98a)
Space heating requirement - total per year (kWh/year)												1306.4062	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1306.4062	
Space heating per m2											(98c) / (4) =	24.1927	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	111.6989	79.5839	62.6099	33.2757	14.8814	0.0000	0.0000	0.0000	0.0000	32.6191	72.7932	115.3094	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												522.7716	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1029.7283	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1673.1706	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	522.7716	0.1558	81.4658	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			227.2529	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)
Total CO2, kg/year			244.6694	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.5300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	522.7716	1.5769	824.3589	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2393.1894	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2578.2782	(286)
Dwelling Primary energy Rate (DPER)			47.7500	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440
E18 Party wall between dwellings	13.0000	0.0600	0.7800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5655 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	21.9455 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												102.2682	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	
Distribution loss (46)m = 0.15 x (45)m													
	26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
WWHRS	-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
											Total per year (kWh/year) = Sum(64)m =	2015.6255	(64)
12Total per year (kWh/year)												2016	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area													
	0.9089	0.8674	0.8150	0.7239	0.6027	0.4541	0.3356	0.3632	0.5334	0.7408	0.8661	0.9177	(86)
MIT	19.3557	19.6759	20.0380	20.4553	20.7534	20.9246	20.9775	20.9709	20.8718	20.5009	19.8868	19.3066	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house													
	0.8972	0.8514	0.7930	0.6923	0.5587	0.3972	0.2696	0.2958	0.4757	0.7045	0.8473	0.9069	(89)
MIT 2	18.1697	18.5648	19.0083	19.5129	19.8506	20.0351	20.0801	20.0776	19.9842	19.5787	18.8417	18.1161	(90)
Living area fraction											fLA = Living area / (4) =	0.6481	(91)
MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8805	0.8362	0.7829	0.6939	0.5762	0.4302	0.3113	0.3380	0.5062	0.7084	0.8344	0.8905	(94)
Useful gains	467.3108	513.8383	518.5707	489.6358	418.0620	304.8196	212.4333	220.9121	319.0381	410.6113	441.5938	451.5061	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	811.0892	794.5329	725.4808	608.9595	472.6564	321.0480	216.9151	226.7690	346.7108	518.1416	675.7290	803.8498	(97)
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98a)
Space heating requirement - total per year (kWh/year)												1235.5940	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1235.5940	
Space heating per m2											(98c) / (4) =	22.8814	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	277.1085	204.3628	166.7834	93.0803	44.0067	0.0000	0.0000	0.0000	0.0000	86.6766	182.6407	284.0127	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6365	84.2273	83.6340	82.6684	81.4657	79.8000	79.8000	79.8000	79.8000	82.5052	83.9553	84.7141	(217)
Fuel for water heating, kWh/month	233.7804	207.8654	222.8809	199.6432	197.2914	182.5113	180.9699	187.6483	189.1231	202.7633	210.3846	231.2142	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1338.6718	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2446.0762	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3470.3688	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1338.6718	0.2100	281.1211	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2446.0762	0.2100	513.6760	(264)
Space and water heating			794.7971	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			756.6824	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.0100	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1338.6718	1.1300	1512.6991	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2446.0762	1.1300	2764.0661	(278)
Space and water heating			4276.7651	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4048.5927	(286)
Target Primary Energy Rate (TPER)			74.9700	(287)

Summary for Input Data

Property Reference	Flat 05	**Issued on Date**	27/07/2025
Assessment Reference	Flat 05	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	13.00 m	72.60 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	42.25	25.74	0.00	None	16.51	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		26.40	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	

Summary for Input Data

Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 05	**Issued on Date**	27/07/2025
Assessment Reference	Flat 05	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3353	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.6900	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	69.0352	68.8357	68.6400	67.7212	67.5493	66.7490	66.7490	66.6008	67.0572	67.5493	67.8970	68.2606	(39)
Average = Sum(39)m / 12 =												67.7203	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9509	0.9481	0.9455	0.9328	0.9304	0.9194	0.9194	0.9174	0.9237	0.9304	0.9352	0.9402	(40)
HLP (average)												0.9328	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												125.2310	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)										Total = Sum(45)m =		2080.0760	
Distribution loss (46)m = 0.15 x (45)m													
	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains													
	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.1334	32.2265	32.3184	32.7569	32.8402	33.2340	33.2340	33.3079	33.0812	32.8402	32.6720	32.4980	
alpha	3.1422	3.1484	3.1546	3.1838	3.1893	3.2156	3.2156	3.2205	3.2054	3.1893	3.1781	3.1665	
util living area													
	0.9330	0.8951	0.8465	0.7588	0.6373	0.4841	0.3598	0.3906	0.5711	0.7818	0.8977	0.9409	(86)
MIT	19.6492	19.8959	20.1704	20.4883	20.7168	20.8480	20.8879	20.8828	20.8051	20.5125	20.0407	19.6082	(87)
Th 2	20.1245	20.1268	20.1290	20.1397	20.1417	20.1510	20.1510	20.1528	20.1474	20.1417	20.1377	20.1334	(88)
util rest of house													
	0.9241	0.8820	0.8276	0.7300	0.5953	0.4281	0.2939	0.3233	0.5149	0.7493	0.8827	0.9330	(89)
MIT 2	18.5412	18.8488	19.1881	19.5776	19.8398	19.9843	20.0189	20.0172	19.9418	19.6161	19.0426	18.4969	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9113	0.8687	0.8163	0.7255	0.6015	0.4450	0.3165	0.3461	0.5293	0.7455	0.8704	0.9208	(94)
Useful gains	550.2652	616.4653	628.2124	597.8827	510.5913	368.5542	251.5818	262.4873	386.0640	495.6678	523.7515	528.3531	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1020.0196	994.9233	903.4165	752.8322	578.3985	387.1913	256.1725	268.7010	419.6435	638.2219	843.5362	1012.4871	(97)
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98a)
Space heating requirement - total per year (kWh/year)												1667.0860	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1667.0860	
Space heating per m2											(98c) / (4) =	22.9626	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	139.8549	101.7702	81.9335	44.6433	20.1875	0.0000	0.0000	0.0000	0.0000	42.4411	92.1348	144.1360	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	667.1012	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1187.9361	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	156.5610	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2011.5983	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	667.1012	0.1557	103.8427	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			272.0285	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)
Total CO2, kg/year			294.6251	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.0600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	667.1012	1.5763	1051.5337	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			2861.4000	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3101.5384	(286)
Dwelling Primary energy Rate (DPER)			42.7200	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0695	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	27.3433	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												117.9810	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m													
	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
											Total per year (kWh/year) = Sum(64)m =	2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains													
	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area													
	0.9246	0.8868	0.8383	0.7509	0.6309	0.4784	0.3552	0.3845	0.5614	0.7690	0.8866	0.9324	(86)
MIT	19.2854	19.6099	19.9808	20.4177	20.7335	20.9185	20.9757	20.9685	20.8606	20.4639	19.8280	19.2392	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house													
	0.9146	0.8726	0.8182	0.7208	0.5876	0.4208	0.2874	0.3155	0.5036	0.7348	0.8700	0.9233	(89)
MIT 2	18.0967	18.4997	18.9570	19.4894	19.8505	20.0517	20.1009	20.0981	19.9952	19.5565	18.7870	18.0468	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)
MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8956	0.8536	0.8025	0.7149	0.5963	0.4444	0.3191	0.3473	0.5239	0.7303	0.8527	0.9051	(94)
Useful gains	580.6778	643.8526	653.6213	621.7010	533.5169	388.6599	268.4721	279.5078	406.3246	518.9287	551.5433	559.7131	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1045.8161	1025.1535	936.0533	784.9025	608.0402	410.2009	274.1385	286.9982	443.6097	666.0191	869.5364	1035.4553	(97)
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98a)
Space heating requirement - total per year (kWh/year)												1677.7194	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1677.7194	
Space heating per m2											(98c) / (4) =	23.1091	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	374.9328	277.6102	227.6592	127.3078	60.0707	0.0000	0.0000	0.0000	0.0000	118.5647	248.0553	383.4802	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.0601	84.6673	84.0839	83.0877	81.7661	79.8000	79.8000	79.8000	79.8000	82.9146	84.3996	85.1320	(217)
Fuel for water heating, kWh/month	259.9419	230.9203	247.2356	220.8170	218.0124	201.8711	199.8040	207.5092	209.5004	224.1294	233.2243	257.0224	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1817.6808	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2709.9880	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-717.6874	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4068.9321	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1817.6808	0.2100	381.7130	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2709.9880	0.2100	569.0975	(264)
Space and water heating			950.8105	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			894.5537	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1817.6808	1.1300	2053.9793	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2709.9880	1.1300	3062.2864	(278)
Space and water heating			5116.2658	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			4762.5318	(286)
Target Primary Energy Rate (TPER)			65.6000	(287)

Full SAP Calculation Printout

Property Reference	Flat 05	**Issued on Date**	27/07/2025
Assessment Reference	Flat 05	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3776	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3210	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4093	0.4012	0.3932	0.3531	0.3451	0.3049	0.3049	0.2969	0.3210	0.3451	0.3611	0.3772	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5838	0.5805	0.5773	0.5623	0.5595	0.5465	0.5465	0.5441	0.5515	0.5595	0.5652	0.5711	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.6900	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4530	45.1998	44.9516	43.7857	43.5676	42.5522	42.5522	42.3641	42.9433	43.5676	44.0088	44.4702	(38)
Heat transfer coeff													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	70.4168	70.1636	69.9154	68.7495	68.5314	67.5160	67.5160	67.3279	67.9071	68.5314	68.9727	69.4340	(39)
Average = Sum(39)m / 12 =												68.7485	
HLP	0.9699	0.9664	0.9630	0.9470	0.9440	0.9300	0.9300	0.9274	0.9354	0.9440	0.9500	0.9564	(40)
HLP (average)												0.9469	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												59.9802	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	65.4382	63.6432	61.6835	59.2442	57.0682	54.8067	54.3368	56.2925	58.2983	60.6207	63.0816	65.3463	(44)
Energy conte	103.6381	90.6271	94.8053	81.1024	76.8248	67.3913	65.7156	69.7019	71.8877	82.2617	89.8713	102.3165	(45)
Energy content (annual)										Total = Sum(45)m =		996.1436	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(64)
								Total per year (kWh/year) = Sum(64)m =				846.7221	(64)
12Total per year (kWh/year)												847	(64)
Electric shower(s)	50.3803	44.8892	49.0173	46.7766	47.6544	45.4576	46.9729	47.6544	46.7766	49.0173	48.0956	50.3803	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							573.0725	(64a)
Heat gains from water heating, kWh/month	34.6182	30.4806	32.4005	28.9284	28.2389	25.6851	25.7078	26.7252	26.9703	29.7349	31.1216	34.3373	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	46.5298	45.3580	43.5490	40.1784	37.9554	35.6737	34.5535	35.9210	37.4587	39.9663	43.2244	46.1523	(72)
Total internal gains	410.5675	422.5556	404.3804	393.1308	373.1846	360.9144	347.3867	346.6448	356.9362	367.3227	388.3041	401.2205	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	550.9173	658.0078	720.9495	782.5713	811.5795	798.3701	768.1188	729.6748	698.1149	625.6533	555.6551	521.8723	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	31.5029	31.6166	31.7288	32.2669	32.3696	32.8564	32.8564	32.9482	32.6672	32.3696	32.1625	31.9488	
alpha	3.1002	3.1078	3.1153	3.1511	3.1580	3.1904	3.1904	3.1965	3.1778	3.1580	3.1442	3.1299	
util living area	0.9470	0.9127	0.8675	0.7818	0.6613	0.5033	0.3751	0.4082	0.5945	0.8065	0.9155	0.9538	(86)
MIT	19.1582	19.5087	19.9042	20.3754	20.7142	20.9136	20.9744	20.9662	20.8475	20.4087	19.7244	19.1085	(87)
Th 2	20.1085	20.1114	20.1143	20.1278	20.1303	20.1421	20.1421	20.1443	20.1375	20.1303	20.1252	20.1198	(88)
util rest of house	0.9396	0.9011	0.8502	0.7539	0.6192	0.4455	0.3061	0.3378	0.5372	0.7756	0.9025	0.9472	(89)
MIT 2	18.4319	18.7745	19.1578	19.6114	19.9166	20.0893	20.1307	20.1283	20.0379	19.6533	19.0000	18.3915	(90)
Living area fraction									fLA = Living area / (4) =			0.4821	(91)
MIT	18.7820	19.1285	19.5177	19.9798	20.3011	20.4867	20.5374	20.5322	20.4282	20.0175	19.3492	18.7372	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.7820	19.1285	19.5177	19.9798	20.3011	20.4867	20.5374	20.5322	20.4282	20.0175	19.3492	18.7372	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9259	0.8861	0.8369	0.7488	0.6278	0.4693	0.3383	0.3703	0.5572	0.7712	0.8887	0.9344	(94)
Useful gains	510.1019	583.0819	603.3669	585.9566	509.5408	374.6590	259.8813	270.1803	389.0217	482.4785	493.8256	487.6534	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1019.7780	998.3191	910.1339	761.7280	589.4456	397.4455	265.8390	278.2153	429.7317	645.3928	844.8607	1009.3733	(97)
Space heating kWh	379.1990	279.0394	228.2346	126.5554	59.4492	0.0000	0.0000	0.0000	0.0000	121.2082	252.7453	388.1596	(98a)
Space heating requirement - total per year (kWh/year)												1834.5906	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	379.1990	279.0394	228.2346	126.5554	59.4492	0.0000	0.0000	0.0000	0.0000	121.2082	252.7453	388.1596	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1834.5906	
Space heating per m2											(98c) / (4) =	25.2698	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	634.6501	499.6182	511.6923	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8723	0.9175	0.9027	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	553.6191	458.4027	461.9062	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	244.8516	299.0583	264.5158	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	61.2129	74.7646	66.1290	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												202.1064	(107)
Energy for space heating												25.2698	(99)
Energy for space cooling												2.7838	(108)
Total												28.0537	(109)
Fabric Energy Efficiency (DFEE)												28.1	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		235.9500	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)

Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.0695 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 27.3433 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 59.9802 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	65.4382	63.6432	61.6835	59.2442	57.0682	54.8067	54.3368	56.2925	58.2983	60.6207	63.0816	65.3463	(44)
Energy conte	103.6381	90.6271	94.8053	81.1024	76.8248	67.3913	65.7156	69.7019	71.8877	82.2617	89.8713	102.3165	(45)
Energy content (annual)										Total = Sum(45)m =		996.1436	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(64)
										Total per year (kWh/year) = Sum(64)m =		846.7221	(64)
12Total per year (kWh/year)												847	(64)
Electric shower(s)	50.3803	44.8892	49.0173	46.7766	47.6544	45.4576	46.9729	47.6544	46.7766	49.0173	48.0956	50.3803	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		573.0725	(64a)
Heat gains from water heating, kWh/month	34.6182	30.4806	32.4005	28.9284	28.2389	25.6851	25.7078	26.7252	26.9703	29.7349	31.1216	34.3373	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	46.5298	45.3580	43.5490	40.1784	37.9554	35.6737	34.5535	35.9210	37.4587	39.9663	43.2244	46.1523	(72)
Total internal gains	410.5675	422.5556	404.3804	393.1308	373.1846	360.9144	347.3867	346.6448	356.9362	367.3227	388.3041	401.2205	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	550.9173	658.0078	720.9495	782.5713	811.5795	798.3701	768.1188	729.6748	698.1149	625.6533	555.6551	521.8723	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area	0.9482	0.9153	0.8720	0.7894	0.6721	0.5156	0.3862	0.4198	0.6064	0.8134	0.9181	0.9548	(86)
MIT	19.0709	19.4242	19.8297	20.3190	20.6801	20.8995	20.9693	20.9597	20.8265	20.3583	19.6506	19.0201	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house	0.9409	0.9038	0.8547	0.7615	0.6292	0.4556	0.3135	0.3459	0.5475	0.7825	0.9051	0.9483	(89)
MIT 2	18.3270	18.6725	19.0661	19.5376	19.8639	20.0534	20.1010	20.0979	19.9970	19.5856	18.9086	18.2854	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.6856	19.0349	19.4343	19.9143	20.2574	20.4613	20.5196	20.5134	20.3969	19.9581	19.2663	18.6396	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6856	19.0349	19.4343	19.9143	20.2574	20.4613	20.5196	20.5134	20.3969	19.9581	19.2663	18.6396	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9269	0.8883	0.8406	0.7552	0.6370	0.4797	0.3472	0.3797	0.5673	0.7770	0.8909	0.9352	(94)
Useful gains	510.6349	584.4992	606.0291	591.0160	516.9682	382.9833	266.7290	277.0679	396.0149	486.1025	495.0176	488.0602	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1046.9694	1025.1523	934.8748	783.2954	606.7094	409.6214	273.9228	286.6938	442.5206	663.4770	867.9291	1036.7474	(97)
Space heating kWh	399.0328	296.1189	244.6612	138.4411	66.7675	0.0000	0.0000	0.0000	0.0000	131.9666	268.4963	408.2233	(98a)
Space heating requirement - total per year (kWh/year)												1953.7077	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	399.0328	296.1189	244.6612	138.4411	66.7675	0.0000	0.0000	0.0000	0.0000	131.9666	268.4963	408.2233	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1953.7077	
Space heating per m2											(98c) / (4) =	26.9106	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	656.9274	517.1556	529.7074	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8587	0.9069	0.8909	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	564.0721	468.9980	471.9192	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	237.3255	291.1754	257.0661	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	59.3314	72.7939	64.2665	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												196.3917	(107)
Energy for space heating												26.9106	(99)
Energy for space cooling												2.7051	(108)
Total												29.6157	(109)
Fabric Energy Efficiency (TFEE)												29.6	(109)

Full SAP Calculation Printout

Property Reference	Flat 05	**Issued on Date**	27/07/2025
Assessment Reference	Flat 05	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3353	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.6900	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	69.0352	68.8357	68.6400	67.7212	67.5493	66.7490	66.7490	66.6008	67.0572	67.5493	67.8970	68.2606	(39)
Average = Sum(39)m / 12 =												67.7203	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9509	0.9481	0.9455	0.9328	0.9304	0.9194	0.9194	0.9174	0.9237	0.9304	0.9352	0.9402	(40)
HLP (average)												0.9328	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												125.2310	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)										Total = Sum(45)m =		2080.0760	
Distribution loss (46)m = 0.15 x (45)m													
	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains													
	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.1334	32.2265	32.3184	32.7569	32.8402	33.2340	33.2340	33.3079	33.0812	32.8402	32.6720	32.4980	
alpha	3.1422	3.1484	3.1546	3.1838	3.1893	3.2156	3.2156	3.2205	3.2054	3.1893	3.1781	3.1665	
util living area													
	0.9330	0.8951	0.8465	0.7588	0.6373	0.4841	0.3598	0.3906	0.5711	0.7818	0.8977	0.9409	(86)
MIT	19.6492	19.8959	20.1704	20.4883	20.7168	20.8480	20.8879	20.8828	20.8051	20.5125	20.0407	19.6082	(87)
Th 2	20.1245	20.1268	20.1290	20.1397	20.1417	20.1510	20.1510	20.1528	20.1474	20.1417	20.1377	20.1334	(88)
util rest of house													
	0.9241	0.8820	0.8276	0.7300	0.5953	0.4281	0.2939	0.3233	0.5149	0.7493	0.8827	0.9330	(89)
MIT 2	18.5412	18.8488	19.1881	19.5776	19.8398	19.9843	20.0189	20.0172	19.9418	19.6161	19.0426	18.4969	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9113	0.8687	0.8163	0.7255	0.6015	0.4450	0.3165	0.3461	0.5293	0.7455	0.8704	0.9208	(94)
Useful gains	550.2652	616.4653	628.2124	597.8827	510.5913	368.5542	251.5818	262.4873	386.0640	495.6678	523.7515	528.3531	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1020.0196	994.9233	903.4165	752.8322	578.3985	387.1913	256.1725	268.7010	419.6435	638.2219	843.5362	1012.4871	(97)
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98a)
Space heating requirement - total per year (kWh/year)												1667.0860	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1667.0860	
Space heating per m2											(98c) / (4) =	22.9626	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	139.8549	101.7702	81.9335	44.6433	20.1875	0.0000	0.0000	0.0000	0.0000	42.4411	92.1348	144.1360	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	667.1012	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1187.9361	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	156.5610	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2011.5983	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	667.1012	0.1557	103.8427	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			272.0285	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)
Total CO2, kg/year			294.6251	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.0600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	667.1012	1.5763	1051.5337	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			2861.4000	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3101.5384	(286)
Dwelling Primary energy Rate (DPER)			42.7200	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0695	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	27.3433	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												117.9810	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m													
	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
											Total per year (kWh/year) = Sum(64)m =	2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains													
	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area													
	0.9246	0.8868	0.8383	0.7509	0.6309	0.4784	0.3552	0.3845	0.5614	0.7690	0.8866	0.9324	(86)
MIT	19.2854	19.6099	19.9808	20.4177	20.7335	20.9185	20.9757	20.9685	20.8606	20.4639	19.8280	19.2392	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house													
	0.9146	0.8726	0.8182	0.7208	0.5876	0.4208	0.2874	0.3155	0.5036	0.7348	0.8700	0.9233	(89)
MIT 2	18.0967	18.4997	18.9570	19.4894	19.8505	20.0517	20.1009	20.0981	19.9952	19.5565	18.7870	18.0468	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)
MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8956	0.8536	0.8025	0.7149	0.5963	0.4444	0.3191	0.3473	0.5239	0.7303	0.8527	0.9051	(94)
Useful gains	580.6778	643.8526	653.6213	621.7010	533.5169	388.6599	268.4721	279.5078	406.3246	518.9287	551.5433	559.7131	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1045.8161	1025.1535	936.0533	784.9025	608.0402	410.2009	274.1385	286.9982	443.6097	666.0191	869.5364	1035.4553	(97)
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98a)
Space heating requirement - total per year (kWh/year)												1677.7194	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1677.7194	
Space heating per m2											(98c) / (4) =	23.1091	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	374.9328	277.6102	227.6592	127.3078	60.0707	0.0000	0.0000	0.0000	0.0000	118.5647	248.0553	383.4802	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.0601	84.6673	84.0839	83.0877	81.7661	79.8000	79.8000	79.8000	79.8000	82.9146	84.3996	85.1320	(217)
Fuel for water heating, kWh/month	259.9419	230.9203	247.2356	220.8170	218.0124	201.8711	199.8040	207.5092	209.5004	224.1294	233.2243	257.0224	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1817.6808	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2709.9880	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-717.6874	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4068.9321	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1817.6808	0.2100	381.7130	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2709.9880	0.2100	569.0975	(264)
Space and water heating			950.8105	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			894.5537	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1817.6808	1.1300	2053.9793	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2709.9880	1.1300	3062.2864	(278)
Space and water heating			5116.2658	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			4762.5318	(286)
Target Primary Energy Rate (TPER)			65.6000	(287)

Summary for Input Data

Property Reference	Flat 06	**Issued on Date**	27/07/2025
Assessment Reference	Flat 06	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	5.07	**TER**	15.92
Environmental	96 A	**% DER < TER**			68.15
CO_2 Emissions (t/year)	0.25	**DFEE**	37.69	**TFEE**	38.86
Compliance Check	See BREL	**% DFEE < TFEE**			3.02
% DPER < TPER	37.45	**DPER**	53.30	**TPER**	85.22

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, End-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	22.65 m	53.90 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	73.61	57.10	0.00	None	16.51	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

elmhurst energy

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		45.30	0.00	0.00	No
E18 Party wall between dwellings		6.50	0.00	0.00	No
E16 Corner (normal)		9.75	0.00	0.00	No
E17 Corner (inverted – internal area greater than external area)		3.25	0.00	0.00	No

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	

Summary for Input Data

Flow Temperature	Enter value
Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None
28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 06	**Issued on Date**	27/07/2025
Assessment Reference	Flat 06	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	5.07	**TER**	15.92
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CO_2 Emissions (t/year)	0.25	**DFEE**	37.69	**TFEE**	38.86
Compliance Check	See BREL	**% DFEE < TFEE**			3.02
% DPER < TPER	37.45	**DPER**	53.30	**TPER**	85.22

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.1750	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys		0 * 80 =	0.0000 (6a)
Number of open flues		0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000 (6d)
Number of flues attached to other heater		0 * 35 =	0.0000 (6e)
Number of blocked chimneys		0 * 20 =	0.0000 (6f)
Number of intermittent extract fans		2 * 10 =	20.0000 (7a)
Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		20.0000 / (5) =	0.1142 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0100 (17)
Infiltration rate			0.3647 (18)
Number of sides sheltered			2 (19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.3100 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3952	0.3875	0.3797	0.3410	0.3332	0.2945	0.2945	0.2867	0.3100	0.3332	0.3487	0.3642	(22b)
Effective ac	0.5781	0.5751	0.5721	0.5581	0.5555	0.5434	0.5434	0.5411	0.5480	0.5555	0.5608	0.5663	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	73.6125	16.5100	57.1025	0.1800	10.2784			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.9191			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		2.9445 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	31.8636 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4185	33.2432	33.0713	32.2642	32.1132	31.4102	31.4102	31.2801	31.6810	32.1132	32.4187	32.7381	(38)
Heat transfer coeff	65.2820	65.1067	64.9349	64.1278	63.9768	63.2738	63.2738	63.1436	63.5446	63.9768	64.2823	64.6016	(39)
Average = Sum(39)m / 12 =												64.1271	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2112	1.2079	1.2047	1.1898	1.1870	1.1739	1.1739	1.1715	1.1789	1.1870	1.1926	1.1985	(40)
HLP (average)												1.1897	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051	(42)
Hot water usage for mixer showers													
	61.2950	60.3739	59.0316	56.4634	54.5681	52.4545	51.2531	52.5852	54.0455	56.3149	58.9383	61.0602	(42a)
Hot water usage for baths													
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)
Hot water usage for other uses													
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)
Average daily hot water use (litres/day)												108.4548	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	117.9640	115.4889	112.4498	107.7691	103.9895	99.9176	98.3089	101.3344	104.5314	108.8119	113.5665	117.6495	(44)
Energy conte	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(45)
Energy content (annual)										Total = Sum(45)m =		1801.4233	
Distribution loss (46)m = 0.15 x (45)m													
	28.0239	24.6682	25.9247	22.1296	20.9985	18.4291	17.8344	18.8210	19.3347	22.1485	24.2694	27.6316	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
										Total per year (kWh/year) = Sum(64)m =		1801.4233	(64)
12Total per year (kWh/year)												1801	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1197	54.6812	57.4663	49.0539	46.5466	40.8511	39.5329	41.7198	42.8585	49.0959	53.7973	61.2501	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.3632	87.8664	79.3632	82.0086	79.3632	82.0086	79.3632	79.3632	82.0086	79.3632	82.0086	79.3632	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	83.4942	81.3708	77.2397	68.1304	62.5627	56.7376	53.1357	56.0750	59.5257	65.9891	74.7184	82.3254	(72)
Total internal gains													
	373.2798	381.2923	364.5435	349.3203	330.0501	313.4784	300.2885	301.5951	311.8057	327.3830	349.8148	365.1684	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	513.6295	616.7445	681.1126	738.7608	768.4450	750.9340	721.0206	684.6251	652.9843	585.7135	517.1657	485.8202	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.2281	25.2961	25.3630	25.6822	25.7429	26.0289	26.0289	26.0825	25.9179	25.7429	25.6205	25.4939	
alpha	2.6819	2.6864	2.6909	2.7121	2.7162	2.7353	2.7353	2.7388	2.7279	2.7162	2.7080	2.6996	
util living area													
	0.9250	0.8847	0.8340	0.7483	0.6321	0.4883	0.3681	0.3999	0.5752	0.7756	0.8897	0.9335	(86)
MIT	19.2718	19.5657	19.9041	20.2975	20.5983	20.7863	20.8534	20.8439	20.7211	20.3291	19.7428	19.2220	(87)
Th 2	19.9111	19.9137	19.9162	19.9282	19.9305	19.9409	19.9409	19.9429	19.9369	19.9305	19.9259	19.9212	(88)
util rest of house													
	0.9141	0.8689	0.8115	0.7145	0.5828	0.4207	0.2859	0.3163	0.5083	0.7378	0.8719	0.9238	(89)
MIT 2	17.9140	18.2789	18.6956	19.1751	19.5187	19.7221	19.7792	19.7749	19.6601	19.2265	18.5153	17.8592	(90)
Living area fraction										fLA = Living area / (4) =		0.6494	(91)
MIT	18.7957	19.1145	19.4804	19.9039	20.2197	20.4132	20.4767	20.4690	20.3490	19.9424	19.3124	18.7441	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7957	19.1145	19.4804	19.9039	20.2197	20.4132	20.4767	20.4690	20.3490	19.9424	19.3124	18.7441	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9007	0.8555	0.8014	0.7137	0.5968	0.4517	0.3282	0.3589	0.5354	0.7383	0.8600	0.9108	(94)
Useful gains	462.6451	527.6269	545.8240	527.2206	458.6051	339.1901	236.6634	245.6870	349.5864	432.4129	444.7729	442.5041	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	946.3076	925.4598	842.8778	705.6561	545.0645	367.8204	245.2951	256.9340	397.0932	597.6996	785.0382	939.5740	(97)
Space heating kWh	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98a)
Space heating requirement - total per year (kWh/year)												1778.7803	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1778.7803	
Space heating per m2											(98c) / (4) =	33.0015	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	143.9955	106.9803	88.4386	51.4100	25.7406	0.0000	0.0000	0.0000	0.0000	49.2090	98.0356	147.9872	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.6968	93.9204	98.7042	84.2550	79.9485	70.1658	67.9018	71.6580	73.6138	84.3271	92.4022	105.2032	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9274	11.9753	10.7825	7.8997	6.1019	4.9853	5.5664	7.2354	9.3981	12.3308	13.9276	15.3423	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	711.7968	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1028.7969	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	120.4728	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1861.0665	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	711.7968	0.1552	110.4863	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1028.7969	0.1416	145.6552	(264)
Space and water heating			256.1415	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.4728	0.1443	17.3880	(268)
Total CO2, kg/year			273.5295	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 5.0700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	711.7968	1.5746	1120.8270	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1028.7969	1.5235	1567.4115	(278)
Space and water heating			2688.2385	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.4728	1.5338	184.7853	(282)
Total Primary energy kWh/year			2873.0237	(286)
Dwelling Primary energy Rate (DPER)			53.3000	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b) x	3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.1750	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3642 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3095 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3947	0.3869	0.3792	0.3405	0.3328	0.2941	0.2941	0.2863	0.3095	0.3328	0.3482	0.3637	(22b)
Effective ac	0.5779	0.5749	0.5719	0.5580	0.5554	0.5432	0.5432	0.5410	0.5479	0.5554	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6600	1.1450	13.3511			(27)
External Wall 1	73.6125	13.4800	60.1325	0.1800	10.8238			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.9950			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	45.3000	0.0700	3.1710
E18 Party wall between dwellings	6.5000	0.0600	0.3900
E16 Corner (normal)	9.7500	0.0900	0.8775
E17 Corner (inverted - internal area greater than external area)	3.2500	-0.0900	-0.2925

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		5.5875 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	31.5825 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4061	33.2313	33.0599	32.2550	32.1044	31.4034	31.4034	31.2736	31.6734	32.1044	32.4091	32.7276	(38)
Heat transfer coeff	64.9886	64.8138	64.6424	63.8375	63.6869	62.9859	62.9859	62.8560	63.2559	63.6869	63.9916	64.3101	(39)
Average = Sum(39)m / 12 =												63.8368	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2057	1.2025	1.1993	1.1844	1.1816	1.1686	1.1686	1.1662	1.1736	1.1816	1.1872	1.1931	(40)
HLP (average)												1.1844	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051	(42)
Hot water usage for mixer showers													
	54.4845	53.6657	52.4725	50.1897	48.5050	46.6262	45.5583	46.7424	48.0404	50.0577	52.3896	54.2757	(42a)
Hot water usage for baths													
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)
Hot water usage for other uses													
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)
Average daily hot water use (litres/day)												102.1757	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.1535	108.7807	105.8907	101.4954	97.9264	94.0893	92.6141	95.4916	98.5264	102.5547	107.0178	110.8651	(44)
Energy conte	176.0399	154.9022	162.7501	138.9421	131.8278	115.6938	112.0087	118.2385	121.4929	139.1658	152.4665	173.5879	(45)
Energy content (annual)										Total = Sum(45)m =		1697.1161	
Distribution loss (46)m = 0.15 x (45)m													
	26.4060	23.2353	24.4125	20.8413	19.7742	17.3541	16.8013	17.7358	18.2239	20.8749	22.8700	26.0382	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.6348	196.9879	209.3450	184.0340	178.4227	160.7856	158.6036	164.8334	166.5847	185.7607	197.5583	220.1828	(62)
WWHRS	-24.9080	-22.0289	-23.0674	-19.1007	-17.8012	-15.2326	-14.2781	-15.1833	-15.7602	-18.5795	-21.0484	-24.4468	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
										Total per year (kWh/year) = Sum(64)m =		2014.2986	(64)
12Total per year (kWh/year)												2014	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8092	85.1736	91.3903	82.2717	81.1086	74.5417	74.5188	76.5902	76.4699	83.5485	86.7686	94.9939	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4429	87.9546	79.4429	82.0910	79.4429	82.0910	79.4429	79.4429	82.0910	79.4429	82.0910	79.4429	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	128.7758	126.7464	122.8365	114.2663	109.0170	103.5301	100.1597	102.9439	106.2081	112.2964	120.5119	127.6800	(72)
Total internal gains													
	418.6410	426.7561	410.2200	395.5386	376.5841	360.3532	347.3922	348.5436	358.5705	373.7700	395.6906	410.6027	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.6600	46.7521	0.6300	0.7000	0.7700	95.1583	(78)

Solar gains	111.4069	186.8966	251.2832	309.1225	347.9771	347.2299	333.9562	304.0328	270.8162	205.0563	132.8397	95.7711	(83)
Total gains	530.0479	613.6527	661.5031	704.6611	724.5612	707.5832	681.3485	652.5764	629.3867	578.8263	528.5304	506.3738	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.3421	25.4104	25.4778	25.7990	25.8600	26.1478	26.1478	26.2018	26.0362	25.8600	25.7369	25.6094	
alpha	2.6895	2.6940	2.6985	2.7199	2.7240	2.7432	2.7432	2.7468	2.7357	2.7240	2.7158	2.7073	
util living area													
	0.9199	0.8853	0.8414	0.7638	0.6542	0.5101	0.3856	0.4154	0.5887	0.7787	0.8846	0.9273	(86)
MIT	18.9050	19.2450	19.6629	20.1735	20.5822	20.8503	20.9488	20.9359	20.7664	20.2525	19.5123	18.8505	(87)
Th 2	19.9154	19.9180	19.9206	19.9325	19.9348	19.9452	19.9452	19.9472	19.9412	19.9348	19.9302	19.9255	(88)
util rest of house													
	0.9084	0.8696	0.8195	0.7310	0.6054	0.4411	0.3006	0.3297	0.5217	0.7412	0.8663	0.9169	(89)
MIT 2	17.5168	17.9384	18.4541	19.0758	19.5459	19.8336	19.9184	19.9115	19.7541	19.1847	18.2871	17.4553	(90)

Living area fraction											fLA = Living area / (4) =	0.6494	(91)
MIT	18.4182	18.7868	19.2390	19.7886	20.2188	20.4938	20.5875	20.5767	20.4115	19.8780	19.0827	18.3612	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4182	18.7868	19.2390	19.7886	20.2188	20.4938	20.5875	20.5767	20.4115	19.8780	19.0827	18.3612	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8888	0.8502	0.8038	0.7262	0.6191	0.4780	0.3532	0.3819	0.5526	0.7390	0.8490	0.8978	(94)
Useful gains	471.0891	521.7432	531.7198	511.6993	448.5660	338.2000	240.6418	249.2249	347.8256	427.7356	448.7285	454.6085	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	917.5241	900.0569	823.4797	695.0988	542.5388	371.2269	251.1554	262.5295	399.2381	590.8902	766.7926	910.7103	(97)
Space heating kWh													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98a)
Space heating requirement - total per year (kWh/year)												1695.1401	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1695.1401	
Space heating per m2											(98c) / (4) =	31.4497	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98)
Space heating efficiency (main heating system 1)													
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)													
	359.8566	275.4354	235.1780	143.0635	75.7484	0.0000	0.0000	0.0000	0.0000	131.5136	248.1106	367.6487	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2137	84.8968	84.4037	83.5658	82.3306	79.8000	79.8000	79.8000	79.8000	83.3537	84.6447	85.2816	(217)
Fuel for water heating, kWh/month													
	232.0363	206.0844	220.6983	197.3693	195.0933	182.3973	180.8591	187.5314	189.0031	200.5684	208.5304	229.5174	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5067	13.2423	11.9232	8.7354	6.7475	5.5128	6.1553	8.0009	10.3924	13.6353	15.4011	16.9654	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0405	-18.1101	-27.7562	-33.3524	-37.8875	-36.0892	-35.6643	-32.7117	-27.8479	-21.6386	-13.6384	-10.2826	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7436	-8.0966	-16.5107	-25.4205	-34.2237	-34.5988	-34.1781	-28.6457	-20.6253	-11.7651	-5.0580	-2.9432	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1836.5548	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2429.6887	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												133.2182	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-532.8285	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3952.6333	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1836.5548	0.2100	385.6765	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2429.6887	0.2100	510.2346	(264)

Space and water heating			895.9111	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.2182	0.1443	19.2275	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	0.1332	-40.9064	
PV Unit electricity exported	-225.8092	0.1252	-28.2685	
Total			-69.1749	(269)
Total CO2, kg/year			857.8930	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.9200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1836.5548	1.1300	2075.3069	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2429.6887	1.1300	2745.5483	(278)
Space and water heating			4820.8552	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.2182	1.5338	204.3346	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	1.4923	-458.1785	
PV Unit electricity exported	-225.8092	0.4595	-103.7575	
Total			-561.9360	(283)
Total Primary energy kWh/year			4593.3546	(286)
Target Primary Energy Rate (TPER)			85.2200	(287)

Full SAP Calculation Printout

Property Reference	Flat 06	**Issued on Date**	27/07/2025
Assessment Reference	Flat 06	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	5.07	**TER**	15.92
Environmental	96 A	**% DER < TER**			68.15
CO_2 Emissions (t/year)	0.25	**DFEE**	37.69	**TFEE**	38.86
Compliance Check	See BREL	**% DFEE < TFEE**			3.02
% DPER < TPER	37.45	**DPER**	53.30	**TPER**	85.22

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000 (1b)	x	3.2500 (2b)	=	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	175.1750	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3647	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3100	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3952	0.3875	0.3797	0.3410	0.3332	0.2945	0.2945	0.2867	0.3100	0.3332	0.3487	0.3642	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5781	0.5751	0.5721	0.5581	0.5555	0.5434	0.5434	0.5411	0.5480	0.5555	0.5608	0.5663	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	73.6125	16.5100	57.1025	0.1800	10.2784			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.9191			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	2.9445	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	31.8636	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4185	33.2432	33.0713	32.2642	32.1132	31.4102	31.4102	31.2801	31.6810	32.1132	32.4187	32.7381	(38)
Heat transfer coeff													

	65.2820	65.1067	64.9349	64.1278	63.9768	63.2738	63.2738	63.1436	63.5446	63.9768	64.2823	64.6016 (39)
Average = Sum(39)m / 12 =												64.1271
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2112	1.2079	1.2047	1.1898	1.1870	1.1739	1.1739	1.1715	1.1789	1.1870	1.1926	1.1985 (40)
HLP (average)												1.1897
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737 (42b)
Hot water usage for other uses												
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156 (42c)
Average daily hot water use (litres/day)												51.9428 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	56.6690	55.1150	53.4182	51.3057	49.4214	47.4631	47.0558	48.7491	50.4859	52.4971	54.6282	56.5894 (44)
Energy conte	89.7498	78.4830	82.1018	70.2350	66.5307	58.3614	56.9099	60.3616	62.2542	71.2380	77.8279	88.6053 (45)
Energy content (annual)										Total = Sum(45)m =		862.6586
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145 (64)
										Total per year (kWh/year) = Sum(64)m =		733.2598 (64)
12Total per year (kWh/year)												733 (64)
Electric shower(s)												
	43.6330	38.8774	42.4526	40.5120	41.2722	39.3696	40.6820	41.2722	40.5120	42.4526	41.6543	43.6330 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												496.3227 (64a)
Heat gains from water heating, kWh/month												
	29.9801	26.3970	28.0598	25.0529	24.4558	22.2442	22.2638	23.1449	23.3570	25.7512	26.9520	29.7369 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	79.3632	87.8664	79.3632	82.0086	79.3632	82.0086	79.3632	79.3632	82.0086	79.3632	82.0086	79.3632 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025 (71)
Water heating gains (Table 5)												
	40.2958	39.2812	37.7147	34.7957	32.8707	30.8947	29.9245	31.1087	32.4403	34.6119	37.4333	39.9689 (72)
Total internal gains												
	327.0813	336.2027	322.0185	312.9857	297.3582	287.6355	277.0773	276.6288	284.7203	293.0057	309.5297	319.8119 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519 (83)
Total gains	467.4311	571.6550	638.5876	702.4261	735.7531	725.0912	697.8094	659.6588	625.8989	551.3363	476.8807	440.4638 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	25.2281	25.2961	25.3630	25.6822	25.7429	26.0289	26.0289	26.0825	25.9179	25.7429	25.6205	25.4939
alpha	2.6819	2.6864	2.6909	2.7121	2.7162	2.7353	2.7353	2.7388	2.7279	2.7162	2.7080	2.6996
util living area												
	0.9383	0.9001	0.8513	0.7659	0.6494	0.5020	0.3789	0.4130	0.5924	0.7954	0.9057	0.9460 (86)
MIT	18.7202	19.1309	19.6050	20.1616	20.5869	20.8549	20.9504	20.9361	20.7607	20.2002	19.3752	18.6512 (87)
Th 2	19.9111	19.9137	19.9162	19.9282	19.9305	19.9409	19.9409	19.9429	19.9369	19.9305	19.9259	19.9212 (88)
util rest of house												
	0.9290	0.8860	0.8303	0.7331	0.6004	0.4333	0.2948	0.3273	0.5251	0.7592	0.8898	0.9378 (89)
MIT 2	17.8648	18.2640	18.7209	19.2509	19.6314	19.8569	19.9208	19.9153	19.7875	19.3016	18.5175	17.8045 (90)
Living area fraction										fLA = Living area / (4) =		0.6494 (91)
MIT	18.4203	18.8269	19.2950	19.8423	20.2519	20.5049	20.5894	20.5781	20.4194	19.8851	19.0745	18.3543 (92)

Temperature adjustment												0.0000	
adjusted MIT	18.4203	18.8269	19.2950	19.8423	20.2519	20.5049	20.5894	20.5781	20.4194	19.8851	19.0745	18.3543	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9131	0.8691	0.8166	0.7302	0.6159	0.4708	0.3471	0.3798	0.5569	0.7576	0.8747	0.9227	(94)
Useful gains	426.8111	496.8137	521.4696	512.9380	453.1172	341.3854	242.2120	250.5254	348.5372	417.6657	417.1434	406.4021	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	921.7995	906.7371	830.8405	701.7027	547.1203	373.6269	252.4228	263.8234	401.5659	594.0329	769.7458	914.3884	(97)
Space heating kWh	368.2713	275.4685	230.1720	135.9105	69.9383	0.0000	0.0000	0.0000	0.0000	131.2172	253.8738	377.9418	(98a)
Space heating requirement - total per year (kWh/year)												1842.7934	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	368.2713	275.4685	230.1720	135.9105	69.9383	0.0000	0.0000	0.0000	0.0000	131.2172	253.8738	377.9418	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1842.7934	
Space heating per m2											(98c) / (4) =	34.1891	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	594.7738	468.2262	479.8916	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8363	0.8861	0.8680	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	497.4116	414.9147	416.5244	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	818.9413	788.6212	745.5509	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	231.5014	278.0377	244.7957	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	57.8753	69.5094	61.1989	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												188.5837	(107)
Energy for space heating												34.1891	(99)
Energy for space cooling												3.4988	(108)
Total												37.6879	(109)
Fabric Energy Efficiency (DFEE)												37.7	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.1750	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3642	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3095	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3947	0.3869	0.3792	0.3405	0.3328	0.2941	0.2941	0.2863	0.3095	0.3328	0.3482	0.3637	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)

Effective ac	0.5779	0.5749	0.5719	0.5580	0.5554	0.5432	0.5432	0.5410	0.5479	0.5554	0.5606	0.5661 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6600	1.1450	13.3511			(27)
External Wall 1	73.6125	13.4800	60.1325	0.1800	10.8238			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.9950			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	45.3000	0.0700	3.1710	
E18 Party wall between dwellings	6.5000	0.0600	0.3900	
E16 Corner (normal)	9.7500	0.0900	0.8775	
E17 Corner (inverted - internal area greater than external area)	3.2500	-0.0900	-0.2925	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.5875 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 31.5825 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4061	33.2313	33.0599	32.2550	32.1044	31.4034	31.4034	31.2736	31.6734	32.1044	32.4091	32.7276	(38)
Heat transfer coeff	64.9886	64.8138	64.6424	63.8375	63.6869	62.9859	62.9859	62.8560	63.2559	63.6869	63.9916	64.3101	(39)

Average = Sum(39)m / 12 = 63.8368

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2057	1.2025	1.1993	1.1844	1.1816	1.1686	1.1686	1.1662	1.1736	1.1816	1.1872	1.1931	(40)
HLP (average)												1.1844	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8051 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)

Hot water usage for other uses

33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)

Average daily hot water use (litres/day) 51.9428 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	56.6690	55.1150	53.4182	51.3057	49.4214	47.4631	47.0558	48.7491	50.4859	52.4971	54.6282	56.5894	(44)
Energy conte	89.7498	78.4830	82.1018	70.2350	66.5307	58.3614	56.9099	60.3616	62.2542	71.2380	77.8279	88.6053	(45)
Energy content (annual)										Total = Sum(45)m =		862.6586	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145	(64)
										Total per year (kWh/year) = Sum(64)m =		733.2598	(64)
12Total per year (kWh/year)												733	(64)
Electric shower(s)													
	43.6330	38.8774	42.4526	40.5120	41.2722	39.3696	40.6820	41.2722	40.5120	42.4526	41.6543	43.6330	(64a)
						Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =						496.3227	(64a)
Heat gains from water heating, kWh/month													
	29.9801	26.3970	28.0598	25.0529	24.4558	22.2442	22.2638	23.1449	23.3570	25.7512	26.9520	29.7369	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4429	87.9546	79.4429	82.0910	79.4429	82.0910	79.4429	79.4429	82.0910	79.4429	82.0910	79.4429	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	40.2958	39.2812	37.7147	34.7957	32.8707	30.8947	29.9245	31.1087	32.4403	34.6119	37.4333	39.9689	(72)
Total internal gains													
	327.1611	336.2910	322.0982	313.0680	297.4379	287.7179	277.1570	276.7085	284.8027	293.0854	309.6121	319.8916	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.6600	46.7521	0.6300	0.7000	0.7700	95.1583	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	111.4069	186.8966	251.2832	309.1225	347.9771	347.2299	333.9562	304.0328	270.8162	205.0563	132.8397	95.7711	(83)
Total gains	438.5679	523.1875	573.3814	622.1905	645.4149	634.9478	611.1133	580.7412	555.6189	498.1418	442.4518	415.6627	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.3421	25.4104	25.4778	25.7990	25.8600	26.1478	26.1478	26.2018	26.0362	25.8600	25.7369	25.6094	
alpha	2.6895	2.6940	2.6985	2.7199	2.7240	2.7432	2.7432	2.7468	2.7357	2.7240	2.7158	2.7073	
util living area	0.9460	0.9158	0.8769	0.8046	0.6993	0.5533	0.4236	0.4582	0.6390	0.8255	0.9185	0.9523	(86)
MIT	18.6503	19.0199	19.4740	20.0408	20.5022	20.8163	20.9353	20.9181	20.7117	20.1130	19.2967	18.5909	(87)
Th 2	19.9154	19.9180	19.9206	19.9325	19.9348	19.9452	19.9452	19.9472	19.9412	19.9348	19.9302	19.9255	(88)
util rest of house	0.9377	0.9034	0.8585	0.7747	0.6518	0.4821	0.3324	0.3664	0.5717	0.7924	0.9044	0.9449	(89)
MIT 2	17.8000	18.1612	18.6025	19.1482	19.5683	19.8367	19.9183	19.9110	19.7576	19.2292	18.4463	17.7488	(90)
Living area fraction									fLA = Living area / (4) =			0.6494	(91)
MIT	18.3521	18.7188	19.1684	19.7278	20.1747	20.4728	20.5787	20.5650	20.3772	19.8031	18.9985	18.2956	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3521	18.7188	19.1684	19.7278	20.1747	20.4728	20.5787	20.5650	20.3772	19.8031	18.9985	18.2956	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9225	0.8867	0.8435	0.7684	0.6632	0.5189	0.3883	0.4216	0.6009	0.7878	0.8894	0.9306	(94)
Useful gains	404.5933	463.9342	483.6700	478.0849	428.0508	329.4818	237.3111	244.8203	333.8565	392.4588	393.5037	386.7976	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	913.2270	895.6502	818.9173	691.2180	539.7306	369.9051	250.6004	261.7932	397.0684	586.1163	761.4031	906.4905	(97)
Space heating kWh	378.4235	290.1131	249.4240	153.4559	83.0898	0.0000	0.0000	0.0000	0.0000	144.0812	264.8876	386.6516	(98a)
Space heating requirement - total per year (kWh/year)												1950.1266	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	378.4235	290.1131	249.4240	153.4559	83.0898	0.0000	0.0000	0.0000	0.0000	144.0812	264.8876	386.6516	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1950.1266	
Space heating per m2										(98c) / (4) =		36.1805	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	592.0672	466.0954	477.7060	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7970	0.8552	0.8352	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	471.8826	398.6229	398.9966	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	713.4896	687.2025	653.2262	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	173.9571	214.7032	189.1468	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fC = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	43.4893	53.6758	47.2867	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												144.4518	(107)
Energy for space heating												36.1805	(99)
Energy for space cooling												2.6800	(108)
Total												38.8605	(109)
Fabric Energy Efficiency (TFEE)												38.9	(109)

Full SAP Calculation Printout

Property Reference	Flat 06	**Issued on Date**	27/07/2025
Assessment Reference	Flat 06	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	5.07	**TER**	15.92
Environmental	96 A	**% DER < TER**			68.15
CO_2 Emissions (t/year)	0.25	**DFEE**	37.69	**TFEE**	38.86
Compliance Check	See BREL	**% DFEE < TFEE**			3.02
% DPER < TPER	37.45	**DPER**	53.30	**TPER**	85.22

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.1750	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys		0 * 80 =	0.0000 (6a)
Number of open flues		0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000 (6d)
Number of flues attached to other heater		0 * 35 =	0.0000 (6e)
Number of blocked chimneys		0 * 20 =	0.0000 (6f)
Number of intermittent extract fans		2 * 10 =	20.0000 (7a)
Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		20.0000 / (5) =	0.1142 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0100 (17)
Infiltration rate			0.3647 (18)
Number of sides sheltered			2 (19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.3100 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3952	0.3875	0.3797	0.3410	0.3332	0.2945	0.2945	0.2867	0.3100	0.3332	0.3487	0.3642	(22b)
Effective ac	0.5781	0.5751	0.5721	0.5581	0.5555	0.5434	0.5434	0.5411	0.5480	0.5555	0.5608	0.5663	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	73.6125	16.5100	57.1025	0.1800	10.2784			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.9191			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		2.9445 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	31.8636 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4185	33.2432	33.0713	32.2642	32.1132	31.4102	31.4102	31.2801	31.6810	32.1132	32.4187	32.7381	(38)
Heat transfer coeff	65.2820	65.1067	64.9349	64.1278	63.9768	63.2738	63.2738	63.1436	63.5446	63.9768	64.2823	64.6016	(39)
Average = Sum(39)m / 12 =												64.1271	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2112	1.2079	1.2047	1.1898	1.1870	1.1739	1.1739	1.1715	1.1789	1.1870	1.1926	1.1985	(40)
HLP (average)												1.1897	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051	(42)
Hot water usage for mixer showers													
	61.2950	60.3739	59.0316	56.4634	54.5681	52.4545	51.2531	52.5852	54.0455	56.3149	58.9383	61.0602	(42a)
Hot water usage for baths													
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)
Hot water usage for other uses													
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)
Average daily hot water use (litres/day)												108.4548	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	117.9640	115.4889	112.4498	107.7691	103.9895	99.9176	98.3089	101.3344	104.5314	108.8119	113.5665	117.6495	(44)
Energy conte	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(45)
Energy content (annual)										Total = Sum(45)m =		1801.4233	
Distribution loss (46)m = 0.15 x (45)m													
	28.0239	24.6682	25.9247	22.1296	20.9985	18.4291	17.8344	18.8210	19.3347	22.1485	24.2694	27.6316	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
										Total per year (kWh/year) = Sum(64)m =		1801.4233	(64)
12Total per year (kWh/year)												1801	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1197	54.6812	57.4663	49.0539	46.5466	40.8511	39.5329	41.7198	42.8585	49.0959	53.7973	61.2501	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.3632	87.8664	79.3632	82.0086	79.3632	82.0086	79.3632	79.3632	82.0086	79.3632	82.0086	79.3632	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	83.4942	81.3708	77.2397	68.1304	62.5627	56.7376	53.1357	56.0750	59.5257	65.9891	74.7184	82.3254	(72)
Total internal gains													
	373.2798	381.2923	364.5435	349.3203	330.0501	313.4784	300.2885	301.5951	311.8057	327.3830	349.8148	365.1684	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	513.6295	616.7445	681.1126	738.7608	768.4450	750.9340	721.0206	684.6251	652.9843	585.7135	517.1657	485.8202	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.2281	25.2961	25.3630	25.6822	25.7429	26.0289	26.0289	26.0825	25.9179	25.7429	25.6205	25.4939	
alpha	2.6819	2.6864	2.6909	2.7121	2.7162	2.7353	2.7353	2.7388	2.7279	2.7162	2.7080	2.6996	
util living area													
	0.9250	0.8847	0.8340	0.7483	0.6321	0.4883	0.3681	0.3999	0.5752	0.7756	0.8897	0.9335	(86)
MIT	19.2718	19.5657	19.9041	20.2975	20.5983	20.7863	20.8534	20.8439	20.7211	20.3291	19.7428	19.2220	(87)
Th 2	19.9111	19.9137	19.9162	19.9282	19.9305	19.9409	19.9409	19.9429	19.9369	19.9305	19.9259	19.9212	(88)
util rest of house													
	0.9141	0.8689	0.8115	0.7145	0.5828	0.4207	0.2859	0.3163	0.5083	0.7378	0.8719	0.9238	(89)
MIT 2	17.9140	18.2789	18.6956	19.1751	19.5187	19.7221	19.7792	19.7749	19.6601	19.2265	18.5153	17.8592	(90)
Living area fraction										fLA = Living area / (4) =		0.6494	(91)
MIT	18.7957	19.1145	19.4804	19.9039	20.2197	20.4132	20.4767	20.4690	20.3490	19.9424	19.3124	18.7441	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7957	19.1145	19.4804	19.9039	20.2197	20.4132	20.4767	20.4690	20.3490	19.9424	19.3124	18.7441	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9007	0.8555	0.8014	0.7137	0.5968	0.4517	0.3282	0.3589	0.5354	0.7383	0.8600	0.9108	(94)
Useful gains	462.6451	527.6269	545.8240	527.2206	458.6051	339.1901	236.6634	245.6870	349.5864	432.4129	444.7729	442.5041	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	946.3076	925.4598	842.8778	705.6561	545.0645	367.8204	245.2951	256.9340	397.0932	597.6996	785.0382	939.5740	(97)
Space heating kWh	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98a)
Space heating requirement - total per year (kWh/year)												1778.7803	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1778.7803	
Space heating per m2											(98c) / (4) =	33.0015	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	143.9955	106.9803	88.4386	51.4100	25.7406	0.0000	0.0000	0.0000	0.0000	49.2090	98.0356	147.9872	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.6968	93.9204	98.7042	84.2550	79.9485	70.1658	67.9018	71.6580	73.6138	84.3271	92.4022	105.2032	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9274	11.9753	10.7825	7.8997	6.1019	4.9853	5.5664	7.2354	9.3981	12.3308	13.9276	15.3423	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	711.7968	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1028.7969	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	120.4728	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1861.0665	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	711.7968	0.1552	110.4863	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1028.7969	0.1416	145.6552	(264)
Space and water heating			256.1415	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.4728	0.1443	17.3880	(268)
Total CO2, kg/year			273.5295	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 5.0700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	711.7968	1.5746	1120.8270	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1028.7969	1.5235	1567.4115	(278)
Space and water heating			2688.2385	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.4728	1.5338	184.7853	(282)
Total Primary energy kWh/year			2873.0237	(286)
Dwelling Primary energy Rate (DPER)			53.3000	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b) x	3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.1750	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3642 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3095 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3947	0.3869	0.3792	0.3405	0.3328	0.2941	0.2941	0.2863	0.3095	0.3328	0.3482	0.3637	(22b)
Effective ac	0.5779	0.5749	0.5719	0.5580	0.5554	0.5432	0.5432	0.5410	0.5479	0.5554	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6600	1.1450	13.3511			(27)
External Wall 1	73.6125	13.4800	60.1325	0.1800	10.8238			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.9950			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	45.3000	0.0700	3.1710
E18 Party wall between dwellings	6.5000	0.0600	0.3900
E16 Corner (normal)	9.7500	0.0900	0.8775
E17 Corner (inverted - internal area greater than external area)	3.2500	-0.0900	-0.2925

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		5.5875 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	31.5825 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4061	33.2313	33.0599	32.2550	32.1044	31.4034	31.4034	31.2736	31.6734	32.1044	32.4091	32.7276	(38)
Heat transfer coeff	64.9886	64.8138	64.6424	63.8375	63.6869	62.9859	62.9859	62.8560	63.2559	63.6869	63.9916	64.3101	(39)
Average = Sum(39)m / 12 =												63.8368	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2057	1.2025	1.1993	1.1844	1.1816	1.1686	1.1686	1.1662	1.1736	1.1816	1.1872	1.1931	(40)
HLP (average)												1.1844	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051	(42)
Hot water usage for mixer showers													
	54.4845	53.6657	52.4725	50.1897	48.5050	46.6262	45.5583	46.7424	48.0404	50.0577	52.3896	54.2757	(42a)
Hot water usage for baths													
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)
Hot water usage for other uses													
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)
Average daily hot water use (litres/day)												102.1757	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.1535	108.7807	105.8907	101.4954	97.9264	94.0893	92.6141	95.4916	98.5264	102.5547	107.0178	110.8651	(44)
Energy conte	176.0399	154.9022	162.7501	138.9421	131.8278	115.6938	112.0087	118.2385	121.4929	139.1658	152.4665	173.5879	(45)
Energy content (annual)										Total = Sum(45)m =		1697.1161	
Distribution loss (46)m = 0.15 x (45)m													
	26.4060	23.2353	24.4125	20.8413	19.7742	17.3541	16.8013	17.7358	18.2239	20.8749	22.8700	26.0382	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.6348	196.9879	209.3450	184.0340	178.4227	160.7856	158.6036	164.8334	166.5847	185.7607	197.5583	220.1828	(62)
WWHRS	-24.9080	-22.0289	-23.0674	-19.1007	-17.8012	-15.2326	-14.2781	-15.1833	-15.7602	-18.5795	-21.0484	-24.4468	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
										Total per year (kWh/year) = Sum(64)m =		2014.2986	(64)
12Total per year (kWh/year)												2014	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8092	85.1736	91.3903	82.2717	81.1086	74.5417	74.5188	76.5902	76.4699	83.5485	86.7686	94.9939	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4429	87.9546	79.4429	82.0910	79.4429	82.0910	79.4429	79.4429	82.0910	79.4429	82.0910	79.4429	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	128.7758	126.7464	122.8365	114.2663	109.0170	103.5301	100.1597	102.9439	106.2081	112.2964	120.5119	127.6800	(72)
Total internal gains													
	418.6410	426.7561	410.2200	395.5386	376.5841	360.3532	347.3922	348.5436	358.5705	373.7700	395.6906	410.6027	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.6600	46.7521	0.6300	0.7000	0.7700	95.1583	(78)

Solar gains	111.4069	186.8966	251.2832	309.1225	347.9771	347.2299	333.9562	304.0328	270.8162	205.0563	132.8397	95.7711	(83)
Total gains	530.0479	613.6527	661.5031	704.6611	724.5612	707.5832	681.3485	652.5764	629.3867	578.8263	528.5304	506.3738	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.3421	25.4104	25.4778	25.7990	25.8600	26.1478	26.1478	26.2018	26.0362	25.8600	25.7369	25.6094	
alpha	2.6895	2.6940	2.6985	2.7199	2.7240	2.7432	2.7432	2.7468	2.7357	2.7240	2.7158	2.7073	
util living area													
	0.9199	0.8853	0.8414	0.7638	0.6542	0.5101	0.3856	0.4154	0.5887	0.7787	0.8846	0.9273	(86)
MIT	18.9050	19.2450	19.6629	20.1735	20.5822	20.8503	20.9488	20.9359	20.7664	20.2525	19.5123	18.8505	(87)
Th 2	19.9154	19.9180	19.9206	19.9325	19.9348	19.9452	19.9452	19.9472	19.9412	19.9348	19.9302	19.9255	(88)
util rest of house													
	0.9084	0.8696	0.8195	0.7310	0.6054	0.4411	0.3006	0.3297	0.5217	0.7412	0.8663	0.9169	(89)
MIT 2	17.5168	17.9384	18.4541	19.0758	19.5459	19.8336	19.9184	19.9115	19.7541	19.1847	18.2871	17.4553	(90)

Living area fraction											fLA = Living area / (4) =	0.6494	(91)
MIT	18.4182	18.7868	19.2390	19.7886	20.2188	20.4938	20.5875	20.5767	20.4115	19.8780	19.0827	18.3612	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4182	18.7868	19.2390	19.7886	20.2188	20.4938	20.5875	20.5767	20.4115	19.8780	19.0827	18.3612	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8888	0.8502	0.8038	0.7262	0.6191	0.4780	0.3532	0.3819	0.5526	0.7390	0.8490	0.8978	(94)
Useful gains	471.0891	521.7432	531.7198	511.6993	448.5660	338.2000	240.6418	249.2249	347.8256	427.7356	448.7285	454.6085	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	917.5241	900.0569	823.4797	695.0988	542.5388	371.2269	251.1554	262.5295	399.2381	590.8902	766.7926	910.7103	(97)
Space heating kWh													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98a)
Space heating requirement - total per year (kWh/year)												1695.1401	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1695.1401	
Space heating per m2											(98c) / (4) =	31.4497	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98)
Space heating efficiency (main heating system 1)													
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)													
	359.8566	275.4354	235.1780	143.0635	75.7484	0.0000	0.0000	0.0000	0.0000	131.5136	248.1106	367.6487	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2137	84.8968	84.4037	83.5658	82.3306	79.8000	79.8000	79.8000	79.8000	83.3537	84.6447	85.2816	(217)
Fuel for water heating, kWh/month													
	232.0363	206.0844	220.6983	197.3693	195.0933	182.3973	180.8591	187.5314	189.0031	200.5684	208.5304	229.5174	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5067	13.2423	11.9232	8.7354	6.7475	5.5128	6.1553	8.0009	10.3924	13.6353	15.4011	16.9654	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0405	-18.1101	-27.7562	-33.3524	-37.8875	-36.0892	-35.6643	-32.7117	-27.8479	-21.6386	-13.6384	-10.2826	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7436	-8.0966	-16.5107	-25.4205	-34.2237	-34.5988	-34.1781	-28.6457	-20.6253	-11.7651	-5.0580	-2.9432	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1836.5548	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2429.6887	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												133.2182	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-532.8285	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3952.6333	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1836.5548	0.2100	385.6765	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2429.6887	0.2100	510.2346	(264)

Space and water heating			895.9111	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.2182	0.1443	19.2275	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	0.1332	-40.9064	
PV Unit electricity exported	-225.8092	0.1252	-28.2685	
Total			-69.1749	(269)
Total CO2, kg/year			857.8930	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.9200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1836.5548	1.1300	2075.3069	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2429.6887	1.1300	2745.5483	(278)
Space and water heating			4820.8552	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.2182	1.5338	204.3346	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	1.4923	-458.1785	
PV Unit electricity exported	-225.8092	0.4595	-103.7575	
Total			-561.9360	(283)
Total Primary energy kWh/year			4593.3546	(286)
Target Primary Energy Rate (TPER)			85.2200	(287)

Summary for Input Data

Property Reference	Flat 07	**Issued on Date**	27/07/2025
Assessment Reference	Flat 07	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.17	**TER**	12.69
Environmental	97 A	**% DER < TER**			67.14
CO_2 Emissions (t/year)	0.28	**DFEE**	30.82	**TFEE**	32.15
Compliance Check	See BREL	**% DFEE < TFEE**			4.15
% DPER < TPER	35.18	**DPER**	43.79	**TPER**	67.56

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, End-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	3	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	18.50 m	74.40 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	60.13	39.48	0.00	None	20.65	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	12.53	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		11.27	0.00	0.00	Yes
E3 Sill		10.46	0.00	0.00	Yes
E4 Jamb		15.30	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		37.00	0.00	0.00	No
E16 Corner (normal)		6.50	0.00	0.00	Yes
E18 Party wall between dwellings		6.50	0.00	0.00	Yes

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	

Summary for Input Data

Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 07	**Issued on Date**	27/07/2025
Assessment Reference	Flat 07	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.17	**TER**	12.69
Environmental	97 A	**% DER < TER**			67.14
CO_2 Emissions (t/year)	0.28	**DFEE**	30.82	**TFEE**	32.15
Compliance Check	See BREL	**% DFEE < TFEE**			4.15
% DPER < TPER	35.18	**DPER**	43.79	**TPER**	67.56

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	241.8000	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0827 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3332 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2832 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3611	0.3540	0.3470	0.3116	0.3045	0.2691	0.2691	0.2620	0.2832	0.3045	0.3186	0.3328	(22b)
Effective ac	0.5652	0.5627	0.5602	0.5485	0.5464	0.5362	0.5362	0.5343	0.5401	0.5464	0.5508	0.5554	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			18.8300	1.1450	21.5611			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	60.1250	20.6500	39.4750	0.1800	7.1055			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.4866			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		2.4050 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	32.8916 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.0999	44.8978	44.6998	43.7696	43.5956	42.7855	42.7855	42.6355	43.0975	43.5956	43.9477	44.3157	(38)
Heat transfer coeff	77.9914	77.7894	77.5914	76.6612	76.4872	75.6770	75.6770	75.5270	75.9891	76.4872	76.8392	77.2073	(39)
Average = Sum(39)m / 12 =												76.6604	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0483	1.0456	1.0429	1.0304	1.0281	1.0172	1.0172	1.0151	1.0214	1.0281	1.0328	1.0377	(40)
HLP (average)												1.0304	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480	(42)
Hot water usage for mixer showers													
	71.5372	70.4622	68.8956	65.8982	63.6862	61.2194	59.8173	61.3720	63.0763	65.7249	68.7866	71.2631	(42a)
Hot water usage for baths													
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)
Hot water usage for other uses													
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)
Average daily hot water use (litres/day)												126.5828	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	137.6820	134.7926	131.2451	125.7821	121.3706	116.6179	114.7407	118.2723	122.0041	127.0002	132.5494	137.3150	(44)
Energy conte	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(45)
Energy content (annual)										Total = Sum(45)m =		2102.5281	
Distribution loss (46)m = 0.15 x (45)m													
	32.7082	28.7914	30.2578	25.8284	24.5082	21.5093	20.8153	21.9669	22.5665	25.8507	28.3261	32.2503	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
										Total per year (kWh/year) = Sum(64)m =		2102.5281	(64)
12Total per year (kWh/year)												2103	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	72.5032	63.8210	67.0715	57.2530	54.3265	47.6789	46.1407	48.6932	50.0224	57.3024	62.7896	71.4882	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5799	115.7849	104.5799	108.0659	104.5799	108.0659	104.5799	104.5799	108.0659	104.5799	108.0659	104.5799	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	97.4505	94.9717	90.1499	79.5180	73.0195	66.2208	62.0171	65.4479	69.4755	77.0193	87.2078	96.0863	(72)
Total internal gains													
	470.5923	481.4701	460.0214	441.3331	416.7783	396.7715	379.9334	381.2127	394.1482	412.7484	440.9931	460.0797	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	12.5300	46.7521	0.6300	0.7000	0.7700	179.0291	(78)

Solar gains	199.5023	332.3288	439.9726	528.9132	583.7342	577.3249	557.3928	515.7465	470.0882	362.8210	237.4668	171.7651	(83)
Total gains	670.0946	813.7989	899.9941	970.2463	1000.5125	974.0964	937.3262	896.9592	864.2363	775.5694	678.4600	631.8448	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.1485	29.2242	29.2988	29.6543	29.7218	30.0399	30.0399	30.0996	29.9166	29.7218	29.5856	29.4445	
alpha	2.9432	2.9483	2.9533	2.9770	2.9815	3.0027	3.0027	3.0066	2.9944	2.9815	2.9724	2.9630	
util living area													
	0.9260	0.8798	0.8235	0.7315	0.6109	0.4645	0.3448	0.3733	0.5449	0.7582	0.8866	0.9354	(86)
MIT	19.5279	19.8191	20.1246	20.4572	20.6949	20.8332	20.8780	20.8724	20.7893	20.4782	19.9561	19.4752	(87)
Th 2	20.0433	20.0455	20.0477	20.0581	20.0600	20.0691	20.0691	20.0707	20.0656	20.0600	20.0561	20.0520	(88)
util rest of house													
	0.9159	0.8647	0.8018	0.6996	0.5661	0.4056	0.2756	0.3028	0.4854	0.7223	0.8697	0.9264	(89)
MIT 2	18.3289	18.6897	19.0646	19.4685	19.7386	19.8889	19.9270	19.9249	19.8462	19.5045	18.8745	18.2698	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	18.8929	19.2210	19.5632	19.9336	20.1885	20.3331	20.3744	20.3706	20.2899	19.9625	19.3833	18.8368	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8929	19.2210	19.5632	19.9336	20.1885	20.3331	20.3744	20.3706	20.2899	19.9625	19.3833	18.8368	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9013	0.8497	0.7896	0.6951	0.5725	0.4227	0.2987	0.3260	0.5003	0.7182	0.8557	0.9125	(94)
Useful gains	603.9440	691.5104	710.6196	674.4504	572.8031	411.7826	279.9819	292.3903	432.3400	557.0411	580.5837	576.5756	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1138.1227	1114.0216	1013.5949	845.8523	649.2601	433.8655	285.6324	299.8900	470.3636	716.1140	943.8405	1130.0711	(97)
Space heating kWh	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98a)
Space heating requirement - total per year (kWh/year)												1878.7593	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1878.7593	
Space heating per m2											(98c) / (4) =	25.2521	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	159.0352	113.6165	90.2015	49.3835	22.7627	0.0000	0.0000	0.0000	0.0000	47.3590	104.6598	164.7862	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	124.5315	109.6190	115.2021	98.3377	93.3113	81.8934	79.2513	83.6355	85.9185	98.4226	107.8474	122.7882	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.6704	15.7803	14.2085	10.4097	8.0408	6.5694	7.3351	9.5344	12.3842	16.2488	18.3530	20.2171	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	751.8044	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1200.7585	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	158.7516	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2111.3146	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	751.8044	0.1557	117.0733	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1200.7585	0.1416	170.0012	(264)
Space and water heating			287.0746	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	158.7516	0.1443	22.9128	(268)
Total CO2, kg/year			309.9873	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.1700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	751.8044	1.5765	1185.2113	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1200.7585	1.5235	1829.4017	(278)
Space and water heating			3014.6131	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	158.7516	1.5338	243.4985	(282)
Total Primary energy kWh/year			3258.1116	(286)
Dwelling Primary energy Rate (DPER)			43.7900	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b) x	3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.8000	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3741	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3180	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4054	0.3974	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736	(22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5505	0.5584	0.5640	0.5698	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			16.7800	1.1450	19.2137			(27)
External Wall 1	60.1250	18.6000	41.5250	0.1800	7.4745			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.5082			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	11.2700	0.0500	0.5635	
E3 Sill	10.4600	0.0500	0.5230	
E4 Jamb	15.3000	0.0500	0.7650	
E7 Party floor between dwellings (in blocks of flats)	37.0000	0.0700	2.5900	
E16 Corner (normal)	6.5000	0.0900	0.5850	
E18 Party wall between dwellings	6.5000	0.0600	0.3900	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.4165	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		33.9247	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4540	46.1994	45.9498	44.7775	44.5582	43.5372	43.5372	43.3482	43.9305	44.5582	45.0019	45.4658	(38)
Heat transfer coeff	80.3787	80.1241	79.8745	78.7023	78.4830	77.4620	77.4620	77.2729	77.8552	78.4830	78.9266	79.3905	(39)
Average = Sum(39)m / 12 =												78.7012	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0804	1.0769	1.0736	1.0578	1.0549	1.0412	1.0412	1.0386	1.0464	1.0549	1.0608	1.0671	(40)
HLP (average)												1.0578	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480	(42)
Hot water usage for mixer showers													
	63.5887	62.6330	61.2405	58.5762	56.6100	54.4173	53.1710	54.5529	56.0678	58.4221	61.1437	63.3450	(42a)
Hot water usage for baths													
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)
Hot water usage for other uses													
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)
Average daily hot water use (litres/day)												119.2545	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	129.7334	126.9634	123.5900	118.4601	114.2943	109.8157	108.0944	111.4532	114.9956	119.6974	124.9064	129.3969	(44)
Energy conte	205.4660	180.7942	189.9533	162.1659	153.8621	135.0313	130.7308	138.0024	141.8011	162.4282	177.9521	202.6043	(45)
Energy content (annual)										Total = Sum(45)m =		1980.7916	
Distribution loss (46)m = 0.15 x (45)m													
	30.8199	27.1191	28.4930	24.3249	23.0793	20.2547	19.6096	20.7004	21.2702	24.3642	26.6928	30.3906	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	252.0609	222.8799	236.5482	207.2577	200.4570	180.1231	177.3257	184.5973	186.8930	209.0231	223.0439	249.1992	(62)
WWHRS	-29.0701	-25.7098	-26.9218	-22.2923	-20.7757	-17.7779	-16.6639	-17.7204	-18.3937	-21.6841	-24.5655	-28.5317	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
										Total per year (kWh/year) = Sum(64)m =		2259.3020	(64)
12Total per year (kWh/year)												2259	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	105.5934	93.7827	100.4354	89.9936	88.4351	80.9714	80.7439	83.1617	83.2223	91.2833	95.2425	104.6418	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5626	115.7658	104.5626	108.0481	104.5626	108.0481	104.5626	104.5626	108.0481	104.5626	108.0481	104.5626	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	141.9266	139.5575	134.9938	124.9912	118.8643	112.4602	108.5268	111.7765	115.5866	122.6926	132.2813	140.6476	(72)
Total internal gains													
	515.0512	526.0368	504.8481	486.7884	462.6059	442.9932	426.4258	427.5240	440.2414	458.4045	486.0489	504.6238	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308	(74)
South	11.1700	46.7521	0.6300	0.7000	0.7700	159.5974	(78)

Solar gains	177.8282	296.2195	392.1528	471.4001	520.2343	514.5107	496.7521	459.6554	418.9863	323.3947	211.6674	153.1050	(83)
Total gains	692.8794	822.2563	897.0009	958.1886	982.8402	957.5039	923.1780	887.1794	859.2277	781.7992	697.7163	657.7288	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.2828	28.3727	28.4613	28.8852	28.9659	29.3477	29.3477	29.4195	29.1995	28.9659	28.8031	28.6348	
alpha	2.8855	2.8915	2.8974	2.9257	2.9311	2.9565	2.9565	2.9613	2.9466	2.9311	2.9202	2.9090	
util living area													
	0.9223	0.8807	0.8295	0.7430	0.6268	0.4792	0.3567	0.3842	0.5556	0.7615	0.8831	0.9308	(86)
MIT	19.1394	19.5014	19.9018	20.3592	20.6961	20.9012	20.9691	20.9609	20.8399	20.4105	19.7193	19.0826	(87)
Th 2	20.0169	20.0197	20.0225	20.0354	20.0379	20.0492	20.0492	20.0513	20.0448	20.0379	20.0329	20.0278	(88)
util rest of house													
	0.9116	0.8655	0.8079	0.7111	0.5812	0.4181	0.2841	0.3107	0.4947	0.7252	0.8656	0.9212	(89)
MIT 2	17.8726	18.3210	18.8132	19.3685	19.7530	19.9742	20.0323	20.0288	19.9151	19.4428	18.6086	17.8091	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)

MIT	18.4685	18.8763	19.3253	19.8345	20.1967	20.4102	20.4730	20.4673	20.3501	19.8980	19.1311	18.4082	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4685	18.8763	19.3253	19.8345	20.1967	20.4102	20.4730	20.4673	20.3501	19.8980	19.1311	18.4082	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8908	0.8445	0.7905	0.7040	0.5890	0.4419	0.3170	0.3435	0.5149	0.7194	0.8462	0.9012	(94)
Useful gains	617.2257	694.3674	709.0995	674.5327	578.9282	423.1155	292.6273	304.7395	442.4085	562.4155	590.4284	592.7399	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	1138.8473	1119.8350	1024.4157	860.5718	666.8432	450.0732	300.0125	314.2886	486.6068	729.7384	949.5742	1127.9967	(97)
Space heating kWh													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98a)
Space heating requirement - total per year (kWh/year)												1889.2572	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1889.2572	
Space heating per m2											(98c) / (4) =	25.3932	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98)
Space heating efficiency (main heating system 1)													
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)													
	420.4620	309.7662	254.1660	145.1226	70.8654	0.0000	0.0000	0.0000	0.0000	134.8735	280.1571	431.4529	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2898	84.8923	84.3128	83.3480	82.0185	79.8000	79.8000	79.8000	79.8000	83.1650	84.6540	85.3672	(217)
Fuel for water heating, kWh/month													
	261.4506	232.2593	248.6294	221.9193	219.0743	203.4401	201.3305	209.1188	211.1520	225.2619	234.4583	258.4921	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.7260	17.4294	15.6933	11.4976	8.8811	7.2559	8.1016	10.5308	13.6784	17.9468	20.2709	22.3299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.4607	-24.6716	-37.6751	-45.0891	-51.0410	-48.5313	-47.9380	-44.0442	-37.6205	-29.3823	-18.6085	-14.0654	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.3266	-11.5023	-23.4280	-36.0371	-48.4965	-49.0418	-48.4678	-40.6495	-29.2887	-16.7260	-7.1987	-4.1905	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2046.8658	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2726.5866	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	175.3417	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-735.4813	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4299.3128	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2046.8658	0.2100	429.8418	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2726.5866	0.2100	572.5832	(264)
Space and water heating			1002.4250	(265)

Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	175.3417	0.1443	25.3072	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	0.1333	-55.3461	
PV Unit electricity exported	-320.3536	0.1252	-40.1090	
Total			-95.4551	(269)
Total CO2, kg/year			944.2064	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2046.8658	1.1300	2312.9584	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2726.5866	1.1300	3081.0429	(278)
Space and water heating			5394.0012	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	175.3417	1.5338	268.9449	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	1.4927	-619.6474	
PV Unit electricity exported	-320.3536	0.4595	-147.2169	
Total			-766.8643	(283)
Total Primary energy kWh/year			5026.1826	(286)
Target Primary Energy Rate (TPER)			67.5600	(287)

Full SAP Calculation Printout

Property Reference	Flat 07	**Issued on Date**	27/07/2025
Assessment Reference	Flat 07	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.17	**TER**	12.69
Environmental	97 A	**% DER < TER**			67.14
CO_2 Emissions (t/year)	0.28	**DFEE**	30.82	**TFEE**	32.15
Compliance Check	See BREL	**% DFEE < TFEE**			4.15
% DPER < TPER	35.18	**DPER**	43.79	**TPER**	67.56

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000 (1b)	x	3.2500 (2b)	=	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	241.8000	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3746	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3184	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4059	0.3980	0.3900	0.3502	0.3423	0.3025	0.3025	0.2945	0.3184	0.3423	0.3582	0.3741	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000 (23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5824	0.5792	0.5761	0.5613	0.5586	0.5457	0.5457	0.5434	0.5507	0.5586	0.5641	0.5700	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			18.8300	1.1450	21.5611			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	60.1250	20.6500	39.4750	0.1800	7.1055			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.4866			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)	2.4050 (36)
Point Thermal bridges (36a) =	0.0000
Total fabric heat loss (33) + (36) + (36a) =	32.8916 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4715	46.2162	45.9660	44.7906	44.5707	43.5470	43.5470	43.3574	43.9413	44.5707	45.0156	45.4807	(38)
Heat transfer coeff													

	79.3631	79.1078	78.8575	77.6822	77.4623	76.4385	76.4385	76.2490	76.8329	77.4623	77.9071	78.3722 (39)
Average = Sum(39)m / 12 =												77.6811

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0667	1.0633	1.0599	1.0441	1.0412	1.0274	1.0274	1.0249	1.0327	1.0412	1.0471	1.0534	(40)
HLP (average)												1.0441	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756 (42b)
Hot water usage for other uses												
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763 (42c)
Average daily hot water use (litres/day)												60.6278 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	66.1447	64.3304	62.3495	59.8839	57.6843	55.3985	54.9234	56.9003	58.9278	61.2753	63.7627	66.0519	(44)
Energy conte	104.7571	91.6056	95.8289	81.9780	77.6542	68.1189	66.4251	70.4544	72.6639	83.1500	90.8417	103.4213	(45)
Energy content (annual)										Total = Sum(45)m =		1006.8990	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(64)
										Total per year (kWh/year) = Sum(64)m =		855.8642	(64)
12Total per year (kWh/year)												856	(64)
Electric shower(s)													
	50.9239	45.3736	49.5463	47.2814	48.1686	45.9482	47.4798	48.1686	47.2814	49.5463	48.6146	50.9239	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												579.2565	(64a)
Heat gains from water heating, kWh/month													
	34.9919	30.8096	32.7502	29.2407	28.5437	25.9623	25.9853	27.0137	27.2614	30.0559	31.4575	34.7080	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5799	115.7849	104.5799	108.0659	104.5799	108.0659	104.5799	104.5799	108.0659	104.5799	108.0659	104.5799	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	47.0321	45.8476	44.0191	40.6121	38.3651	36.0588	34.9265	36.3088	37.8631	40.3978	43.6910	46.6505	(72)
Total internal gains													
	417.1739	429.3460	410.8907	399.4271	379.1239	366.6095	352.8428	352.0735	362.5357	373.1269	394.4764	407.6440	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	12.5300	46.7521	0.6300	0.7000	0.7700	179.0291	(78)

Solar gains	199.5023	332.3288	439.9726	528.9132	583.7342	577.3249	557.3928	515.7465	470.0882	362.8210	237.4668	171.7651 (83)
Total gains	616.6762	761.6748	850.8633	928.3404	962.8581	943.9344	910.2356	867.8201	832.6239	735.9479	631.9432	579.4090 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	28.6447	28.7372	28.8284	29.2645	29.3476	29.7407	29.7407	29.8146	29.5880	29.3476	29.1800	29.0069
alpha	2.9096	2.9158	2.9219	2.9510	2.9565	2.9827	2.9827	2.9876	2.9725	2.9565	2.9453	2.9338
util living area												
	0.9392	0.8964	0.8428	0.7515	0.6311	0.4803	0.3573	0.3876	0.5642	0.7800	0.9032	0.9475 (86)
MIT	19.0169	19.4278	19.8643	20.3511	20.6979	20.9036	20.9701	20.9613	20.8377	20.3792	19.6299	18.9507 (87)
Th 2	20.0281	20.0309	20.0337	20.0467	20.0492	20.0606	20.0606	20.0627	20.0562	20.0492	20.0442	20.0391 (88)
util rest of house												
	0.9306	0.8827	0.8224	0.7203	0.5859	0.4197	0.2854	0.3144	0.5036	0.7452	0.8880	0.9400 (89)
MIT 2	18.2358	18.6349	19.0548	19.5187	19.8278	20.0034	20.0478	20.0452	19.9531	19.5572	18.8477	18.1791 (90)
Living area fraction										fLA = Living area / (4) =		0.4704 (91)
MIT	18.6033	19.0079	19.4356	19.9103	20.2371	20.4269	20.4817	20.4762	20.3692	19.9439	19.2157	18.5421 (92)

Temperature adjustment												0.0000	
adjusted MIT	18.6033	19.0079	19.4356	19.9103	20.2371	20.4269	20.4817	20.4762	20.3692	19.9439	19.2157	18.5421	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9148	0.8657	0.8082	0.7155	0.5953	0.4439	0.3181	0.3473	0.5244	0.7410	0.8724	0.9251	(94)
Useful gains	564.1210	659.3608	687.6471	664.2587	573.1635	419.0373	289.5656	301.3672	436.6594	545.3371	551.3190	536.0311	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1135.1516	1116.0459	1020.0689	855.3033	661.3042	445.3966	296.7105	310.8059	481.6820	723.7997	943.8959	1124.0189	(97)
Space heating kWh	424.8468	306.8923	247.3219	137.5521	65.5767	0.0000	0.0000	0.0000	0.0000	132.7761	282.6554	437.4630	(98a)
Space heating requirement - total per year (kWh/year)												2035.0843	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	424.8468	306.8923	247.3219	137.5521	65.5767	0.0000	0.0000	0.0000	0.0000	132.7761	282.6554	437.4630	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2035.0843	
Space heating per m2											(98c) / (4) =	27.3533	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	718.5223	565.6452	579.4922	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8726	0.9163	0.9027	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	626.9555	518.2757	523.1321	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1063.5721	1026.2251	978.6832	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	314.3640	377.9143	338.9300	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	78.5910	94.4786	84.7325	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												257.8021	(107)
Energy for space heating												27.3533	(99)
Energy for space cooling												3.4651	(108)
Total												30.8184	(109)
Fabric Energy Efficiency (DFEE)												30.8	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.8000	(5)

2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3741	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3180	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4054	0.3974	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000	(23c)

Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5505	0.5584	0.5640	0.5698	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			16.7800	1.1450	19.2137			(27)
External Wall 1	60.1250	18.6000	41.5250	0.1800	7.4745			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.5082			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	11.2700	0.0500	0.5635
E3 Sill	10.4600	0.0500	0.5230
E4 Jamb	15.3000	0.0500	0.7650
E7 Party floor between dwellings (in blocks of flats)	37.0000	0.0700	2.5900
E16 Corner (normal)	6.5000	0.0900	0.5850
E18 Party wall between dwellings	6.5000	0.0600	0.3900

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.4165 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 33.9247 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4540	46.1994	45.9498	44.7775	44.5582	43.5372	43.5372	43.3482	43.9305	44.5582	45.0019	45.4658	(38)
Heat transfer coeff	80.3787	80.1241	79.8745	78.7023	78.4830	77.4620	77.4620	77.2729	77.8552	78.4830	78.9266	79.3905	(39)
Average = Sum(39)m / 12 =												78.7012	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0804	1.0769	1.0736	1.0578	1.0549	1.0412	1.0412	1.0386	1.0464	1.0549	1.0608	1.0671	(40)
HLP (average)												1.0578	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3480 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)

Hot water usage for other uses

38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)

Average daily hot water use (litres/day) 60.6278 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	66.1447	64.3304	62.3495	59.8839	57.6843	55.3985	54.9234	56.9003	58.9278	61.2753	63.7627	66.0519	(44)
Energy conte	104.7571	91.6056	95.8289	81.9780	77.6542	68.1189	66.4251	70.4544	72.6639	83.1500	90.8417	103.4213	(45)
Energy content (annual)										Total = Sum(45)m =		1006.8990	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(64)
										Total per year (kWh/year) = Sum(64)m =		855.8642	(64)
12Total per year (kWh/year)												856	(64)
Electric shower(s)													
	50.9239	45.3736	49.5463	47.2814	48.1686	45.9482	47.4798	48.1686	47.2814	49.5463	48.6146	50.9239	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 579.2565 (64a)													
Heat gains from water heating, kWh/month													
	34.9919	30.8096	32.7502	29.2407	28.5437	25.9623	25.9853	27.0137	27.2614	30.0559	31.4575	34.7080	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5626	115.7658	104.5626	108.0481	104.5626	108.0481	104.5626	104.5626	108.0481	104.5626	108.0481	104.5626	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	47.0321	45.8476	44.0191	40.6121	38.3651	36.0588	34.9265	36.3088	37.8631	40.3978	43.6910	46.6505	(72)
Total internal gains													
	417.1567	429.3269	410.8734	399.4093	379.1067	366.5917	352.8255	352.0563	362.5179	373.1096	394.4585	407.6267	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308	(74)
South	11.1700	46.7521	0.6300	0.7000	0.7700	159.5974	(78)

Solar gains	177.8282	296.2195	392.1528	471.4001	520.2343	514.5107	496.7521	459.6554	418.9863	323.3947	211.6674	153.1050	(83)
Total gains	594.9849	725.5464	803.0262	870.8094	899.3410	881.1024	849.5777	811.7116	781.5042	696.5043	606.1260	560.7317	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.2828	28.3727	28.4613	28.8852	28.9659	29.3477	29.3477	29.4195	29.1995	28.9659	28.8031	28.6348	
alpha	2.8855	2.8915	2.8974	2.9257	2.9311	2.9565	2.9565	2.9613	2.9466	2.9311	2.9202	2.9090	
util living area	0.9444	0.9073	0.8604	0.7776	0.6635	0.5126	0.3846	0.4157	0.5952	0.8014	0.9123	0.9518	(86)
MIT	18.9354	19.3268	19.7610	20.2665	20.6445	20.8817	20.9622	20.9517	20.8072	20.3115	19.5511	18.8739	(87)
Th 2	20.0169	20.0197	20.0225	20.0354	20.0379	20.0492	20.0492	20.0513	20.0448	20.0379	20.0329	20.0278	(88)
util rest of house	0.9363	0.8946	0.8414	0.7476	0.6182	0.4491	0.3074	0.3375	0.5332	0.7681	0.8981	0.9447	(89)
MIT 2	18.1486	18.5301	18.9500	19.4348	19.7754	19.9784	20.0330	20.0293	19.9213	19.4889	18.7644	18.0963	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	18.5187	18.9049	19.3315	19.8260	20.1843	20.4033	20.4701	20.4632	20.3380	19.8758	19.1345	18.4621	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5187	18.9049	19.3315	19.8260	20.1843	20.4033	20.4701	20.4632	20.3380	19.8758	19.1345	18.4621	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9208	0.8774	0.8260	0.7406	0.6255	0.4735	0.3422	0.3722	0.5531	0.7619	0.8823	0.9302	(94)
Useful gains	547.8889	636.5694	663.2959	644.8797	562.5380	417.1696	290.7205	302.1437	432.2314	530.6385	534.7883	521.5738	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1142.8830	1122.1287	1024.9091	859.9035	665.8699	449.5383	299.7863	313.9783	485.6645	727.9956	949.8396	1132.2736	(97)
Space heating kWh	442.6756	326.2959	269.0402	154.8171	76.8790	0.0000	0.0000	0.0000	0.0000	146.8337	298.8369	454.3606	(98a)
Space heating requirement - total per year (kWh/year)												2169.7391	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	442.6756	326.2959	269.0402	154.8171	76.8790	0.0000	0.0000	0.0000	0.0000	146.8337	298.8369	454.3606	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2169.7391	
Space heating per m2											(98c) / (4) =	29.1632	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	728.1426	573.2187	587.2741	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8484	0.8982	0.8831	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	617.7734	514.8425	518.6104	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	990.1514	955.3447	913.1200	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	268.1122	327.7337	293.5152	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	67.0280	81.9334	73.3788	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												222.3402	(107)
Energy for space heating												29.1632	(99)
Energy for space cooling												2.9884	(108)
Total												32.1516	(109)
Fabric Energy Efficiency (TFEE)												32.2	(109)

Full SAP Calculation Printout

Property Reference	Flat 07	**Issued on Date**	27/07/2025
Assessment Reference	Flat 07	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.17	**TER**	12.69
Environmental	97 A	**% DER < TER**			67.14
CO_2 Emissions (t/year)	0.28	**DFEE**	30.82	**TFEE**	32.15
Compliance Check	See BREL	**% DFEE < TFEE**			4.15
% DPER < TPER	35.18	**DPER**	43.79	**TPER**	67.56

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	241.8000	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0827 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3332 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2832 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3611	0.3540	0.3470	0.3116	0.3045	0.2691	0.2691	0.2620	0.2832	0.3045	0.3186	0.3328	(22b)
Effective ac	0.5652	0.5627	0.5602	0.5485	0.5464	0.5362	0.5362	0.5343	0.5401	0.5464	0.5508	0.5554	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			18.8300	1.1450	21.5611			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	60.1250	20.6500	39.4750	0.1800	7.1055			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.4866			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		2.4050 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	32.8916 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.0999	44.8978	44.6998	43.7696	43.5956	42.7855	42.7855	42.6355	43.0975	43.5956	43.9477	44.3157	(38)
Heat transfer coeff	77.9914	77.7894	77.5914	76.6612	76.4872	75.6770	75.6770	75.5270	75.9891	76.4872	76.8392	77.2073	(39)
Average = Sum(39)m / 12 =												76.6604	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0483	1.0456	1.0429	1.0304	1.0281	1.0172	1.0172	1.0151	1.0214	1.0281	1.0328	1.0377	(40)
HLP (average)												1.0304	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480	(42)
Hot water usage for mixer showers													
	71.5372	70.4622	68.8956	65.8982	63.6862	61.2194	59.8173	61.3720	63.0763	65.7249	68.7866	71.2631	(42a)
Hot water usage for baths													
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)
Hot water usage for other uses													
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)
Average daily hot water use (litres/day)												126.5828	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	137.6820	134.7926	131.2451	125.7821	121.3706	116.6179	114.7407	118.2723	122.0041	127.0002	132.5494	137.3150	(44)
Energy conte	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(45)
Energy content (annual)										Total = Sum(45)m =		2102.5281	
Distribution loss (46)m = 0.15 x (45)m													
	32.7082	28.7914	30.2578	25.8284	24.5082	21.5093	20.8153	21.9669	22.5665	25.8507	28.3261	32.2503	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
										Total per year (kWh/year) = Sum(64)m =		2102.5281	(64)
12Total per year (kWh/year)												2103	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	72.5032	63.8210	67.0715	57.2530	54.3265	47.6789	46.1407	48.6932	50.0224	57.3024	62.7896	71.4882	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5799	115.7849	104.5799	108.0659	104.5799	108.0659	104.5799	104.5799	108.0659	104.5799	108.0659	104.5799	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	97.4505	94.9717	90.1499	79.5180	73.0195	66.2208	62.0171	65.4479	69.4755	77.0193	87.2078	96.0863	(72)
Total internal gains													
	470.5923	481.4701	460.0214	441.3331	416.7783	396.7715	379.9334	381.2127	394.1482	412.7484	440.9931	460.0797	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	12.5300	46.7521	0.6300	0.7000	0.7700	179.0291	(78)

Solar gains	199.5023	332.3288	439.9726	528.9132	583.7342	577.3249	557.3928	515.7465	470.0882	362.8210	237.4668	171.7651	(83)
Total gains	670.0946	813.7989	899.9941	970.2463	1000.5125	974.0964	937.3262	896.9592	864.2363	775.5694	678.4600	631.8448	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.1485	29.2242	29.2988	29.6543	29.7218	30.0399	30.0399	30.0996	29.9166	29.7218	29.5856	29.4445	
alpha	2.9432	2.9483	2.9533	2.9770	2.9815	3.0027	3.0027	3.0066	2.9944	2.9815	2.9724	2.9630	
util living area													
	0.9260	0.8798	0.8235	0.7315	0.6109	0.4645	0.3448	0.3733	0.5449	0.7582	0.8866	0.9354	(86)
MIT	19.5279	19.8191	20.1246	20.4572	20.6949	20.8332	20.8780	20.8724	20.7893	20.4782	19.9561	19.4752	(87)
Th 2	20.0433	20.0455	20.0477	20.0581	20.0600	20.0691	20.0691	20.0707	20.0656	20.0600	20.0561	20.0520	(88)
util rest of house													
	0.9159	0.8647	0.8018	0.6996	0.5661	0.4056	0.2756	0.3028	0.4854	0.7223	0.8697	0.9264	(89)
MIT 2	18.3289	18.6897	19.0646	19.4685	19.7386	19.8889	19.9270	19.9249	19.8462	19.5045	18.8745	18.2698	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	18.8929	19.2210	19.5632	19.9336	20.1885	20.3331	20.3744	20.3706	20.2899	19.9625	19.3833	18.8368	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8929	19.2210	19.5632	19.9336	20.1885	20.3331	20.3744	20.3706	20.2899	19.9625	19.3833	18.8368	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9013	0.8497	0.7896	0.6951	0.5725	0.4227	0.2987	0.3260	0.5003	0.7182	0.8557	0.9125	(94)
Useful gains	603.9440	691.5104	710.6196	674.4504	572.8031	411.7826	279.9819	292.3903	432.3400	557.0411	580.5837	576.5756	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1138.1227	1114.0216	1013.5949	845.8523	649.2601	433.8655	285.6324	299.8900	470.3636	716.1140	943.8405	1130.0711	(97)
Space heating kWh	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98a)
Space heating requirement - total per year (kWh/year)												1878.7593	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1878.7593	
Space heating per m2											(98c) / (4) =	25.2521	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	397.4290	283.9275	225.4137	123.4094	56.8840	0.0000	0.0000	0.0000	0.0000	118.3502	261.5449	411.8006	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	159.0352	113.6165	90.2015	49.3835	22.7627	0.0000	0.0000	0.0000	0.0000	47.3590	104.6598	164.7862	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	124.5315	109.6190	115.2021	98.3377	93.3113	81.8934	79.2513	83.6355	85.9185	98.4226	107.8474	122.7882	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.6704	15.7803	14.2085	10.4097	8.0408	6.5694	7.3351	9.5344	12.3842	16.2488	18.3530	20.2171	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	751.8044	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1200.7585	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	158.7516	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2111.3146	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	751.8044	0.1557	117.0733	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1200.7585	0.1416	170.0012	(264)
Space and water heating			287.0746	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	158.7516	0.1443	22.9128	(268)
Total CO2, kg/year			309.9873	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.1700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	751.8044	1.5765	1185.2113	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1200.7585	1.5235	1829.4017	(278)
Space and water heating			3014.6131	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	158.7516	1.5338	243.4985	(282)
Total Primary energy kWh/year			3258.1116	(286)
Dwelling Primary energy Rate (DPER)			43.7900	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b) x	3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.8000	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3741	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3180	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4054	0.3974	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736	(22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5505	0.5584	0.5640	0.5698	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			16.7800	1.1450	19.2137			(27)
External Wall 1	60.1250	18.6000	41.5250	0.1800	7.4745			(29a)
Total net area of external elements Aum(A, m2)			60.1250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.5082			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	11.2700	0.0500	0.5635	
E3 Sill	10.4600	0.0500	0.5230	
E4 Jamb	15.3000	0.0500	0.7650	
E7 Party floor between dwellings (in blocks of flats)	37.0000	0.0700	2.5900	
E16 Corner (normal)	6.5000	0.0900	0.5850	
E18 Party wall between dwellings	6.5000	0.0600	0.3900	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.4165	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		33.9247	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4540	46.1994	45.9498	44.7775	44.5582	43.5372	43.5372	43.3482	43.9305	44.5582	45.0019	45.4658	(38)
Heat transfer coeff	80.3787	80.1241	79.8745	78.7023	78.4830	77.4620	77.4620	77.2729	77.8552	78.4830	78.9266	79.3905	(39)
Average = Sum(39)m / 12 =												78.7012	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0804	1.0769	1.0736	1.0578	1.0549	1.0412	1.0412	1.0386	1.0464	1.0549	1.0608	1.0671	(40)
HLP (average)												1.0578	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480	(42)
Hot water usage for mixer showers													
	63.5887	62.6330	61.2405	58.5762	56.6100	54.4173	53.1710	54.5529	56.0678	58.4221	61.1437	63.3450	(42a)
Hot water usage for baths													
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)
Hot water usage for other uses													
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)
Average daily hot water use (litres/day)												119.2545	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	129.7334	126.9634	123.5900	118.4601	114.2943	109.8157	108.0944	111.4532	114.9956	119.6974	124.9064	129.3969	(44)
Energy conte	205.4660	180.7942	189.9533	162.1659	153.8621	135.0313	130.7308	138.0024	141.8011	162.4282	177.9521	202.6043	(45)
Energy content (annual)										Total = Sum(45)m =		1980.7916	
Distribution loss (46)m = 0.15 x (45)m													
	30.8199	27.1191	28.4930	24.3249	23.0793	20.2547	19.6096	20.7004	21.2702	24.3642	26.6928	30.3906	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	252.0609	222.8799	236.5482	207.2577	200.4570	180.1231	177.3257	184.5973	186.8930	209.0231	223.0439	249.1992	(62)
WWHRS	-29.0701	-25.7098	-26.9218	-22.2923	-20.7757	-17.7779	-16.6639	-17.7204	-18.3937	-21.6841	-24.5655	-28.5317	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
										Total per year (kWh/year) = Sum(64)m =		2259.3020	(64)
12Total per year (kWh/year)												2259	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	105.5934	93.7827	100.4354	89.9936	88.4351	80.9714	80.7439	83.1617	83.2223	91.2833	95.2425	104.6418	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5626	115.7658	104.5626	108.0481	104.5626	108.0481	104.5626	104.5626	108.0481	104.5626	108.0481	104.5626	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	141.9266	139.5575	134.9938	124.9912	118.8643	112.4602	108.5268	111.7765	115.5866	122.6926	132.2813	140.6476	(72)
Total internal gains													
	515.0512	526.0368	504.8481	486.7884	462.6059	442.9932	426.4258	427.5240	440.2414	458.4045	486.0489	504.6238	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308	(74)
South	11.1700	46.7521	0.6300	0.7000	0.7700	159.5974	(78)

Solar gains	177.8282	296.2195	392.1528	471.4001	520.2343	514.5107	496.7521	459.6554	418.9863	323.3947	211.6674	153.1050	(83)
Total gains	692.8794	822.2563	897.0009	958.1886	982.8402	957.5039	923.1780	887.1794	859.2277	781.7992	697.7163	657.7288	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.2828	28.3727	28.4613	28.8852	28.9659	29.3477	29.3477	29.4195	29.1995	28.9659	28.8031	28.6348	
alpha	2.8855	2.8915	2.8974	2.9257	2.9311	2.9565	2.9565	2.9613	2.9466	2.9311	2.9202	2.9090	
util living area													
	0.9223	0.8807	0.8295	0.7430	0.6268	0.4792	0.3567	0.3842	0.5556	0.7615	0.8831	0.9308	(86)
MIT	19.1394	19.5014	19.9018	20.3592	20.6961	20.9012	20.9691	20.9609	20.8399	20.4105	19.7193	19.0826	(87)
Th 2	20.0169	20.0197	20.0225	20.0354	20.0379	20.0492	20.0492	20.0513	20.0448	20.0379	20.0329	20.0278	(88)
util rest of house													
	0.9116	0.8655	0.8079	0.7111	0.5812	0.4181	0.2841	0.3107	0.4947	0.7252	0.8656	0.9212	(89)
MIT 2	17.8726	18.3210	18.8132	19.3685	19.7530	19.9742	20.0323	20.0288	19.9151	19.4428	18.6086	17.8091	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)

MIT	18.4685	18.8763	19.3253	19.8345	20.1967	20.4102	20.4730	20.4673	20.3501	19.8980	19.1311	18.4082	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4685	18.8763	19.3253	19.8345	20.1967	20.4102	20.4730	20.4673	20.3501	19.8980	19.1311	18.4082	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8908	0.8445	0.7905	0.7040	0.5890	0.4419	0.3170	0.3435	0.5149	0.7194	0.8462	0.9012	(94)
Useful gains	617.2257	694.3674	709.0995	674.5327	578.9282	423.1155	292.6273	304.7395	442.4085	562.4155	590.4284	592.7399	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	1138.8473	1119.8350	1024.4157	860.5718	666.8432	450.0732	300.0125	314.2886	486.6068	729.7384	949.5742	1127.9967	(97)
Space heating kWh													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98a)
Space heating requirement - total per year (kWh/year)												1889.2572	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1889.2572	
Space heating per m2											(98c) / (4) =	25.3932	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	388.0865	285.9142	234.5952	133.9482	65.4088	0.0000	0.0000	0.0000	0.0000	124.4883	258.5850	398.2310	(98)
Space heating efficiency (main heating system 1)													
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)													
	420.4620	309.7662	254.1660	145.1226	70.8654	0.0000	0.0000	0.0000	0.0000	134.8735	280.1571	431.4529	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2898	84.8923	84.3128	83.3480	82.0185	79.8000	79.8000	79.8000	79.8000	83.1650	84.6540	85.3672	(217)
Fuel for water heating, kWh/month													
	261.4506	232.2593	248.6294	221.9193	219.0743	203.4401	201.3305	209.1188	211.1520	225.2619	234.4583	258.4921	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.7260	17.4294	15.6933	11.4976	8.8811	7.2559	8.1016	10.5308	13.6784	17.9468	20.2709	22.3299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.4607	-24.6716	-37.6751	-45.0891	-51.0410	-48.5313	-47.9380	-44.0442	-37.6205	-29.3823	-18.6085	-14.0654	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.3266	-11.5023	-23.4280	-36.0371	-48.4965	-49.0418	-48.4678	-40.6495	-29.2887	-16.7260	-7.1987	-4.1905	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2046.8658	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2726.5866	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	175.3417	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-735.4813	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4299.3128	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2046.8658	0.2100	429.8418	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2726.5866	0.2100	572.5832	(264)
Space and water heating			1002.4250	(265)

Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	175.3417	0.1443	25.3072	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	0.1333	-55.3461	
PV Unit electricity exported	-320.3536	0.1252	-40.1090	
Total			-95.4551	(269)
Total CO2, kg/year			944.2064	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2046.8658	1.1300	2312.9584	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2726.5866	1.1300	3081.0429	(278)
Space and water heating			5394.0012	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	175.3417	1.5338	268.9449	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	1.4927	-619.6474	
PV Unit electricity exported	-320.3536	0.4595	-147.2169	
Total			-766.8643	(283)
Total Primary energy kWh/year			5026.1826	(286)
Target Primary Energy Rate (TPER)			67.5600	(287)

Summary for Input Data

Property Reference	Flat 08	**Issued on Date**	27/07/2025
Assessment Reference	Flat 08	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	3	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	9.60 m	54.00 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	31.20	14.69	0.00	None	16.51	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory None

15.0 Draught Proofing 100 %

16.0 Draught Lobby No

17.0 Thermal Bridging User Input

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		19.20	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes

Y-value 0.04 W/m²K

Description RCDa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present No

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys 0

Number of open flues 0

Number of chimneys/flues attached to closed fire 0

Number of flues attached to solid fuel boiler 0

Number of flues attached to other heater 0

Number of blocked chimneys 0

Number of intermittent extract fans 2

Number of passive vents 0

Number of flueless gas fires 0

21.0 Fixed Cooling System No

22.0 Pressure Testing Yes

Designed AP_{50} 5.01 m³/(h.m²) @ 50 Pa

Property Tested? Yes

Test Method Blower Door

22.0 Lighting

No Fixed Lighting No

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1 SAP table

Percentage of Heat 100.00 %

Database Ref. No. 0

Fuel Type Electricity

SAP Code 214

Controls SAP Code 2207

Delayed Start Stat No

HETAS approved System No

Is MHS Pumped Pump in heated space

Heating Pump Age 2013 or later

Heat Emitter Underfloor

Underfloor Heating Yes - Pipes in thin screed

Flow Temperature Enter value

Summary for Input Data

Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 08	**Issued on Date**	27/07/2025
Assessment Reference	Flat 08	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.2480	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	22.5328	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272	(39)
Average = Sum(39)m / 12 =												54.8523	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246	(40)
HLP (average)												1.0158	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												108.5529	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)										Total = Sum(45)m =		1803.0542	
Distribution loss (46)m = 0.15 x (45)m													
	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains													
	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226	
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882	
util living area													
	0.9157	0.8676	0.8078	0.7086	0.5819	0.4354	0.3217	0.3511	0.5223	0.7394	0.8731	0.9256	(86)
MIT	19.6079	19.8877	20.1839	20.5069	20.7265	20.8470	20.8833	20.8785	20.8055	20.5190	20.0249	19.5618	(87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629	(88)
util rest of house													
	0.9046	0.8516	0.7852	0.6762	0.5378	0.3796	0.2575	0.2850	0.4647	0.7027	0.8549	0.9156	(89)
MIT 2	18.4347	18.7805	19.1427	19.5344	19.7820	19.9144	19.9451	19.9440	19.8739	19.5602	18.9666	18.3855	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8929	0.8410	0.7790	0.6796	0.5535	0.4065	0.2907	0.3189	0.4903	0.7073	0.8458	0.9042	(94)
Useful gains	459.0633	519.0977	530.9664	502.4090	425.6017	305.4686	209.7185	218.4902	320.3372	414.5702	437.8312	439.7165	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	834.2454	815.0506	741.2650	617.9035	475.5866	319.6116	213.4678	223.5367	346.1147	524.1335	690.4843	827.0258	(97)
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98a)
Space heating requirement - total per year (kWh/year)												1306.4062	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1306.4062	
Space heating per m2											(98c) / (4) =	24.1927	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	111.6989	79.5839	62.6099	33.2757	14.8814	0.0000	0.0000	0.0000	0.0000	32.6191	72.7932	115.3094	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												522.7716	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1029.7283	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1673.1706	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	522.7716	0.1558	81.4658	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			227.2529	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)
Total CO2, kg/year			244.6694	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.5300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	522.7716	1.5769	824.3589	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2393.1894	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2578.2782	(286)
Dwelling Primary energy Rate (DPER)			47.7500	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440
E18 Party wall between dwellings	13.0000	0.0600	0.7800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5655 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	21.9455 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												102.2682	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	
Distribution loss (46)m = 0.15 x (45)m													
	26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
WWHRS	-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
											Total per year (kWh/year) = Sum(64)m =	2015.6255	(64)
12Total per year (kWh/year)												2016	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area													
	0.9089	0.8674	0.8150	0.7239	0.6027	0.4541	0.3356	0.3632	0.5334	0.7408	0.8661	0.9177	(86)
MIT	19.3557	19.6759	20.0380	20.4553	20.7534	20.9246	20.9775	20.9709	20.8718	20.5009	19.8868	19.3066	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house													
	0.8972	0.8514	0.7930	0.6923	0.5587	0.3972	0.2696	0.2958	0.4757	0.7045	0.8473	0.9069	(89)
MIT 2	18.1697	18.5648	19.0083	19.5129	19.8506	20.0351	20.0801	20.0776	19.9842	19.5787	18.8417	18.1161	(90)
Living area fraction											fLA = Living area / (4) =	0.6481	(91)
MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8805	0.8362	0.7829	0.6939	0.5762	0.4302	0.3113	0.3380	0.5062	0.7084	0.8344	0.8905	(94)
Useful gains	467.3108	513.8383	518.5707	489.6358	418.0620	304.8196	212.4333	220.9121	319.0381	410.6113	441.5938	451.5061	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	811.0892	794.5329	725.4808	608.9595	472.6564	321.0480	216.9151	226.7690	346.7108	518.1416	675.7290	803.8498	(97)
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98a)
Space heating requirement - total per year (kWh/year)												1235.5940	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1235.5940	
Space heating per m2											(98c) / (4) =	22.8814	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	277.1085	204.3628	166.7834	93.0803	44.0067	0.0000	0.0000	0.0000	0.0000	86.6766	182.6407	284.0127	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6365	84.2273	83.6340	82.6684	81.4657	79.8000	79.8000	79.8000	79.8000	82.5052	83.9553	84.7141	(217)
Fuel for water heating, kWh/month	233.7804	207.8654	222.8809	199.6432	197.2914	182.5113	180.9699	187.6483	189.1231	202.7633	210.3846	231.2142	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1338.6718	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2446.0762	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3470.3688	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1338.6718	0.2100	281.1211	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2446.0762	0.2100	513.6760	(264)
Space and water heating			794.7971	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			756.6824	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.0100	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1338.6718	1.1300	1512.6991	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2446.0762	1.1300	2764.0661	(278)
Space and water heating			4276.7651	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4048.5927	(286)
Target Primary Energy Rate (TPER)			74.9700	(287)

Full SAP Calculation Printout

Property Reference	Flat 08	**Issued on Date**	27/07/2025
Assessment Reference	Flat 08	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000 (23c)

Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.2480 (36)
Point Thermal bridges (36a) =	0.0000
Total fabric heat loss (33) + (36) + (36a) =	22.5328 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff													

	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272 (39)
Average = Sum(39)m / 12 =												54.8523
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246 (40)
HLP (average)												1.0158
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948 (42b)
Hot water usage for other uses												
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458 (42c)
Average daily hot water use (litres/day)												51.9898 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406 (44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855 (45)
Energy content (annual)										Total = Sum(45)m =		863.4398
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827 (64)
									Total per year (kWh/year) = Sum(64)m =			733.9239 (64)
12Total per year (kWh/year)												734 (64)
Electric shower(s)												
	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725 (64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							496.7719 (64a)
Heat gains from water heating, kWh/month												
	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201 (71)
Water heating gains (Table 5)												
	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051 (72)
Total internal gains												
	327.5507	336.6878	322.4815	313.4359	297.7842	288.0471	277.4722	277.0221	285.1259	293.4234	309.9724	320.2696 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519 (83)
Total gains	467.9005	572.1401	639.0506	702.8764	736.1791	725.5027	698.2043	660.0521	626.3045	551.7539	477.3233	440.9215 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882
util living area												
	0.9315	0.8860	0.8281	0.7284	0.6002	0.4487	0.3317	0.3633	0.5399	0.7620	0.8922	0.9403 (86)
MIT	19.1526	19.5487	19.9701	20.4348	20.7508	20.9250	20.9775	20.9700	20.8642	20.4465	19.7393	19.0876 (87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629 (88)
util rest of house												
	0.9220	0.8715	0.8069	0.6967	0.5559	0.3918	0.2657	0.2953	0.4814	0.7266	0.8760	0.9320 (89)
MIT 2	18.3850	18.7685	19.1721	19.6119	19.8909	20.0390	20.0737	20.0718	19.9932	19.6353	18.9692	18.3294 (90)
Living area fraction										fLA = Living area / (4) =		0.6481 (91)
MIT	18.8825	19.2742	19.6893	20.1453	20.4482	20.6132	20.6595	20.6539	20.5577	20.1611	19.4683	18.8208 (92)

Temperature adjustment												0.0000	
adjusted MIT	18.8825	19.2742	19.6893	20.1453	20.4482	20.6132	20.6595	20.6539	20.5577	20.1611	19.4683	18.8208	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9080	0.8578	0.7978	0.6994	0.5744	0.4252	0.3075	0.3380	0.5125	0.7303	0.8640	0.9186	(94)
Useful gains	424.8306	490.7984	509.8455	491.6136	422.8636	308.4638	214.7062	223.0802	320.9890	402.9191	412.3969	405.0117	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	816.7391	802.5500	734.1268	616.8360	478.5426	324.7052	219.2062	229.1522	350.4576	523.0080	680.3507	808.9287	(97)
Space heating kWh	291.5799	209.4970	166.8653	90.1601	41.4252	0.0000	0.0000	0.0000	0.0000	89.3462	192.9267	300.5143	(98a)
Space heating requirement - total per year (kWh/year)												1382.3147	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	291.5799	209.4970	166.8653	90.1601	41.4252	0.0000	0.0000	0.0000	0.0000	89.3462	192.9267	300.5143	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1382.3147	
Space heating per m2											(98c) / (4) =	25.5984	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	507.5851	399.5883	409.3979	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8961	0.9332	0.9202	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	454.8463	372.8983	376.7344	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	819.3656	789.0286	745.9590	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	262.4539	309.6009	274.7031	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	65.6135	77.4002	68.6758	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												211.6895	(107)
Energy for space heating												25.5984	(99)
Energy for space cooling												3.9202	(108)
Total												29.5186	(109)
Fabric Energy Efficiency (DFEE)												29.5	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area		Storey height		Volume	
Main dwelling	(m2)		(m)		(m3)	
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3640	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)

Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5655	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		21.9455	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												51.9898	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406	(44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855	(45)
Energy content (annual)										Total = Sum(45)m =		863.4398	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(64)
									Total per year (kWh/year) = Sum(64)m =			733.9239	(64)
12Total per year (kWh/year)												734	(64)
Electric shower(s)	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725	(64a)
									Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			496.7719	(64a)
Heat gains from water heating, kWh/month	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051	(72)
Total internal gains	327.6311	336.7768	322.5619	313.5190	297.8646	288.1301	277.5526	277.1024	285.2089	293.5037	310.0554	320.3500	(73)

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6. Solar gains

Full SAP Calculation Printout

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	439.2133	523.9695	574.2486	623.1479	646.4210	635.9423	612.0672	581.6368	556.4634	498.8863	443.1046	416.2716	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area	0.9401	0.9040	0.8572	0.7709	0.6515	0.4970	0.3710	0.4036	0.5859	0.7953	0.9068	0.9474	(86)
MIT	19.0977	19.4554	19.8610	20.3415	20.6930	20.9033	20.9703	20.9611	20.8337	20.3789	19.6757	19.0423	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house	0.9317	0.8912	0.8384	0.7415	0.6076	0.4369	0.2991	0.3302	0.5263	0.7624	0.8923	0.9400	(89)
MIT 2	18.3387	18.6870	19.0789	19.5390	19.8544	20.0344	20.0796	20.0766	19.9812	19.5852	18.9163	18.2922	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.8307	19.1850	19.5858	20.0591	20.3979	20.5976	20.6569	20.6499	20.5337	20.0996	19.4085	18.7784	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8307	19.1850	19.5858	20.0591	20.3979	20.5976	20.6569	20.6499	20.5337	20.0996	19.4085	18.7784	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9183	0.8773	0.8276	0.7408	0.6233	0.4710	0.3443	0.3758	0.5563	0.7631	0.8801	0.9272	(94)
Useful gains	403.3078	459.7009	475.2326	461.6106	402.9182	299.5167	210.7343	218.5686	309.5612	380.7225	389.9750	385.9464	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	805.1210	789.0117	720.5311	605.4546	470.6077	320.2955	216.6559	226.4105	345.3268	513.9853	669.7123	797.8668	(97)
Space heating kWh	298.9490	221.2969	182.5021	103.5677	50.3610	0.0000	0.0000	0.0000	0.0000	99.1475	201.4109	306.4688	(98a)
Space heating requirement - total per year (kWh/year)												1463.7038	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	298.9490	221.2969	182.5021	103.5677	50.3610	0.0000	0.0000	0.0000	0.0000	99.1475	201.4109	306.4688	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1463.7038	
Space heating per m2											(98c) / (4) =	27.1056	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	502.0002	395.1916	404.8852	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8674	0.9129	0.8979	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	435.4315	360.7536	363.5487	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	714.5946	688.2625	654.2208	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	200.9975	243.6666	216.2600	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	50.2494	60.9167	54.0650	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												165.2310	(107)
Energy for space heating												27.1056	(99)
Energy for space cooling												3.0598	(108)
Total												30.1655	(109)
Fabric Energy Efficiency (TFEE)												30.2	(109)

Full SAP Calculation Printout

Property Reference	Flat 08	**Issued on Date**	27/07/2025
Assessment Reference	Flat 08	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.2480	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	22.5328	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272	(39)
Average = Sum(39)m / 12 =												54.8523	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246	(40)
HLP (average)												1.0158	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												108.5529	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)										Total = Sum(45)m =		1803.0542	
Distribution loss (46)m = 0.15 x (45)m													
	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains													
	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226	
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882	
util living area													
	0.9157	0.8676	0.8078	0.7086	0.5819	0.4354	0.3217	0.3511	0.5223	0.7394	0.8731	0.9256	(86)
MIT	19.6079	19.8877	20.1839	20.5069	20.7265	20.8470	20.8833	20.8785	20.8055	20.5190	20.0249	19.5618	(87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629	(88)
util rest of house													
	0.9046	0.8516	0.7852	0.6762	0.5378	0.3796	0.2575	0.2850	0.4647	0.7027	0.8549	0.9156	(89)
MIT 2	18.4347	18.7805	19.1427	19.5344	19.7820	19.9144	19.9451	19.9440	19.8739	19.5602	18.9666	18.3855	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8929	0.8410	0.7790	0.6796	0.5535	0.4065	0.2907	0.3189	0.4903	0.7073	0.8458	0.9042	(94)
Useful gains	459.0633	519.0977	530.9664	502.4090	425.6017	305.4686	209.7185	218.4902	320.3372	414.5702	437.8312	439.7165	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	834.2454	815.0506	741.2650	617.9035	475.5866	319.6116	213.4678	223.5367	346.1147	524.1335	690.4843	827.0258	(97)
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98a)
Space heating requirement - total per year (kWh/year)												1306.4062	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1306.4062	
Space heating per m2											(98c) / (4) =	24.1927	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	111.6989	79.5839	62.6099	33.2757	14.8814	0.0000	0.0000	0.0000	0.0000	32.6191	72.7932	115.3094	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												522.7716	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1029.7283	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1673.1706	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	522.7716	0.1558	81.4658	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			227.2529	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)
Total CO2, kg/year			244.6694	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.5300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	522.7716	1.5769	824.3589	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2393.1894	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2578.2782	(286)
Dwelling Primary energy Rate (DPER)			47.7500	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440
E18 Party wall between dwellings	13.0000	0.0600	0.7800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5655 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	21.9455 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												102.2682	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	
Distribution loss (46)m = 0.15 x (45)m													
	26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
WWHRS	-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
											Total per year (kWh/year) = Sum(64)m =	2015.6255	(64)
12Total per year (kWh/year)												2016	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area													
	0.9089	0.8674	0.8150	0.7239	0.6027	0.4541	0.3356	0.3632	0.5334	0.7408	0.8661	0.9177	(86)
MIT	19.3557	19.6759	20.0380	20.4553	20.7534	20.9246	20.9775	20.9709	20.8718	20.5009	19.8868	19.3066	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house													
	0.8972	0.8514	0.7930	0.6923	0.5587	0.3972	0.2696	0.2958	0.4757	0.7045	0.8473	0.9069	(89)
MIT 2	18.1697	18.5648	19.0083	19.5129	19.8506	20.0351	20.0801	20.0776	19.9842	19.5787	18.8417	18.1161	(90)
Living area fraction											fLA = Living area / (4) =	0.6481	(91)
MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8805	0.8362	0.7829	0.6939	0.5762	0.4302	0.3113	0.3380	0.5062	0.7084	0.8344	0.8905	(94)
Useful gains	467.3108	513.8383	518.5707	489.6358	418.0620	304.8196	212.4333	220.9121	319.0381	410.6113	441.5938	451.5061	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	811.0892	794.5329	725.4808	608.9595	472.6564	321.0480	216.9151	226.7690	346.7108	518.1416	675.7290	803.8498	(97)
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98a)
Space heating requirement - total per year (kWh/year)												1235.5940	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1235.5940	
Space heating per m2											(98c) / (4) =	22.8814	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	277.1085	204.3628	166.7834	93.0803	44.0067	0.0000	0.0000	0.0000	0.0000	86.6766	182.6407	284.0127	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6365	84.2273	83.6340	82.6684	81.4657	79.8000	79.8000	79.8000	79.8000	82.5052	83.9553	84.7141	(217)
Fuel for water heating, kWh/month	233.7804	207.8654	222.8809	199.6432	197.2914	182.5113	180.9699	187.6483	189.1231	202.7633	210.3846	231.2142	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1338.6718	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2446.0762	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3470.3688	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1338.6718	0.2100	281.1211	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2446.0762	0.2100	513.6760	(264)
Space and water heating			794.7971	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			756.6824	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.0100	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1338.6718	1.1300	1512.6991	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2446.0762	1.1300	2764.0661	(278)
Space and water heating			4276.7651	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4048.5927	(286)
Target Primary Energy Rate (TPER)			74.9700	(287)

Summary for Input Data

Property Reference	Flat 09	**Issued on Date**	27/07/2025
Assessment Reference	Flat 09	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	13.00 m	72.60 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	42.25	25.74	0.00	None	16.51	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		26.40	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	

Summary for Input Data

Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 09	**Issued on Date**	27/07/2025
Assessment Reference	Flat 09	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	235.9500	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3353	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.6900	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	69.0352	68.8357	68.6400	67.7212	67.5493	66.7490	66.7490	66.6008	67.0572	67.5493	67.8970	68.2606	(39)
Average = Sum(39)m / 12 =												67.7203	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9509	0.9481	0.9455	0.9328	0.9304	0.9194	0.9194	0.9174	0.9237	0.9304	0.9352	0.9402	(40)
HLP (average)												0.9328	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												125.2310	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)										Total = Sum(45)m =		2080.0760	
Distribution loss (46)m = 0.15 x (45)m													
	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains													
	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.1334	32.2265	32.3184	32.7569	32.8402	33.2340	33.2340	33.3079	33.0812	32.8402	32.6720	32.4980	
alpha	3.1422	3.1484	3.1546	3.1838	3.1893	3.2156	3.2156	3.2205	3.2054	3.1893	3.1781	3.1665	
util living area													
	0.9330	0.8951	0.8465	0.7588	0.6373	0.4841	0.3598	0.3906	0.5711	0.7818	0.8977	0.9409	(86)
MIT	19.6492	19.8959	20.1704	20.4883	20.7168	20.8480	20.8879	20.8828	20.8051	20.5125	20.0407	19.6082	(87)
Th 2	20.1245	20.1268	20.1290	20.1397	20.1417	20.1510	20.1510	20.1528	20.1474	20.1417	20.1377	20.1334	(88)
util rest of house													
	0.9241	0.8820	0.8276	0.7300	0.5953	0.4281	0.2939	0.3233	0.5149	0.7493	0.8827	0.9330	(89)
MIT 2	18.5412	18.8488	19.1881	19.5776	19.8398	19.9843	20.0189	20.0172	19.9418	19.6161	19.0426	18.4969	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9113	0.8687	0.8163	0.7255	0.6015	0.4450	0.3165	0.3461	0.5293	0.7455	0.8704	0.9208	(94)
Useful gains	550.2652	616.4653	628.2124	597.8827	510.5913	368.5542	251.5818	262.4873	386.0640	495.6678	523.7515	528.3531	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1020.0196	994.9233	903.4165	752.8322	578.3985	387.1913	256.1725	268.7010	419.6435	638.2219	843.5362	1012.4871	(97)
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98a)
Space heating requirement - total per year (kWh/year)												1667.0860	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1667.0860	
Space heating per m2											(98c) / (4) =	22.9626	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	139.8549	101.7702	81.9335	44.6433	20.1875	0.0000	0.0000	0.0000	0.0000	42.4411	92.1348	144.1360	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	667.1012	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1187.9361	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	156.5610	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2011.5983	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	667.1012	0.1557	103.8427	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			272.0285	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)
Total CO2, kg/year			294.6251	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.0600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	667.1012	1.5763	1051.5337	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			2861.4000	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3101.5384	(286)
Dwelling Primary energy Rate (DPER)			42.7200	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0695	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	27.3433	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												117.9810	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m													
	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
											Total per year (kWh/year) = Sum(64)m =	2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains													
	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area													
	0.9246	0.8868	0.8383	0.7509	0.6309	0.4784	0.3552	0.3845	0.5614	0.7690	0.8866	0.9324	(86)
MIT	19.2854	19.6099	19.9808	20.4177	20.7335	20.9185	20.9757	20.9685	20.8606	20.4639	19.8280	19.2392	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house													
	0.9146	0.8726	0.8182	0.7208	0.5876	0.4208	0.2874	0.3155	0.5036	0.7348	0.8700	0.9233	(89)
MIT 2	18.0967	18.4997	18.9570	19.4894	19.8505	20.0517	20.1009	20.0981	19.9952	19.5565	18.7870	18.0468	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)
MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8956	0.8536	0.8025	0.7149	0.5963	0.4444	0.3191	0.3473	0.5239	0.7303	0.8527	0.9051	(94)
Useful gains	580.6778	643.8526	653.6213	621.7010	533.5169	388.6599	268.4721	279.5078	406.3246	518.9287	551.5433	559.7131	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1045.8161	1025.1535	936.0533	784.9025	608.0402	410.2009	274.1385	286.9982	443.6097	666.0191	869.5364	1035.4553	(97)
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98a)
Space heating requirement - total per year (kWh/year)												1677.7194	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1677.7194	
Space heating per m2											(98c) / (4) =	23.1091	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	374.9328	277.6102	227.6592	127.3078	60.0707	0.0000	0.0000	0.0000	0.0000	118.5647	248.0553	383.4802	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.0601	84.6673	84.0839	83.0877	81.7661	79.8000	79.8000	79.8000	79.8000	82.9146	84.3996	85.1320	(217)
Fuel for water heating, kWh/month	259.9419	230.9203	247.2356	220.8170	218.0124	201.8711	199.8040	207.5092	209.5004	224.1294	233.2243	257.0224	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1817.6808	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2709.9880	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-717.6874	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4068.9321	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1817.6808	0.2100	381.7130	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2709.9880	0.2100	569.0975	(264)
Space and water heating			950.8105	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			894.5537	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1817.6808	1.1300	2053.9793	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2709.9880	1.1300	3062.2864	(278)
Space and water heating			5116.2658	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			4762.5318	(286)
Target Primary Energy Rate (TPER)			65.6000	(287)

Full SAP Calculation Printout

Property Reference	Flat 09	**Issued on Date**	27/07/2025
Assessment Reference	Flat 09	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3776	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3210	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4093	0.4012	0.3932	0.3531	0.3451	0.3049	0.3049	0.2969	0.3210	0.3451	0.3611	0.3772	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000	(23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5838	0.5805	0.5773	0.5623	0.5595	0.5465	0.5465	0.5441	0.5515	0.5595	0.5652	0.5711	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.6900	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4530	45.1998	44.9516	43.7857	43.5676	42.5522	42.5522	42.3641	42.9433	43.5676	44.0088	44.4702	(38)

Heat transfer coeff

```
               70.4168    70.1636    69.9154    68.7495    68.5314    67.5160    67.5160    67.3279    67.9071    68.5314    68.9727    69.4340 (39)
Average = Sum(39)m / 12 =                                                                                                              68.7485

                 Jan        Feb        Mar        Apr        May        Jun        Jul        Aug        Sep        Oct        Nov        Dec
HLP              0.9699     0.9664     0.9630     0.9470     0.9440     0.9300     0.9300     0.9274     0.9354     0.9440     0.9500     0.9564 (40)
HLP (average)                                                                                                                           0.9469
Days in mont         31         28         31         30         31         30         31         31         30         31         30         31



-------------------------------------------------------------------------------------------
4. Water heating energy requirements (kWh/year)
-------------------------------------------------------------------------------------------
Assumed occupancy                                                                                                                       2.3076 (42)
Hot water usage for mixer showers
                 0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (42a)
Hot water usage for baths
               27.1765    26.7729    26.2045    25.1566    24.3718    23.5017    23.0317    23.5961    24.2107    25.1417    26.2113    27.0846 (42b)
Hot water usage for other uses
               38.2617    36.8703    35.4790    34.0877    32.6963    31.3050    31.3050    32.6963    34.0877    35.4790    36.8703    38.2617 (42c)
Average daily hot water use (litres/day)                                                                                               59.9802 (43)

                 Jan        Feb        Mar        Apr        May        Jun        Jul        Aug        Sep        Oct        Nov        Dec
Daily hot water use
               65.4382    63.6432    61.6835    59.2442    57.0682    54.8067    54.3368    56.2925    58.2983    60.6207    63.0816    65.3463 (44)
Energy conte  103.6381    90.6271    94.8053    81.1024    76.8248    67.3913    65.7156    69.7019    71.8877    82.2617    89.8713   102.3165 (45)
Energy content (annual)                                                                                Total = Sum(45)m =     996.1436
Distribution loss  (46)m = 0.15 x (45)m
                 0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (46)
Water storage loss:
Total storage loss
                 0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (56)
If cylinder contains dedicated solar storage
                 0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (57)
Primary loss     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (59)
Combi loss       0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (61)
Total heat required for water heating calculated for each month
               88.0924    77.0330    80.5845    68.9370    65.3010    57.2826    55.8583    59.2466    61.1045    69.9225    76.3906    86.9690 (62)
WWHRS            0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (63a)
PV diverter      0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (63b)
Solar input      0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (63c)
FGHRS            0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (63d)
Output from w/h
               88.0924    77.0330    80.5845    68.9370    65.3010    57.2826    55.8583    59.2466    61.1045    69.9225    76.3906    86.9690 (64)
                                                                  Total per year (kWh/year) = Sum(64)m =     846.7221 (64)
12Total per year (kWh/year)                                                                                                                847 (64)
Electric shower(s)
               50.3803    44.8892    49.0173    46.7766    47.6544    45.4576    46.9729    47.6544    46.7766    49.0173    48.0956    50.3803 (64a)
                                              Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =     573.0725 (64a)
Heat gains from water heating, kWh/month
               34.6182    30.4806    32.4005    28.9284    28.2389    25.6851    25.7078    26.7252    26.9703    29.7349    31.1216    34.3373 (65)



-------------------------------------------------------------------------------------------
5. Internal gains (see Table 5 and 5a)
-------------------------------------------------------------------------------------------
Metabolic gains (Table 5), Watts
                 Jan        Feb        Mar        Apr        May        Jun        Jul        Aug        Sep        Oct        Nov        Dec
(66)m         115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5
              103.1368   114.1871   103.1368   106.5747   103.1368   106.5747   103.1368   103.1368   106.5747   103.1368   106.5747   103.1368 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5
              203.2876   205.3971   200.0813   188.7645   174.4790   161.0527   152.0832   149.9737   155.2895   166.6063   180.8917   194.3180 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5
               34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378 (69)
Pumps, fans      0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)
              -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022 (71)
Water heating gains (Table 5)
               46.5298    45.3580    43.5490    40.1784    37.9554    35.6737    34.5535    35.9210    37.4587    39.9663    43.2244    46.1523 (72)
Total internal gains
              410.5675   422.5556   404.3804   393.1308   373.1846   360.9144   347.3867   346.6448   356.9362   367.3227   388.3041   401.2205 (73)



-------------------------------------------------------------------------------------------
6. Solar gains
-------------------------------------------------------------------------------------------

[Jan]                                       Area         Solar flux              g               FF             Access             Gains
                                              m2           Table 6a    Specific data    Specific data            factor                 W
                                                               W/m2     or Table 6b      or Table 6c          Table 6d
-------------------------------------------------------------------------------------------
North                                     6.3000            10.6334           0.6300           0.7000            0.7700           20.4731 (74)
South                                     8.3900            46.7521           0.6300           0.7000            0.7700          119.8766 (78)
-------------------------------------------------------------------------------------------

Solar gains   140.3498   235.4523   316.5691   389.4405   438.3949   437.4556   420.7320   383.0300   341.1786   258.3306   167.3509   120.6519 (83)
Total gains   550.9173   658.0078   720.9495   782.5713   811.5795   798.3701   768.1188   729.6748   698.1149   625.6533   555.6551   521.8723 (84)



-------------------------------------------------------------------------------------------
7. Mean internal temperature (heating season)
-------------------------------------------------------------------------------------------
Temperature during heating periods in the living area from Table 9, Th1 (C)                                                           21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)
                 Jan        Feb        Mar        Apr        May        Jun        Jul        Aug        Sep        Oct        Nov        Dec
tau            31.5029    31.6166    31.7288    32.2669    32.3696    32.8564    32.8564    32.9482    32.6672    32.3696    32.1625    31.9488
alpha           3.1002     3.1078     3.1153     3.1511     3.1580     3.1904     3.1904     3.1965     3.1778     3.1580     3.1442     3.1299
util living area
                 0.9470     0.9127     0.8675     0.7818     0.6613     0.5033     0.3751     0.4082     0.5945     0.8065     0.9155     0.9538 (86)

MIT            19.1582    19.5087    19.9042    20.3754    20.7142    20.9136    20.9744    20.9662    20.8475    20.4087    19.7244    19.1085 (87)
Th 2           20.1085    20.1114    20.1143    20.1278    20.1303    20.1421    20.1421    20.1443    20.1375    20.1303    20.1252    20.1198 (88)
util rest of house
                 0.9396     0.9011     0.8502     0.7539     0.6192     0.4455     0.3061     0.3378     0.5372     0.7756     0.9025     0.9472 (89)
MIT 2          18.4319    18.7745    19.1578    19.6114    19.9166    20.0893    20.1307    20.1283    20.0379    19.6533    19.0000    18.3915 (90)
Living area fraction                                                                         fLA = Living area / (4) =      0.4821 (91)
MIT            18.7820    19.1285    19.5177    19.9798    20.3011    20.4867    20.5374    20.5322    20.4282    20.0175    19.3492    18.7372 (92)
```

Temperature adjustment												0.0000	
adjusted MIT	18.7820	19.1285	19.5177	19.9798	20.3011	20.4867	20.5374	20.5322	20.4282	20.0175	19.3492	18.7372	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9259	0.8861	0.8369	0.7488	0.6278	0.4693	0.3383	0.3703	0.5572	0.7712	0.8887	0.9344	(94)
Useful gains	510.1019	583.0819	603.3669	585.9566	509.5408	374.6590	259.8813	270.1803	389.0217	482.4785	493.8256	487.6534	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1019.7780	998.3191	910.1339	761.7280	589.4456	397.4455	265.8390	278.2153	429.7317	645.3928	844.8607	1009.3733	(97)
Space heating kWh	379.1990	279.0394	228.2346	126.5554	59.4492	0.0000	0.0000	0.0000	0.0000	121.2082	252.7453	388.1596	(98a)
Space heating requirement - total per year (kWh/year)												1834.5906	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	379.1990	279.0394	228.2346	126.5554	59.4492	0.0000	0.0000	0.0000	0.0000	121.2082	252.7453	388.1596	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1834.5906	
Space heating per m2											(98c) / (4) =	25.2698	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	634.6501	499.6182	511.6923	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8723	0.9175	0.9027	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	553.6191	458.4027	461.9062	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	244.8516	299.0583	264.5158	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	61.2129	74.7646	66.1290	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												202.1064	(107)
Energy for space heating												25.2698	(99)
Energy for space cooling												2.7838	(108)
Total												28.0537	(109)
Fabric Energy Efficiency (DFEE)												28.1	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		235.9500	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)

Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709 (25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.0695 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 27.3433 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 59.9802 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	65.4382	63.6432	61.6835	59.2442	57.0682	54.8067	54.3368	56.2925	58.2983	60.6207	63.0816	65.3463	(44)
Energy conte	103.6381	90.6271	94.8053	81.1024	76.8248	67.3913	65.7156	69.7019	71.8877	82.2617	89.8713	102.3165	(45)
Energy content (annual)										Total = Sum(45)m =		996.1436	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(64)
										Total per year (kWh/year) = Sum(64)m =		846.7221	(64)
12Total per year (kWh/year)												847	(64)
Electric shower(s)	50.3803	44.8892	49.0173	46.7766	47.6544	45.4576	46.9729	47.6544	46.7766	49.0173	48.0956	50.3803	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		573.0725	(64a)
Heat gains from water heating, kWh/month	34.6182	30.4806	32.4005	28.9284	28.2389	25.6851	25.7078	26.7252	26.9703	29.7349	31.1216	34.3373	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	46.5298	45.3580	43.5490	40.1784	37.9554	35.6737	34.5535	35.9210	37.4587	39.9663	43.2244	46.1523	(72)
Total internal gains	410.5675	422.5556	404.3804	393.1308	373.1846	360.9144	347.3867	346.6448	356.9362	367.3227	388.3041	401.2205	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	550.9173	658.0078	720.9495	782.5713	811.5795	798.3701	768.1188	729.6748	698.1149	625.6533	555.6551	521.8723	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area	0.9482	0.9153	0.8720	0.7894	0.6721	0.5156	0.3862	0.4198	0.6064	0.8134	0.9181	0.9548	(86)
MIT	19.0709	19.4242	19.8297	20.3190	20.6801	20.8995	20.9693	20.9597	20.8265	20.3583	19.6506	19.0201	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house	0.9409	0.9038	0.8547	0.7615	0.6292	0.4556	0.3135	0.3459	0.5475	0.7825	0.9051	0.9483	(89)
MIT 2	18.3270	18.6725	19.0661	19.5376	19.8639	20.0534	20.1010	20.0979	19.9970	19.5856	18.9086	18.2854	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.6856	19.0349	19.4343	19.9143	20.2574	20.4613	20.5196	20.5134	20.3969	19.9581	19.2663	18.6396	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6856	19.0349	19.4343	19.9143	20.2574	20.4613	20.5196	20.5134	20.3969	19.9581	19.2663	18.6396	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9269	0.8883	0.8406	0.7552	0.6370	0.4797	0.3472	0.3797	0.5673	0.7770	0.8909	0.9352	(94)
Useful gains	510.6349	584.4992	606.0291	591.0160	516.9682	382.9833	266.7290	277.0679	396.0149	486.1025	495.0176	488.0602	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1046.9694	1025.1523	934.8748	783.2954	606.7094	409.6214	273.9228	286.6938	442.5206	663.4770	867.9291	1036.7474	(97)
Space heating kWh	399.0328	296.1189	244.6612	138.4411	66.7675	0.0000	0.0000	0.0000	0.0000	131.9666	268.4963	408.2233	(98a)
Space heating requirement - total per year (kWh/year)												1953.7077	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	399.0328	296.1189	244.6612	138.4411	66.7675	0.0000	0.0000	0.0000	0.0000	131.9666	268.4963	408.2233	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1953.7077	
Space heating per m2											(98c) / (4) =	26.9106	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	656.9274	517.1556	529.7074	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8587	0.9069	0.8909	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	564.0721	468.9980	471.9192	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	237.3255	291.1754	257.0661	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	59.3314	72.7939	64.2665	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												196.3917	(107)
Energy for space heating												26.9106	(99)
Energy for space cooling												2.7051	(108)
Total												29.6157	(109)
Fabric Energy Efficiency (TFEE)												29.6	(109)

Full SAP Calculation Printout

Property Reference	Flat 09	**Issued on Date**	27/07/2025
Assessment Reference	Flat 09	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	235.9500	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3353	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.6900	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	69.0352	68.8357	68.6400	67.7212	67.5493	66.7490	66.7490	66.6008	67.0572	67.5493	67.8970	68.2606	(39)
Average = Sum(39)m / 12 =												67.7203	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9509	0.9481	0.9455	0.9328	0.9304	0.9194	0.9194	0.9174	0.9237	0.9304	0.9352	0.9402	(40)
HLP (average)												0.9328	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												125.2310	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)										Total = Sum(45)m =		2080.0760	
Distribution loss (46)m = 0.15 x (45)m													
	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains													
	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.1334	32.2265	32.3184	32.7569	32.8402	33.2340	33.2340	33.3079	33.0812	32.8402	32.6720	32.4980	
alpha	3.1422	3.1484	3.1546	3.1838	3.1893	3.2156	3.2156	3.2205	3.2054	3.1893	3.1781	3.1665	
util living area													
	0.9330	0.8951	0.8465	0.7588	0.6373	0.4841	0.3598	0.3906	0.5711	0.7818	0.8977	0.9409	(86)
MIT	19.6492	19.8959	20.1704	20.4883	20.7168	20.8480	20.8879	20.8828	20.8051	20.5125	20.0407	19.6082	(87)
Th 2	20.1245	20.1268	20.1290	20.1397	20.1417	20.1510	20.1510	20.1528	20.1474	20.1417	20.1377	20.1334	(88)
util rest of house													
	0.9241	0.8820	0.8276	0.7300	0.5953	0.4281	0.2939	0.3233	0.5149	0.7493	0.8827	0.9330	(89)
MIT 2	18.5412	18.8488	19.1881	19.5776	19.8398	19.9843	20.0189	20.0172	19.9418	19.6161	19.0426	18.4969	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9113	0.8687	0.8163	0.7255	0.6015	0.4450	0.3165	0.3461	0.5293	0.7455	0.8704	0.9208	(94)
Useful gains	550.2652	616.4653	628.2124	597.8827	510.5913	368.5542	251.5818	262.4873	386.0640	495.6678	523.7515	528.3531	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1020.0196	994.9233	903.4165	752.8322	578.3985	387.1913	256.1725	268.7010	419.6435	638.2219	843.5362	1012.4871	(97)
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98a)
Space heating requirement - total per year (kWh/year)												1667.0860	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1667.0860	
Space heating per m2											(98c) / (4) =	22.9626	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	139.8549	101.7702	81.9335	44.6433	20.1875	0.0000	0.0000	0.0000	0.0000	42.4411	92.1348	144.1360	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	667.1012	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1187.9361	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	156.5610	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2011.5983	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	667.1012	0.1557	103.8427	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			272.0285	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)
Total CO2, kg/year			294.6251	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.0600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	667.1012	1.5763	1051.5337	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			2861.4000	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3101.5384	(286)
Dwelling Primary energy Rate (DPER)			42.7200	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0695	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	27.3433	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												117.9810	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m													
	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
											Total per year (kWh/year) = Sum(64)m =	2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains													
	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area													
	0.9246	0.8868	0.8383	0.7509	0.6309	0.4784	0.3552	0.3845	0.5614	0.7690	0.8866	0.9324	(86)
MIT	19.2854	19.6099	19.9808	20.4177	20.7335	20.9185	20.9757	20.9685	20.8606	20.4639	19.8280	19.2392	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house													
	0.9146	0.8726	0.8182	0.7208	0.5876	0.4208	0.2874	0.3155	0.5036	0.7348	0.8700	0.9233	(89)
MIT 2	18.0967	18.4997	18.9570	19.4894	19.8505	20.0517	20.1009	20.0981	19.9952	19.5565	18.7870	18.0468	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)
MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8956	0.8536	0.8025	0.7149	0.5963	0.4444	0.3191	0.3473	0.5239	0.7303	0.8527	0.9051	(94)
Useful gains	580.6778	643.8526	653.6213	621.7010	533.5169	388.6599	268.4721	279.5078	406.3246	518.9287	551.5433	559.7131	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1045.8161	1025.1535	936.0533	784.9025	608.0402	410.2009	274.1385	286.9982	443.6097	666.0191	869.5364	1035.4553	(97)
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98a)
Space heating requirement - total per year (kWh/year)												1677.7194	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1677.7194	
Space heating per m2											(98c) / (4) =	23.1091	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	374.9328	277.6102	227.6592	127.3078	60.0707	0.0000	0.0000	0.0000	0.0000	118.5647	248.0553	383.4802	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.0601	84.6673	84.0839	83.0877	81.7661	79.8000	79.8000	79.8000	79.8000	82.9146	84.3996	85.1320	(217)
Fuel for water heating, kWh/month	259.9419	230.9203	247.2356	220.8170	218.0124	201.8711	199.8040	207.5092	209.5004	224.1294	233.2243	257.0224	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1817.6808	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2709.9880	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-717.6874	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4068.9321	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1817.6808	0.2100	381.7130	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2709.9880	0.2100	569.0975	(264)
Space and water heating			950.8105	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			894.5537	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1817.6808	1.1300	2053.9793	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2709.9880	1.1300	3062.2864	(278)
Space and water heating			5116.2658	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			4762.5318	(286)
Target Primary Energy Rate (TPER)			65.6000	(287)

Summary for Input Data

Property Reference	Flat 10	**Issued on Date**	27/07/2025
Assessment Reference	Flat 10	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	3	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	9.60 m	54.00 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	31.20	14.69	0.00	None	16.51	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	70.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

elmhurst energy

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		19.20	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
In Winter	249.90	
In Summer	175.10	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	

Summary for Input Data

Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None
28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 10	**Issued on Date**	27/07/2025
Assessment Reference	Flat 10	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys		0 * 80 =	0.0000 (6a)
Number of open flues		0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000 (6d)
Number of flues attached to other heater		0 * 35 =	0.0000 (6e)
Number of blocked chimneys		0 * 20 =	0.0000 (6f)
Number of intermittent extract fans		2 * 10 =	20.0000 (7a)
Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		20.0000 / (5) =	0.1140 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0100 (17)
Infiltration rate			0.3645 (18)
Number of sides sheltered			2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3098 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K			110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)			1.2480 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =		22.5328 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272	(39)
Average = Sum(39)m / 12 =												54.8523	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246	(40)
HLP (average)												1.0158	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												108.5529	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)										Total = Sum(45)m =		1803.0542	
Distribution loss (46)m = 0.15 x (45)m													
	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains													
	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226	
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882	
util living area													
	0.9157	0.8676	0.8078	0.7086	0.5819	0.4354	0.3217	0.3511	0.5223	0.7394	0.8731	0.9256	(86)
MIT	19.6079	19.8877	20.1839	20.5069	20.7265	20.8470	20.8833	20.8785	20.8055	20.5190	20.0249	19.5618	(87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629	(88)
util rest of house													
	0.9046	0.8516	0.7852	0.6762	0.5378	0.3796	0.2575	0.2850	0.4647	0.7027	0.8549	0.9156	(89)
MIT 2	18.4347	18.7805	19.1427	19.5344	19.7820	19.9144	19.9451	19.9440	19.8739	19.5602	18.9666	18.3855	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8929	0.8410	0.7790	0.6796	0.5535	0.4065	0.2907	0.3189	0.4903	0.7073	0.8458	0.9042	(94)
Useful gains	459.0633	519.0977	530.9664	502.4090	425.6017	305.4686	209.7185	218.4902	320.3372	414.5702	437.8312	439.7165	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	834.2454	815.0506	741.2650	617.9035	475.5866	319.6116	213.4678	223.5367	346.1147	524.1335	690.4843	827.0258	(97)
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98a)
Space heating requirement - total per year (kWh/year)												1306.4062	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1306.4062	
Space heating per m2											(98c) / (4) =	24.1927	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	111.6989	79.5839	62.6099	33.2757	14.8814	0.0000	0.0000	0.0000	0.0000	32.6191	72.7932	115.3094	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												522.7716	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1029.7283	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1673.1706	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	522.7716	0.1558	81.4658	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			227.2529	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)
Total CO2, kg/year			244.6694	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.5300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	522.7716	1.5769	824.3589	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2393.1894	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2578.2782	(286)
Dwelling Primary energy Rate (DPER)			47.7500	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440
E18 Party wall between dwellings	13.0000	0.0600	0.7800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5655 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	21.9455 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												102.2682	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	
Distribution loss (46)m = 0.15 x (45)m													
	26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
WWHRS	-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
											Total per year (kWh/year) = Sum(64)m =	2015.6255	(64)
12Total per year (kWh/year)												2016	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area													
	0.9089	0.8674	0.8150	0.7239	0.6027	0.4541	0.3356	0.3632	0.5334	0.7408	0.8661	0.9177	(86)
MIT	19.3557	19.6759	20.0380	20.4553	20.7534	20.9246	20.9775	20.9709	20.8718	20.5009	19.8868	19.3066	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house													
	0.8972	0.8514	0.7930	0.6923	0.5587	0.3972	0.2696	0.2958	0.4757	0.7045	0.8473	0.9069	(89)
MIT 2	18.1697	18.5648	19.0083	19.5129	19.8506	20.0351	20.0801	20.0776	19.9842	19.5787	18.8417	18.1161	(90)
Living area fraction											fLA = Living area / (4) =	0.6481	(91)
MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8805	0.8362	0.7829	0.6939	0.5762	0.4302	0.3113	0.3380	0.5062	0.7084	0.8344	0.8905	(94)
Useful gains	467.3108	513.8383	518.5707	489.6358	418.0620	304.8196	212.4333	220.9121	319.0381	410.6113	441.5938	451.5061	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	811.0892	794.5329	725.4808	608.9595	472.6564	321.0480	216.9151	226.7690	346.7108	518.1416	675.7290	803.8498	(97)
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98a)
Space heating requirement - total per year (kWh/year)												1235.5940	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1235.5940	
Space heating per m2											(98c) / (4) =	22.8814	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	277.1085	204.3628	166.7834	93.0803	44.0067	0.0000	0.0000	0.0000	0.0000	86.6766	182.6407	284.0127	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6365	84.2273	83.6340	82.6684	81.4657	79.8000	79.8000	79.8000	79.8000	82.5052	83.9553	84.7141	(217)
Fuel for water heating, kWh/month	233.7804	207.8654	222.8809	199.6432	197.2914	182.5113	180.9699	187.6483	189.1231	202.7633	210.3846	231.2142	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1338.6718	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2446.0762	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3470.3688	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1338.6718	0.2100	281.1211	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2446.0762	0.2100	513.6760	(264)
Space and water heating			794.7971	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			756.6824	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.0100	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1338.6718	1.1300	1512.6991	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2446.0762	1.1300	2764.0661	(278)
Space and water heating			4276.7651	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4048.5927	(286)
Target Primary Energy Rate (TPER)			74.9700	(287)

Full SAP Calculation Printout

Property Reference	Flat 10	**Issued on Date**	27/07/2025
Assessment Reference	Flat 10	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	175.5000	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a) 0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0.0000 (23c)

Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.2480	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	22.5328	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)

Heat transfer coeff

	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272 (39)
Average = Sum(39)m / 12 =												54.8523
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246 (40)
HLP (average)												1.0158
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948 (42b)
Hot water usage for other uses												
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458 (42c)
Average daily hot water use (litres/day)												51.9898 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406 (44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855 (45)
Energy content (annual)										Total = Sum(45)m =		863.4398
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827 (64)
									Total per year (kWh/year) = Sum(64)m =			733.9239 (64)
12Total per year (kWh/year)												734 (64)
Electric shower(s)												
	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725 (64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							496.7719 (64a)
Heat gains from water heating, kWh/month												
	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201 (71)
Water heating gains (Table 5)												
	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051 (72)
Total internal gains												
	327.5507	336.6878	322.4815	313.4359	297.7842	288.0471	277.4722	277.0221	285.1259	293.4234	309.9724	320.2696 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519 (83)
Total gains	467.9005	572.1401	639.0506	702.8764	736.1791	725.5027	698.2043	660.0521	626.3045	551.7539	477.3233	440.9215 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882
util living area												
	0.9315	0.8860	0.8281	0.7284	0.6002	0.4487	0.3317	0.3633	0.5399	0.7620	0.8922	0.9403 (86)
MIT	19.1526	19.5487	19.9701	20.4348	20.7508	20.9250	20.9775	20.9700	20.8642	20.4465	19.7393	19.0876 (87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629 (88)
util rest of house												
	0.9220	0.8715	0.8069	0.6967	0.5559	0.3918	0.2657	0.2953	0.4814	0.7266	0.8760	0.9320 (89)
MIT 2	18.3850	18.7685	19.1721	19.6119	19.8909	20.0390	20.0737	20.0718	19.9932	19.6353	18.9692	18.3294 (90)
Living area fraction										fLA = Living area / (4) =		0.6481 (91)
MIT	18.8825	19.2742	19.6893	20.1453	20.4482	20.6132	20.6595	20.6539	20.5577	20.1611	19.4683	18.8208 (92)

Temperature adjustment												0.0000	
adjusted MIT	18.8825	19.2742	19.6893	20.1453	20.4482	20.6132	20.6595	20.6539	20.5577	20.1611	19.4683	18.8208	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9080	0.8578	0.7978	0.6994	0.5744	0.4252	0.3075	0.3380	0.5125	0.7303	0.8640	0.9186	(94)
Useful gains	424.8306	490.7984	509.8455	491.6136	422.8636	308.4638	214.7062	223.0802	320.9890	402.9191	412.3969	405.0117	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	816.7391	802.5500	734.1268	616.8360	478.5426	324.7052	219.2062	229.1522	350.4576	523.0080	680.3507	808.9287	(97)
Space heating kWh	291.5799	209.4970	166.8653	90.1601	41.4252	0.0000	0.0000	0.0000	0.0000	89.3462	192.9267	300.5143	(98a)
Space heating requirement - total per year (kWh/year)												1382.3147	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	291.5799	209.4970	166.8653	90.1601	41.4252	0.0000	0.0000	0.0000	0.0000	89.3462	192.9267	300.5143	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1382.3147	
Space heating per m2											(98c) / (4) =	25.5984	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	507.5851	399.5883	409.3979	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8961	0.9332	0.9202	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	454.8463	372.8983	376.7344	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	819.3656	789.0286	745.9590	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	262.4539	309.6009	274.7031	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	65.6135	77.4002	68.6758	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												211.6895	(107)
Energy for space heating												25.5984	(99)
Energy for space cooling												3.9202	(108)
Total												29.5186	(109)
Fabric Energy Efficiency (DFEE)												29.5	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area		Storey height		Volume	
Main dwelling	(m2)		(m)		(m3)	
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3640	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)

Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5655	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		21.9455	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												51.9898	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406	(44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855	(45)
Energy content (annual)										Total = Sum(45)m =		863.4398	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(64)
									Total per year (kWh/year) = Sum(64)m =			733.9239	(64)
12Total per year (kWh/year)												734	(64)
Electric shower(s)	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725	(64a)
									Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			496.7719	(64a)
Heat gains from water heating, kWh/month	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051	(72)
Total internal gains	327.6311	336.7768	322.5619	313.5190	297.8646	288.1301	277.5526	277.1024	285.2089	293.5037	310.0554	320.3500	(73)

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6. Solar gains

Full SAP Calculation Printout

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	439.2133	523.9695	574.2486	623.1479	646.4210	635.9423	612.0672	581.6368	556.4634	498.8863	443.1046	416.2716	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area	0.9401	0.9040	0.8572	0.7709	0.6515	0.4970	0.3710	0.4036	0.5859	0.7953	0.9068	0.9474	(86)
MIT	19.0977	19.4554	19.8610	20.3415	20.6930	20.9033	20.9703	20.9611	20.8337	20.3789	19.6757	19.0423	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house	0.9317	0.8912	0.8384	0.7415	0.6076	0.4369	0.2991	0.3302	0.5263	0.7624	0.8923	0.9400	(89)
MIT 2	18.3387	18.6870	19.0789	19.5390	19.8544	20.0344	20.0796	20.0766	19.9812	19.5852	18.9163	18.2922	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.8307	19.1850	19.5858	20.0591	20.3979	20.5976	20.6569	20.6499	20.5337	20.0996	19.4085	18.7784	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8307	19.1850	19.5858	20.0591	20.3979	20.5976	20.6569	20.6499	20.5337	20.0996	19.4085	18.7784	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9183	0.8773	0.8276	0.7408	0.6233	0.4710	0.3443	0.3758	0.5563	0.7631	0.8801	0.9272	(94)
Useful gains	403.3078	459.7009	475.2326	461.6106	402.9182	299.5167	210.7343	218.5686	309.5612	380.7225	389.9750	385.9464	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	805.1210	789.0117	720.5311	605.4546	470.6077	320.2955	216.6559	226.4105	345.3268	513.9853	669.7123	797.8668	(97)
Space heating kWh	298.9490	221.2969	182.5021	103.5677	50.3610	0.0000	0.0000	0.0000	0.0000	99.1475	201.4109	306.4688	(98a)
Space heating requirement - total per year (kWh/year)												1463.7038	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	298.9490	221.2969	182.5021	103.5677	50.3610	0.0000	0.0000	0.0000	0.0000	99.1475	201.4109	306.4688	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1463.7038	
Space heating per m2											(98c) / (4) =	27.1056	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	502.0002	395.1916	404.8852	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8674	0.9129	0.8979	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	435.4315	360.7536	363.5487	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	714.5946	688.2625	654.2208	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	200.9975	243.6666	216.2600	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	50.2494	60.9167	54.0650	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												165.2310	(107)
Energy for space heating												27.1056	(99)
Energy for space cooling												3.0598	(108)
Total												30.1655	(109)
Fabric Energy Efficiency (TFEE)												30.2	(109)

Full SAP Calculation Printout

Property Reference	Flat 10	**Issued on Date**	27/07/2025
Assessment Reference	Flat 10	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.53	**TER**	14.01
Environmental	97 A	**% DER < TER**			67.67
CO_2 Emissions (t/year)	0.22	**DFEE**	29.52	**TFEE**	30.17
Compliance Check	See BREL	**% DFEE < TFEE**			2.14
% DPER < TPER	36.31	**DPER**	47.75	**TPER**	74.97

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys		0 * 80 =	0.0000 (6a)
Number of open flues		0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000 (6d)
Number of flues attached to other heater		0 * 35 =	0.0000 (6e)
Number of blocked chimneys		0 * 20 =	0.0000 (6f)
Number of intermittent extract fans		2 * 10 =	20.0000 (7a)
Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		20.0000 / (5) =	0.1140 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0100 (17)
Infiltration rate			0.3645 (18)
Number of sides sheltered			2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3098 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.2848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K			110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)			1.2480 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =		22.5328 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	56.0080	55.8326	55.6606	54.8530	54.7019	53.9984	53.9984	53.8681	54.2694	54.7019	55.0076	55.3272	(39)
Average = Sum(39)m / 12 =												54.8523	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0372	1.0339	1.0308	1.0158	1.0130	1.0000	1.0000	0.9976	1.0050	1.0130	1.0187	1.0246	(40)
HLP (average)												1.0158	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												108.5529	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)										Total = Sum(45)m =		1803.0542	
Distribution loss (46)m = 0.15 x (45)m													
	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains													
	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.4601	29.5526	29.6439	30.0804	30.1635	30.5565	30.5565	30.6303	30.4039	30.1635	29.9959	29.8226	
alpha	2.9640	2.9702	2.9763	3.0054	3.0109	3.0371	3.0371	3.0420	3.0269	3.0109	2.9997	2.9882	
util living area													
	0.9157	0.8676	0.8078	0.7086	0.5819	0.4354	0.3217	0.3511	0.5223	0.7394	0.8731	0.9256	(86)
MIT	19.6079	19.8877	20.1839	20.5069	20.7265	20.8470	20.8833	20.8785	20.8055	20.5190	20.0249	19.5618	(87)
Th 2	20.0525	20.0551	20.0578	20.0702	20.0725	20.0834	20.0834	20.0854	20.0792	20.0725	20.0678	20.0629	(88)
util rest of house													
	0.9046	0.8516	0.7852	0.6762	0.5378	0.3796	0.2575	0.2850	0.4647	0.7027	0.8549	0.9156	(89)
MIT 2	18.4347	18.7805	19.1427	19.5344	19.7820	19.9144	19.9451	19.9440	19.8739	19.5602	18.9666	18.3855	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1951	19.4981	19.8176	20.1647	20.3942	20.5189	20.5532	20.5497	20.4777	20.1816	19.6525	19.1479	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8929	0.8410	0.7790	0.6796	0.5535	0.4065	0.2907	0.3189	0.4903	0.7073	0.8458	0.9042	(94)
Useful gains	459.0633	519.0977	530.9664	502.4090	425.6017	305.4686	209.7185	218.4902	320.3372	414.5702	437.8312	439.7165	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	834.2454	815.0506	741.2650	617.9035	475.5866	319.6116	213.4678	223.5367	346.1147	524.1335	690.4843	827.0258	(97)
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98a)
Space heating requirement - total per year (kWh/year)												1306.4062	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1306.4062	
Space heating per m2											(98c) / (4) =	24.1927	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	279.1355	198.8803	156.4622	83.1560	37.1887	0.0000	0.0000	0.0000	0.0000	81.5151	181.9102	288.1582	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	111.6989	79.5839	62.6099	33.2757	14.8814	0.0000	0.0000	0.0000	0.0000	32.6191	72.7932	115.3094	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												522.7716	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1029.7283	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1673.1706	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	522.7716	0.1558	81.4658	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			227.2529	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)
Total CO2, kg/year			244.6694	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.5300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	522.7716	1.5769	824.3589	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2393.1894	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2578.2782	(286)
Dwelling Primary energy Rate (DPER)			47.7500	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b) x	3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
Total net area of external elements Aum(A, m2)			31.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.3800			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	19.2000	0.0700	1.3440
E18 Party wall between dwellings	13.0000	0.0600	0.7800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5655 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	21.9455 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	55.4084	55.2334	55.0619	54.2565	54.1058	53.4043	53.4043	53.2744	53.6745	54.1058	54.4107	54.7294	(39)
Average = Sum(39)m / 12 =												54.2558	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0261	1.0228	1.0197	1.0047	1.0020	0.9890	0.9890	0.9866	0.9940	1.0020	1.0076	1.0135	(40)
HLP (average)												1.0047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8080	(42)
Hot water usage for mixer showers													
	54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)
Hot water usage for baths													
	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)
Hot water usage for other uses													
	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)
Average daily hot water use (litres/day)												102.2682	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	
Distribution loss (46)m = 0.15 x (45)m													
	26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
WWHRS	-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
											Total per year (kWh/year) = Sum(64)m =	2015.6255	(64)
12Total per year (kWh/year)												2016	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.7789	29.8732	29.9662	30.4111	30.4958	30.8964	30.8964	30.9717	30.7409	30.4958	30.3249	30.1483	
alpha	2.9853	2.9915	2.9977	3.0274	3.0331	3.0598	3.0598	3.0648	3.0494	3.0331	3.0217	3.0099	
util living area													
	0.9089	0.8674	0.8150	0.7239	0.6027	0.4541	0.3356	0.3632	0.5334	0.7408	0.8661	0.9177	(86)
MIT	19.3557	19.6759	20.0380	20.4553	20.7534	20.9246	20.9775	20.9709	20.8718	20.5009	19.8868	19.3066	(87)
Th 2	20.0617	20.0643	20.0670	20.0794	20.0817	20.0925	20.0925	20.0945	20.0884	20.0817	20.0770	20.0721	(88)
util rest of house													
	0.8972	0.8514	0.7930	0.6923	0.5587	0.3972	0.2696	0.2958	0.4757	0.7045	0.8473	0.9069	(89)
MIT 2	18.1697	18.5648	19.0083	19.5129	19.8506	20.0351	20.0801	20.0776	19.9842	19.5787	18.8417	18.1161	(90)
Living area fraction											fLA = Living area / (4) =	0.6481	(91)
MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.9384	19.2850	19.6757	20.1237	20.4358	20.6117	20.6618	20.6566	20.5595	20.1765	19.5191	18.8877	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8805	0.8362	0.7829	0.6939	0.5762	0.4302	0.3113	0.3380	0.5062	0.7084	0.8344	0.8905	(94)
Useful gains	467.3108	513.8383	518.5707	489.6358	418.0620	304.8196	212.4333	220.9121	319.0381	410.6113	441.5938	451.5061	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	811.0892	794.5329	725.4808	608.9595	472.6564	321.0480	216.9151	226.7690	346.7108	518.1416	675.7290	803.8498	(97)
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98a)
Space heating requirement - total per year (kWh/year)												1235.5940	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1235.5940	
Space heating per m2											(98c) / (4) =	22.8814	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	255.7712	188.6268	153.9411	85.9131	40.6182	0.0000	0.0000	0.0000	0.0000	80.0025	168.5773	262.1438	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	277.1085	204.3628	166.7834	93.0803	44.0067	0.0000	0.0000	0.0000	0.0000	86.6766	182.6407	284.0127	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6365	84.2273	83.6340	82.6684	81.4657	79.8000	79.8000	79.8000	79.8000	82.5052	83.9553	84.7141	(217)
Fuel for water heating, kWh/month	233.7804	207.8654	222.8809	199.6432	197.2914	182.5113	180.9699	187.6483	189.1231	202.7633	210.3846	231.2142	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1338.6718	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2446.0762	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3470.3688	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1338.6718	0.2100	281.1211	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2446.0762	0.2100	513.6760	(264)
Space and water heating			794.7971	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			756.6824	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.0100	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1338.6718	1.1300	1512.6991	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2446.0762	1.1300	2764.0661	(278)
Space and water heating			4276.7651	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4048.5927	(286)
Target Primary Energy Rate (TPER)			74.9700	(287)

Summary for Input Data

Property Reference	Flat 11	**Issued on Date**	27/07/2025
Assessment Reference	Flat 11	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	13.00 m	72.60 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	42.25	25.74	0.00	None	16.51	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		26.40	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	

Summary for Input Data

Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 11	**Issued on Date**	27/07/2025
Assessment Reference	Flat 11	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3353	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)		1.6900	(36)
Point Thermal bridges	(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	69.0352	68.8357	68.6400	67.7212	67.5493	66.7490	66.7490	66.6008	67.0572	67.5493	67.8970	68.2606	(39)
Average = Sum(39)m / 12 =												67.7203	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9509	0.9481	0.9455	0.9328	0.9304	0.9194	0.9194	0.9174	0.9237	0.9304	0.9352	0.9402	(40)
HLP (average)												0.9328	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												125.2310	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)										Total = Sum(45)m =		2080.0760	
Distribution loss (46)m = 0.15 x (45)m													
	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains													
	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.1334	32.2265	32.3184	32.7569	32.8402	33.2340	33.2340	33.3079	33.0812	32.8402	32.6720	32.4980	
alpha	3.1422	3.1484	3.1546	3.1838	3.1893	3.2156	3.2156	3.2205	3.2054	3.1893	3.1781	3.1665	
util living area													
	0.9330	0.8951	0.8465	0.7588	0.6373	0.4841	0.3598	0.3906	0.5711	0.7818	0.8977	0.9409	(86)
MIT	19.6492	19.8959	20.1704	20.4883	20.7168	20.8480	20.8879	20.8828	20.8051	20.5125	20.0407	19.6082	(87)
Th 2	20.1245	20.1268	20.1290	20.1397	20.1417	20.1510	20.1510	20.1528	20.1474	20.1417	20.1377	20.1334	(88)
util rest of house													
	0.9241	0.8820	0.8276	0.7300	0.5953	0.4281	0.2939	0.3233	0.5149	0.7493	0.8827	0.9330	(89)
MIT 2	18.5412	18.8488	19.1881	19.5776	19.8398	19.9843	20.0189	20.0172	19.9418	19.6161	19.0426	18.4969	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9113	0.8687	0.8163	0.7255	0.6015	0.4450	0.3165	0.3461	0.5293	0.7455	0.8704	0.9208	(94)
Useful gains	550.2652	616.4653	628.2124	597.8827	510.5913	368.5542	251.5818	262.4873	386.0640	495.6678	523.7515	528.3531	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1020.0196	994.9233	903.4165	752.8322	578.3985	387.1913	256.1725	268.7010	419.6435	638.2219	843.5362	1012.4871	(97)
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98a)
Space heating requirement - total per year (kWh/year)												1667.0860	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1667.0860	
Space heating per m2											(98c) / (4) =	22.9626	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	139.8549	101.7702	81.9335	44.6433	20.1875	0.0000	0.0000	0.0000	0.0000	42.4411	92.1348	144.1360	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	667.1012	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1187.9361	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	156.5610	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2011.5983	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	667.1012	0.1557	103.8427	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			272.0285	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)
Total CO2, kg/year			294.6251	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.0600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	667.1012	1.5763	1051.5337	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			2861.4000	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3101.5384	(286)
Dwelling Primary energy Rate (DPER)			42.7200	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0695	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	27.3433	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												117.9810	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m													
	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
											Total per year (kWh/year) = Sum(64)m =	2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains													
	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area													
	0.9246	0.8868	0.8383	0.7509	0.6309	0.4784	0.3552	0.3845	0.5614	0.7690	0.8866	0.9324	(86)
MIT	19.2854	19.6099	19.9808	20.4177	20.7335	20.9185	20.9757	20.9685	20.8606	20.4639	19.8280	19.2392	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house													
	0.9146	0.8726	0.8182	0.7208	0.5876	0.4208	0.2874	0.3155	0.5036	0.7348	0.8700	0.9233	(89)
MIT 2	18.0967	18.4997	18.9570	19.4894	19.8505	20.0517	20.1009	20.0981	19.9952	19.5565	18.7870	18.0468	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)
MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8956	0.8536	0.8025	0.7149	0.5963	0.4444	0.3191	0.3473	0.5239	0.7303	0.8527	0.9051	(94)
Useful gains	580.6778	643.8526	653.6213	621.7010	533.5169	388.6599	268.4721	279.5078	406.3246	518.9287	551.5433	559.7131	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1045.8161	1025.1535	936.0533	784.9025	608.0402	410.2009	274.1385	286.9982	443.6097	666.0191	869.5364	1035.4553	(97)
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98a)
Space heating requirement - total per year (kWh/year)												1677.7194	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1677.7194	
Space heating per m2											(98c) / (4) =	23.1091	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	374.9328	277.6102	227.6592	127.3078	60.0707	0.0000	0.0000	0.0000	0.0000	118.5647	248.0553	383.4802	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.0601	84.6673	84.0839	83.0877	81.7661	79.8000	79.8000	79.8000	79.8000	82.9146	84.3996	85.1320	(217)
Fuel for water heating, kWh/month	259.9419	230.9203	247.2356	220.8170	218.0124	201.8711	199.8040	207.5092	209.5004	224.1294	233.2243	257.0224	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1817.6808	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2709.9880	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-717.6874	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4068.9321	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1817.6808	0.2100	381.7130	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2709.9880	0.2100	569.0975	(264)
Space and water heating			950.8105	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			894.5537	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1817.6808	1.1300	2053.9793	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2709.9880	1.1300	3062.2864	(278)
Space and water heating			5116.2658	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			4762.5318	(286)
Target Primary Energy Rate (TPER)			65.6000	(287)

Full SAP Calculation Printout

Property Reference	Flat 11	**Issued on Date**	27/07/2025
Assessment Reference	Flat 11	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3776	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3210	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4093	0.4012	0.3932	0.3531	0.3451	0.3049	0.3049	0.2969	0.3210	0.3451	0.3611	0.3772	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000	(23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5838	0.5805	0.5773	0.5623	0.5595	0.5465	0.5465	0.5441	0.5515	0.5595	0.5652	0.5711	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	1.6900	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4530	45.1998	44.9516	43.7857	43.5676	42.5522	42.5522	42.3641	42.9433	43.5676	44.0088	44.4702	(38)
Heat transfer coeff													

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                70.4168    70.1636    69.9154    68.7495    68.5314    67.5160    67.5160    67.3279    67.9071    68.5314    68.9727    69.4340 (39)
Average = Sum(39)m / 12 =                                                                                                          68.7485

                 Jan        Feb        Mar        Apr        May        Jun        Jul        Aug        Sep        Oct        Nov        Dec
HLP              0.9699     0.9664     0.9630     0.9470     0.9440     0.9300     0.9300     0.9274     0.9354     0.9440     0.9500     0.9564 (40)
HLP (average)                                                                                                                        0.9469
Days in mont         31         28         31         30         31         30         31         31         30         31         30         31



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4. Water heating energy requirements (kWh/year)
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Assumed occupancy                                                                                                                    2.3076 (42)
Hot water usage for mixer showers
                 0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (42a)
Hot water usage for baths
                27.1765    26.7729    26.2045    25.1566    24.3718    23.5017    23.0317    23.5961    24.2107    25.1417    26.2113    27.0846 (42b)
Hot water usage for other uses
                38.2617    36.8703    35.4790    34.0877    32.6963    31.3050    31.3050    32.6963    34.0877    35.4790    36.8703    38.2617 (42c)
Average daily hot water use (litres/day)                                                                                            59.9802 (43)

                 Jan        Feb        Mar        Apr        May        Jun        Jul        Aug        Sep        Oct        Nov        Dec
Daily hot water use
                65.4382    63.6432    61.6835    59.2442    57.0682    54.8067    54.3368    56.2925    58.2983    60.6207    63.0816    65.3463 (44)
Energy conte   103.6381    90.6271    94.8053    81.1024    76.8248    67.3913    65.7156    69.7019    71.8877    82.2617    89.8713   102.3165 (45)
Energy content (annual)                                                                                 Total = Sum(45)m =   996.1436
Distribution loss  (46)m = 0.15 x (45)m
                 0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (46)
Water storage loss:
Total storage loss
                 0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (56)
If cylinder contains dedicated solar storage
                 0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (57)
Primary loss     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (59)
Combi loss       0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (61)
Total heat required for water heating calculated for each month
                88.0924    77.0330    80.5845    68.9370    65.3010    57.2826    55.8583    59.2466    61.1045    69.9225    76.3906    86.9690 (62)
WWHRS            0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (63a)
PV diverter      0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (63b)
Solar input      0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (63c)
FGHRS            0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (63d)
Output from w/h
                88.0924    77.0330    80.5845    68.9370    65.3010    57.2826    55.8583    59.2466    61.1045    69.9225    76.3906    86.9690 (64)
                                                                                  Total per year (kWh/year) = Sum(64)m =   846.7221 (64)
12Total per year (kWh/year)                                                                                                          847 (64)
Electric shower(s)
                50.3803    44.8892    49.0173    46.7766    47.6544    45.4576    46.9729    47.6544    46.7766    49.0173    48.0956    50.3803 (64a)
                                                    Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =   573.0725 (64a)
Heat gains from water heating, kWh/month
                34.6182    30.4806    32.4005    28.9284    28.2389    25.6851    25.7078    26.7252    26.9703    29.7349    31.1216    34.3373 (65)



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5. Internal gains (see Table 5 and 5a)
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Metabolic gains (Table 5), Watts
                 Jan        Feb        Mar        Apr        May        Jun        Jul        Aug        Sep        Oct        Nov        Dec
(66)m          115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778   115.3778 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5
               103.1368   114.1871   103.1368   106.5747   103.1368   106.5747   103.1368   103.1368   106.5747   103.1368   106.5747   103.1368 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5
               203.2876   205.3971   200.0813   188.7645   174.4790   161.0527   152.0832   149.9737   155.2895   166.6063   180.8917   194.3180 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5
                34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378    34.5378 (69)
Pumps, fans      0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)
               -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022   -92.3022 (71)
Water heating gains (Table 5)
                46.5298    45.3580    43.5490    40.1784    37.9554    35.6737    34.5535    35.9210    37.4587    39.9663    43.2244    46.1523 (72)
Total internal gains
               410.5675   422.5556   404.3804   393.1308   373.1846   360.9144   347.3867   346.6448   356.9362   367.3227   388.3041   401.2205 (73)



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6. Solar gains
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[Jan]                                      Area          Solar flux              g                 FF              Access               Gains
                                             m2            Table 6a    Specific data     Specific data              factor                   W
                                                              W/m2      or Table 6b       or Table 6c            Table 6d
--------------------------------------------------------------------------------------------------------
North                                      6.3000           10.6334           0.6300            0.7000              0.7700             20.4731 (74)
South                                      8.3900           46.7521           0.6300            0.7000              0.7700            119.8766 (78)
--------------------------------------------------------------------------------------------------------

Solar gains    140.3498   235.4523   316.5691   389.4405   438.3949   437.4556   420.7320   383.0300   341.1786   258.3306   167.3509   120.6519 (83)
Total gains    550.9173   658.0078   720.9495   782.5713   811.5795   798.3701   768.1188   729.6748   698.1149   625.6533   555.6551   521.8723 (84)



--------------------------------------------------------------------------------------------------------
7. Mean internal temperature (heating season)
--------------------------------------------------------------------------------------------------------
Temperature during heating periods in the living area from Table 9, Th1 (C)                                                         21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)
                 Jan        Feb        Mar        Apr        May        Jun        Jul        Aug        Sep        Oct        Nov        Dec
tau             31.5029    31.6166    31.7288    32.2669    32.3696    32.8564    32.8564    32.9482    32.6672    32.3696    32.1625    31.9488
alpha            3.1002     3.1078     3.1153     3.1511     3.1580     3.1904     3.1904     3.1965     3.1778     3.1580     3.1442     3.1299
util living area
                 0.9470     0.9127     0.8675     0.7818     0.6613     0.5033     0.3751     0.4082     0.5945     0.8065     0.9155     0.9538 (86)

MIT             19.1582    19.5087    19.9042    20.3754    20.7142    20.9136    20.9744    20.9662    20.8475    20.4087    19.7244    19.1085 (87)
Th 2            20.1085    20.1114    20.1143    20.1278    20.1303    20.1421    20.1421    20.1443    20.1375    20.1303    20.1252    20.1198 (88)
util rest of house
                 0.9396     0.9011     0.8502     0.7539     0.6192     0.4455     0.3061     0.3378     0.5372     0.7756     0.9025     0.9472 (89)
MIT 2           18.4319    18.7745    19.1578    19.6114    19.9166    20.0893    20.1307    20.1283    20.0379    19.6533    19.0000    18.3915 (90)
Living area fraction                                                                         fLA = Living area / (4) =       0.4821 (91)
MIT             18.7820    19.1285    19.5177    19.9798    20.3011    20.4867    20.5374    20.5322    20.4282    20.0175    19.3492    18.7372 (92)
```

Temperature adjustment												0.0000	
adjusted MIT	18.7820	19.1285	19.5177	19.9798	20.3011	20.4867	20.5374	20.5322	20.4282	20.0175	19.3492	18.7372	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9259	0.8861	0.8369	0.7488	0.6278	0.4693	0.3383	0.3703	0.5572	0.7712	0.8887	0.9344	(94)
Useful gains	510.1019	583.0819	603.3669	585.9566	509.5408	374.6590	259.8813	270.1803	389.0217	482.4785	493.8256	487.6534	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1019.7780	998.3191	910.1339	761.7280	589.4456	397.4455	265.8390	278.2153	429.7317	645.3928	844.8607	1009.3733	(97)
Space heating kWh	379.1990	279.0394	228.2346	126.5554	59.4492	0.0000	0.0000	0.0000	0.0000	121.2082	252.7453	388.1596	(98a)
Space heating requirement - total per year (kWh/year)												1834.5906	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	379.1990	279.0394	228.2346	126.5554	59.4492	0.0000	0.0000	0.0000	0.0000	121.2082	252.7453	388.1596	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1834.5906	
Space heating per m2											(98c) / (4) =	25.2698	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	634.6501	499.6182	511.6923	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8723	0.9175	0.9027	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	553.6191	458.4027	461.9062	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	244.8516	299.0583	264.5158	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	61.2129	74.7646	66.1290	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												202.1064	(107)
Energy for space heating												25.2698	(99)
Energy for space cooling												2.7838	(108)
Total												28.0537	(109)
Fabric Energy Efficiency (DFEE)												28.1	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		235.9500	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)

Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.0695 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 27.3433 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 59.9802 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	65.4382	63.6432	61.6835	59.2442	57.0682	54.8067	54.3368	56.2925	58.2983	60.6207	63.0816	65.3463	(44)
Energy conte	103.6381	90.6271	94.8053	81.1024	76.8248	67.3913	65.7156	69.7019	71.8877	82.2617	89.8713	102.3165	(45)
Energy content (annual)										Total = Sum(45)m =		996.1436	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(64)
										Total per year (kWh/year) = Sum(64)m =		846.7221	(64)
12Total per year (kWh/year)												847	(64)
Electric shower(s)	50.3803	44.8892	49.0173	46.7766	47.6544	45.4576	46.9729	47.6544	46.7766	49.0173	48.0956	50.3803	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		573.0725	(64a)
Heat gains from water heating, kWh/month	34.6182	30.4806	32.4005	28.9284	28.2389	25.6851	25.7078	26.7252	26.9703	29.7349	31.1216	34.3373	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	46.5298	45.3580	43.5490	40.1784	37.9554	35.6737	34.5535	35.9210	37.4587	39.9663	43.2244	46.1523	(72)
Total internal gains	410.5675	422.5556	404.3804	393.1308	373.1846	360.9144	347.3867	346.6448	356.9362	367.3227	388.3041	401.2205	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	550.9173	658.0078	720.9495	782.5713	811.5795	798.3701	768.1188	729.6748	698.1149	625.6533	555.6551	521.8723	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area	0.9482	0.9153	0.8720	0.7894	0.6721	0.5156	0.3862	0.4198	0.6064	0.8134	0.9181	0.9548	(86)
MIT	19.0709	19.4242	19.8297	20.3190	20.6801	20.8995	20.9693	20.9597	20.8265	20.3583	19.6506	19.0201	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house	0.9409	0.9038	0.8547	0.7615	0.6292	0.4556	0.3135	0.3459	0.5475	0.7825	0.9051	0.9483	(89)
MIT 2	18.3270	18.6725	19.0661	19.5376	19.8639	20.0534	20.1010	20.0979	19.9970	19.5856	18.9086	18.2854	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.6856	19.0349	19.4343	19.9143	20.2574	20.4613	20.5196	20.5134	20.3969	19.9581	19.2663	18.6396	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6856	19.0349	19.4343	19.9143	20.2574	20.4613	20.5196	20.5134	20.3969	19.9581	19.2663	18.6396	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9269	0.8883	0.8406	0.7552	0.6370	0.4797	0.3472	0.3797	0.5673	0.7770	0.8909	0.9352	(94)
Useful gains	510.6349	584.4992	606.0291	591.0160	516.9682	382.9833	266.7290	277.0679	396.0149	486.1025	495.0176	488.0602	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1046.9694	1025.1523	934.8748	783.2954	606.7094	409.6214	273.9228	286.6938	442.5206	663.4770	867.9291	1036.7474	(97)
Space heating kWh	399.0328	296.1189	244.6612	138.4411	66.7675	0.0000	0.0000	0.0000	0.0000	131.9666	268.4963	408.2233	(98a)
Space heating requirement - total per year (kWh/year)												1953.7077	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	399.0328	296.1189	244.6612	138.4411	66.7675	0.0000	0.0000	0.0000	0.0000	131.9666	268.4963	408.2233	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1953.7077	
Space heating per m2											(98c) / (4) =	26.9106	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	656.9274	517.1556	529.7074	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8587	0.9069	0.8909	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	564.0721	468.9980	471.9192	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	237.3255	291.1754	257.0661	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	59.3314	72.7939	64.2665	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												196.3917	(107)
Energy for space heating												26.9106	(99)
Energy for space cooling												2.7051	(108)
Total												29.6157	(109)
Fabric Energy Efficiency (TFEE)												29.6	(109)

Full SAP Calculation Printout

Property Reference	Flat 11	**Issued on Date**	27/07/2025
Assessment Reference	Flat 11	**Prop Type Ref**	
Property			

SAP Rating	84 B	**DER**	4.06	**TER**	12.32
Environmental	97 A	**% DER < TER**			67.05
CO_2 Emissions (t/year)	0.27	**DFEE**	28.05	**TFEE**	29.62
Compliance Check	See BREL	**% DFEE < TFEE**			5.27
% DPER < TPER	34.88	**DPER**	42.72	**TPER**	65.60

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3353	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.2738			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)		1.6900	(36)
Point Thermal bridges	(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =	24.9638	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	69.0352	68.8357	68.6400	67.7212	67.5493	66.7490	66.7490	66.6008	67.0572	67.5493	67.8970	68.2606	(39)
Average = Sum(39)m / 12 =												67.7203	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9509	0.9481	0.9455	0.9328	0.9304	0.9194	0.9194	0.9174	0.9237	0.9304	0.9352	0.9402	(40)
HLP (average)												0.9328	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												125.2310	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)										Total = Sum(45)m =		2080.0760	
Distribution loss (46)m = 0.15 x (45)m													
	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains													
	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.1334	32.2265	32.3184	32.7569	32.8402	33.2340	33.2340	33.3079	33.0812	32.8402	32.6720	32.4980	
alpha	3.1422	3.1484	3.1546	3.1838	3.1893	3.2156	3.2156	3.2205	3.2054	3.1893	3.1781	3.1665	
util living area													
	0.9330	0.8951	0.8465	0.7588	0.6373	0.4841	0.3598	0.3906	0.5711	0.7818	0.8977	0.9409	(86)
MIT	19.6492	19.8959	20.1704	20.4883	20.7168	20.8480	20.8879	20.8828	20.8051	20.5125	20.0407	19.6082	(87)
Th 2	20.1245	20.1268	20.1290	20.1397	20.1417	20.1510	20.1510	20.1528	20.1474	20.1417	20.1377	20.1334	(88)
util rest of house													
	0.9241	0.8820	0.8276	0.7300	0.5953	0.4281	0.2939	0.3233	0.5149	0.7493	0.8827	0.9330	(89)
MIT 2	18.5412	18.8488	19.1881	19.5776	19.8398	19.9843	20.0189	20.0172	19.9418	19.6161	19.0426	18.4969	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0753	19.3536	19.6617	20.0166	20.2626	20.4007	20.4379	20.4345	20.3580	20.0482	19.5238	19.0327	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9113	0.8687	0.8163	0.7255	0.6015	0.4450	0.3165	0.3461	0.5293	0.7455	0.8704	0.9208	(94)
Useful gains	550.2652	616.4653	628.2124	597.8827	510.5913	368.5542	251.5818	262.4873	386.0640	495.6678	523.7515	528.3531	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1020.0196	994.9233	903.4165	752.8322	578.3985	387.1913	256.1725	268.7010	419.6435	638.2219	843.5362	1012.4871	(97)
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98a)
Space heating requirement - total per year (kWh/year)												1667.0860	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1667.0860	
Space heating per m2											(98c) / (4) =	22.9626	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	349.4973	254.3238	204.7518	111.5636	50.4485	0.0000	0.0000	0.0000	0.0000	106.0602	230.2450	360.1958	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	139.8549	101.7702	81.9335	44.6433	20.1875	0.0000	0.0000	0.0000	0.0000	42.4411	92.1348	144.1360	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	667.1012	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1187.9361	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	156.5610	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2011.5983	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	667.1012	0.1557	103.8427	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			272.0285	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)
Total CO2, kg/year			294.6251	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 4.0600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	667.1012	1.5763	1051.5337	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			2861.4000	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3101.5384	(286)
Dwelling Primary energy Rate (DPER)			42.7200	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
Total net area of external elements Aum(A, m2)			42.2500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.2738			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	26.4000	0.0700	1.8480	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0695	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	27.3433	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	72.7791	72.5265	72.2789	71.1162	70.8986	69.8859	69.8859	69.6983	70.2760	70.8986	71.3387	71.7988	(39)
Average = Sum(39)m / 12 =												71.1151	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.0025	0.9990	0.9956	0.9796	0.9766	0.9626	0.9626	0.9600	0.9680	0.9766	0.9826	0.9890	(40)
HLP (average)												0.9795	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076	(42)
Hot water usage for mixer showers													
	62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)
Hot water usage for baths													
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)
Hot water usage for other uses													
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)
Average daily hot water use (litres/day)												117.9810	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m													
	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
											Total per year (kWh/year) = Sum(64)m =	2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
Heat gains from water heating, kWh/month													
	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains													
	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.4804	30.5865	30.6913	31.1931	31.2888	31.7422	31.7422	31.8276	31.5660	31.2888	31.0958	30.8965	
alpha	3.0320	3.0391	3.0461	3.0795	3.0859	3.1161	3.1161	3.1218	3.1044	3.0859	3.0731	3.0598	
util living area													
	0.9246	0.8868	0.8383	0.7509	0.6309	0.4784	0.3552	0.3845	0.5614	0.7690	0.8866	0.9324	(86)
MIT	19.2854	19.6099	19.9808	20.4177	20.7335	20.9185	20.9757	20.9685	20.8606	20.4639	19.8280	19.2392	(87)
Th 2	20.0813	20.0842	20.0870	20.1004	20.1029	20.1146	20.1146	20.1168	20.1101	20.1029	20.0978	20.0925	(88)
util rest of house													
	0.9146	0.8726	0.8182	0.7208	0.5876	0.4208	0.2874	0.3155	0.5036	0.7348	0.8700	0.9233	(89)
MIT 2	18.0967	18.4997	18.9570	19.4894	19.8505	20.0517	20.1009	20.0981	19.9952	19.5565	18.7870	18.0468	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)
MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(92)

Temperature adjustment												0.0000	
adjusted MIT	18.6697	19.0349	19.4506	19.9369	20.2762	20.4696	20.5227	20.5177	20.4124	19.9940	19.2888	18.6216	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8956	0.8536	0.8025	0.7149	0.5963	0.4444	0.3191	0.3473	0.5239	0.7303	0.8527	0.9051	(94)
Useful gains	580.6778	643.8526	653.6213	621.7010	533.5169	388.6599	268.4721	279.5078	406.3246	518.9287	551.5433	559.7131	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1045.8161	1025.1535	936.0533	784.9025	608.0402	410.2009	274.1385	286.9982	443.6097	666.0191	869.5364	1035.4553	(97)
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98a)
Space heating requirement - total per year (kWh/year)												1677.7194	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1677.7194	
Space heating per m2											(98c) / (4) =	23.1091	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	346.0629	256.2342	210.1294	117.5051	55.4453	0.0000	0.0000	0.0000	0.0000	109.4353	228.9550	353.9522	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	374.9328	277.6102	227.6592	127.3078	60.0707	0.0000	0.0000	0.0000	0.0000	118.5647	248.0553	383.4802	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.0601	84.6673	84.0839	83.0877	81.7661	79.8000	79.8000	79.8000	79.8000	82.9146	84.3996	85.1320	(217)
Fuel for water heating, kWh/month	259.9419	230.9203	247.2356	220.8170	218.0124	201.8711	199.8040	207.5092	209.5004	224.1294	233.2243	257.0224	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1817.6808	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2709.9880	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-717.6874	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4068.9321	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1817.6808	0.2100	381.7130	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2709.9880	0.2100	569.0975	(264)
Space and water heating			950.8105	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)

Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			894.5537	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1817.6808	1.1300	2053.9793	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2709.9880	1.1300	3062.2864	(278)
Space and water heating			5116.2658	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			4762.5318	(286)
Target Primary Energy Rate (TPER)			65.6000	(287)

Summary for Input Data

Property Reference	Flat 12	**Issued on Date**	27/07/2025
Assessment Reference	Flat 12	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	5.07	**TER**	15.92
Environmental	96 A	**% DER < TER**			68.15
CO_2 Emissions (t/year)	0.25	**DFEE**	37.69	**TFEE**	38.86
Compliance Check	See BREL	**% DFEE < TFEE**			3.02
% DPER < TPER	37.45	**DPER**	53.30	**TPER**	85.22

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, End-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	22.65 m	53.90 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	73.61	57.10	0.00	None	16.51	Calculate Wall Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0

Summary for Input Data

elmhurst energy

N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		45.30	0.00	0.00	No
E18 Party wall between dwellings		6.50	0.00	0.00	No
E16 Corner (normal)		9.75	0.00	0.00	No
E17 Corner (inverted – internal area greater than external area)		3.25	0.00	0.00	No

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	

Summary for Input Data

Flow Temperature	Enter value
Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None
28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 12	**Issued on Date**	27/07/2025
Assessment Reference	Flat 12	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	5.07	**TER**	15.92
Environmental	96 A	**% DER < TER**			68.15
CO_2 Emissions (t/year)	0.25	**DFEE**	37.69	**TFEE**	38.86
Compliance Check	See BREL	**% DFEE < TFEE**			3.02
% DPER < TPER	37.45	**DPER**	53.30	**TPER**	85.22

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.1750	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3647	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3100	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3952	0.3875	0.3797	0.3410	0.3332	0.2945	0.2945	0.2867	0.3100	0.3332	0.3487	0.3642	(22b)
Effective ac	0.5781	0.5751	0.5721	0.5581	0.5555	0.5434	0.5434	0.5411	0.5480	0.5555	0.5608	0.5663	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	73.6125	16.5100	57.1025	0.1800	10.2784			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.9191			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	2.9445	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	31.8636	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4185	33.2432	33.0713	32.2642	32.1132	31.4102	31.4102	31.2801	31.6810	32.1132	32.4187	32.7381	(38)
Heat transfer coeff	65.2820	65.1067	64.9349	64.1278	63.9768	63.2738	63.2738	63.1436	63.5446	63.9768	64.2823	64.6016	(39)
Average = Sum(39)m / 12 =												64.1271	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2112	1.2079	1.2047	1.1898	1.1870	1.1739	1.1739	1.1715	1.1789	1.1870	1.1926	1.1985	(40)
HLP (average)												1.1897	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051	(42)
Hot water usage for mixer showers													
	61.2950	60.3739	59.0316	56.4634	54.5681	52.4545	51.2531	52.5852	54.0455	56.3149	58.9383	61.0602	(42a)
Hot water usage for baths													
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)
Hot water usage for other uses													
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)
Average daily hot water use (litres/day)												108.4548	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	117.9640	115.4889	112.4498	107.7691	103.9895	99.9176	98.3089	101.3344	104.5314	108.8119	113.5665	117.6495	(44)
Energy conte	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(45)
Energy content (annual)										Total = Sum(45)m =		1801.4233	
Distribution loss (46)m = 0.15 x (45)m													
	28.0239	24.6682	25.9247	22.1296	20.9985	18.4291	17.8344	18.8210	19.3347	22.1485	24.2694	27.6316	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
										Total per year (kWh/year) = Sum(64)m =		1801.4233	(64)
12Total per year (kWh/year)												1801	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1197	54.6812	57.4663	49.0539	46.5466	40.8511	39.5329	41.7198	42.8585	49.0959	53.7973	61.2501	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.3632	87.8664	79.3632	82.0086	79.3632	82.0086	79.3632	79.3632	82.0086	79.3632	82.0086	79.3632	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	83.4942	81.3708	77.2397	68.1304	62.5627	56.7376	53.1357	56.0750	59.5257	65.9891	74.7184	82.3254	(72)
Total internal gains													
	373.2798	381.2923	364.5435	349.3203	330.0501	313.4784	300.2885	301.5951	311.8057	327.3830	349.8148	365.1684	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	513.6295	616.7445	681.1126	738.7608	768.4450	750.9340	721.0206	684.6251	652.9843	585.7135	517.1657	485.8202	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.2281	25.2961	25.3630	25.6822	25.7429	26.0289	26.0289	26.0825	25.9179	25.7429	25.6205	25.4939	
alpha	2.6819	2.6864	2.6909	2.7121	2.7162	2.7353	2.7353	2.7388	2.7279	2.7162	2.7080	2.6996	
util living area													
	0.9250	0.8847	0.8340	0.7483	0.6321	0.4883	0.3681	0.3999	0.5752	0.7756	0.8897	0.9335	(86)
MIT	19.2718	19.5657	19.9041	20.2975	20.5983	20.7863	20.8534	20.8439	20.7211	20.3291	19.7428	19.2220	(87)
Th 2	19.9111	19.9137	19.9162	19.9282	19.9305	19.9409	19.9409	19.9429	19.9369	19.9305	19.9259	19.9212	(88)
util rest of house													
	0.9141	0.8689	0.8115	0.7145	0.5828	0.4207	0.2859	0.3163	0.5083	0.7378	0.8719	0.9238	(89)
MIT 2	17.9140	18.2789	18.6956	19.1751	19.5187	19.7221	19.7792	19.7749	19.6601	19.2265	18.5153	17.8592	(90)
Living area fraction										fLA = Living area / (4) =		0.6494	(91)
MIT	18.7957	19.1145	19.4804	19.9039	20.2197	20.4132	20.4767	20.4690	20.3490	19.9424	19.3124	18.7441	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7957	19.1145	19.4804	19.9039	20.2197	20.4132	20.4767	20.4690	20.3490	19.9424	19.3124	18.7441	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9007	0.8555	0.8014	0.7137	0.5968	0.4517	0.3282	0.3589	0.5354	0.7383	0.8600	0.9108	(94)
Useful gains	462.6451	527.6269	545.8240	527.2206	458.6051	339.1901	236.6634	245.6870	349.5864	432.4129	444.7729	442.5041	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	946.3076	925.4598	842.8778	705.6561	545.0645	367.8204	245.2951	256.9340	397.0932	597.6996	785.0382	939.5740	(97)
Space heating kWh	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98a)
Space heating requirement - total per year (kWh/year)												1778.7803	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1778.7803	
Space heating per m2											(98c) / (4) =	33.0015	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	143.9955	106.9803	88.4386	51.4100	25.7406	0.0000	0.0000	0.0000	0.0000	49.2090	98.0356	147.9872	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.6968	93.9204	98.7042	84.2550	79.9485	70.1658	67.9018	71.6580	73.6138	84.3271	92.4022	105.2032	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9274	11.9753	10.7825	7.8997	6.1019	4.9853	5.5664	7.2354	9.3981	12.3308	13.9276	15.3423	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	711.7968	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1028.7969	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	120.4728	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1861.0665	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	711.7968	0.1552	110.4863	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1028.7969	0.1416	145.6552	(264)
Space and water heating			256.1415	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.4728	0.1443	17.3880	(268)
Total CO2, kg/year			273.5295	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 5.0700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	711.7968	1.5746	1120.8270	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1028.7969	1.5235	1567.4115	(278)
Space and water heating			2688.2385	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.4728	1.5338	184.7853	(282)
Total Primary energy kWh/year			2873.0237	(286)
Dwelling Primary energy Rate (DPER)			53.3000	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b) x	3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.1750	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3642 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3095 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3947	0.3869	0.3792	0.3405	0.3328	0.2941	0.2941	0.2863	0.3095	0.3328	0.3482	0.3637	(22b)
Effective ac	0.5779	0.5749	0.5719	0.5580	0.5554	0.5432	0.5432	0.5410	0.5479	0.5554	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6600	1.1450	13.3511			(27)
External Wall 1	73.6125	13.4800	60.1325	0.1800	10.8238			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.9950			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	45.3000	0.0700	3.1710
E18 Party wall between dwellings	6.5000	0.0600	0.3900
E16 Corner (normal)	9.7500	0.0900	0.8775
E17 Corner (inverted - internal area greater than external area)	3.2500	-0.0900	-0.2925

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		5.5875 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	31.5825 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4061	33.2313	33.0599	32.2550	32.1044	31.4034	31.4034	31.2736	31.6734	32.1044	32.4091	32.7276	(38)
Heat transfer coeff	64.9886	64.8138	64.6424	63.8375	63.6869	62.9859	62.9859	62.8560	63.2559	63.6869	63.9916	64.3101	(39)
Average = Sum(39)m / 12 =												63.8368	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2057	1.2025	1.1993	1.1844	1.1816	1.1686	1.1686	1.1662	1.1736	1.1816	1.1872	1.1931	(40)
HLP (average)												1.1844	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051	(42)
Hot water usage for mixer showers													
	54.4845	53.6657	52.4725	50.1897	48.5050	46.6262	45.5583	46.7424	48.0404	50.0577	52.3896	54.2757	(42a)
Hot water usage for baths													
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)
Hot water usage for other uses													
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)
Average daily hot water use (litres/day)												102.1757	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.1535	108.7807	105.8907	101.4954	97.9264	94.0893	92.6141	95.4916	98.5264	102.5547	107.0178	110.8651	(44)
Energy conte	176.0399	154.9022	162.7501	138.9421	131.8278	115.6938	112.0087	118.2385	121.4929	139.1658	152.4665	173.5879	(45)
Energy content (annual)										Total = Sum(45)m =		1697.1161	
Distribution loss (46)m = 0.15 x (45)m													
	26.4060	23.2353	24.4125	20.8413	19.7742	17.3541	16.8013	17.7358	18.2239	20.8749	22.8700	26.0382	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.6348	196.9879	209.3450	184.0340	178.4227	160.7856	158.6036	164.8334	166.5847	185.7607	197.5583	220.1828	(62)
WWHRS	-24.9080	-22.0289	-23.0674	-19.1007	-17.8012	-15.2326	-14.2781	-15.1833	-15.7602	-18.5795	-21.0484	-24.4468	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
										Total per year (kWh/year) = Sum(64)m =		2014.2986	(64)
12Total per year (kWh/year)												2014	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8092	85.1736	91.3903	82.2717	81.1086	74.5417	74.5188	76.5902	76.4699	83.5485	86.7686	94.9939	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4429	87.9546	79.4429	82.0910	79.4429	82.0910	79.4429	79.4429	82.0910	79.4429	82.0910	79.4429	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	128.7758	126.7464	122.8365	114.2663	109.0170	103.5301	100.1597	102.9439	106.2081	112.2964	120.5119	127.6800	(72)
Total internal gains													
	418.6410	426.7561	410.2200	395.5386	376.5841	360.3532	347.3922	348.5436	358.5705	373.7700	395.6906	410.6027	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.6600	46.7521	0.6300	0.7000	0.7700	95.1583	(78)

Solar gains	111.4069	186.8966	251.2832	309.1225	347.9771	347.2299	333.9562	304.0328	270.8162	205.0563	132.8397	95.7711	(83)
Total gains	530.0479	613.6527	661.5031	704.6611	724.5612	707.5832	681.3485	652.5764	629.3867	578.8263	528.5304	506.3738	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.3421	25.4104	25.4778	25.7990	25.8600	26.1478	26.1478	26.2018	26.0362	25.8600	25.7369	25.6094	
alpha	2.6895	2.6940	2.6985	2.7199	2.7240	2.7432	2.7432	2.7468	2.7357	2.7240	2.7158	2.7073	
util living area													
	0.9199	0.8853	0.8414	0.7638	0.6542	0.5101	0.3856	0.4154	0.5887	0.7787	0.8846	0.9273	(86)
MIT	18.9050	19.2450	19.6629	20.1735	20.5822	20.8503	20.9488	20.9359	20.7664	20.2525	19.5123	18.8505	(87)
Th 2	19.9154	19.9180	19.9206	19.9325	19.9348	19.9452	19.9452	19.9472	19.9412	19.9348	19.9302	19.9255	(88)
util rest of house													
	0.9084	0.8696	0.8195	0.7310	0.6054	0.4411	0.3006	0.3297	0.5217	0.7412	0.8663	0.9169	(89)
MIT 2	17.5168	17.9384	18.4541	19.0758	19.5459	19.8336	19.9184	19.9115	19.7541	19.1847	18.2871	17.4553	(90)

Living area fraction											fLA = Living area / (4) =	0.6494	(91)
MIT	18.4182	18.7868	19.2390	19.7886	20.2188	20.4938	20.5875	20.5767	20.4115	19.8780	19.0827	18.3612	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4182	18.7868	19.2390	19.7886	20.2188	20.4938	20.5875	20.5767	20.4115	19.8780	19.0827	18.3612	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8888	0.8502	0.8038	0.7262	0.6191	0.4780	0.3532	0.3819	0.5526	0.7390	0.8490	0.8978	(94)
Useful gains	471.0891	521.7432	531.7198	511.6993	448.5660	338.2000	240.6418	249.2249	347.8256	427.7356	448.7285	454.6085	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	917.5241	900.0569	823.4797	695.0988	542.5388	371.2269	251.1554	262.5295	399.2381	590.8902	766.7926	910.7103	(97)
Space heating kWh													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98a)
Space heating requirement - total per year (kWh/year)												1695.1401	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1695.1401	
Space heating per m2											(98c) / (4) =	31.4497	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98)
Space heating efficiency (main heating system 1)													
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)													
	359.8566	275.4354	235.1780	143.0635	75.7484	0.0000	0.0000	0.0000	0.0000	131.5136	248.1106	367.6487	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2137	84.8968	84.4037	83.5658	82.3306	79.8000	79.8000	79.8000	79.8000	83.3537	84.6447	85.2816	(217)
Fuel for water heating, kWh/month													
	232.0363	206.0844	220.6983	197.3693	195.0933	182.3973	180.8591	187.5314	189.0031	200.5684	208.5304	229.5174	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5067	13.2423	11.9232	8.7354	6.7475	5.5128	6.1553	8.0009	10.3924	13.6353	15.4011	16.9654	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0405	-18.1101	-27.7562	-33.3524	-37.8875	-36.0892	-35.6643	-32.7117	-27.8479	-21.6386	-13.6384	-10.2826	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7436	-8.0966	-16.5107	-25.4205	-34.2237	-34.5988	-34.1781	-28.6457	-20.6253	-11.7651	-5.0580	-2.9432	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1836.5548	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2429.6887	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												133.2182	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-532.8285	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3952.6333	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1836.5548	0.2100	385.6765	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2429.6887	0.2100	510.2346	(264)

Space and water heating			895.9111	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.2182	0.1443	19.2275	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	0.1332	-40.9064	
PV Unit electricity exported	-225.8092	0.1252	-28.2685	
Total			-69.1749	(269)
Total CO2, kg/year			857.8930	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.9200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1836.5548	1.1300	2075.3069	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2429.6887	1.1300	2745.5483	(278)
Space and water heating			4820.8552	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.2182	1.5338	204.3346	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	1.4923	-458.1785	
PV Unit electricity exported	-225.8092	0.4595	-103.7575	
Total			-561.9360	(283)
Total Primary energy kWh/year			4593.3546	(286)
Target Primary Energy Rate (TPER)			85.2200	(287)

Full SAP Calculation Printout

Property Reference	Flat 12	**Issued on Date**	27/07/2025
Assessment Reference	Flat 12	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	5.07	**TER**	15.92
Environmental	96 A	**% DER < TER**			68.15
CO_2 Emissions (t/year)	0.25	**DFEE**	37.69	**TFEE**	38.86
Compliance Check	See BREL	**% DFEE < TFEE**			3.02
% DPER < TPER	37.45	**DPER**	53.30	**TPER**	85.22

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000 (1b)	x	3.2500 (2b)	=	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	175.1750	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3647	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3100	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3952	0.3875	0.3797	0.3410	0.3332	0.2945	0.2945	0.2867	0.3100	0.3332	0.3487	0.3642	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5781	0.5751	0.5721	0.5581	0.5555	0.5434	0.5434	0.5411	0.5480	0.5555	0.5608	0.5663	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	73.6125	16.5100	57.1025	0.1800	10.2784			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.9191			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	2.9445	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	31.8636	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4185	33.2432	33.0713	32.2642	32.1132	31.4102	31.4102	31.2801	31.6810	32.1132	32.4187	32.7381	(38)
Heat transfer coeff													

	65.2820	65.1067	64.9349	64.1278	63.9768	63.2738	63.2738	63.1436	63.5446	63.9768	64.2823	64.6016 (39)
Average = Sum(39)m / 12 =												64.1271
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2112	1.2079	1.2047	1.1898	1.1870	1.1739	1.1739	1.1715	1.1789	1.1870	1.1926	1.1985 (40)
HLP (average)												1.1897
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737 (42b)
Hot water usage for other uses												
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156 (42c)
Average daily hot water use (litres/day)												51.9428 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	56.6690	55.1150	53.4182	51.3057	49.4214	47.4631	47.0558	48.7491	50.4859	52.4971	54.6282	56.5894 (44)
Energy conte	89.7498	78.4830	82.1018	70.2350	66.5307	58.3614	56.9099	60.3616	62.2542	71.2380	77.8279	88.6053 (45)
Energy content (annual)										Total = Sum(45)m =		862.6586
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145 (64)
										Total per year (kWh/year) = Sum(64)m =		733.2598 (64)
12Total per year (kWh/year)												733 (64)
Electric shower(s)												
	43.6330	38.8774	42.4526	40.5120	41.2722	39.3696	40.6820	41.2722	40.5120	42.4526	41.6543	43.6330 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												496.3227 (64a)
Heat gains from water heating, kWh/month												
	29.9801	26.3970	28.0598	25.0529	24.4558	22.2442	22.2638	23.1449	23.3570	25.7512	26.9520	29.7369 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	79.3632	87.8664	79.3632	82.0086	79.3632	82.0086	79.3632	79.3632	82.0086	79.3632	82.0086	79.3632 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025 (71)
Water heating gains (Table 5)												
	40.2958	39.2812	37.7147	34.7957	32.8707	30.8947	29.9245	31.1087	32.4403	34.6119	37.4333	39.9689 (72)
Total internal gains												
	327.0813	336.2027	322.0185	312.9857	297.3582	287.6355	277.0773	276.6288	284.7203	293.0057	309.5297	319.8119 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519 (83)
Total gains	467.4311	571.6550	638.5876	702.4261	735.7531	725.0912	697.8094	659.6588	625.8989	551.3363	476.8807	440.4638 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	25.2281	25.2961	25.3630	25.6822	25.7429	26.0289	26.0289	26.0825	25.9179	25.7429	25.6205	25.4939
alpha	2.6819	2.6864	2.6909	2.7121	2.7162	2.7353	2.7353	2.7388	2.7279	2.7162	2.7080	2.6996
util living area												
	0.9383	0.9001	0.8513	0.7659	0.6494	0.5020	0.3789	0.4130	0.5924	0.7954	0.9057	0.9460 (86)
MIT	18.7202	19.1309	19.6050	20.1616	20.5869	20.8549	20.9504	20.9361	20.7607	20.2002	19.3752	18.6512 (87)
Th 2	19.9111	19.9137	19.9162	19.9282	19.9305	19.9409	19.9409	19.9429	19.9369	19.9305	19.9259	19.9212 (88)
util rest of house												
	0.9290	0.8860	0.8303	0.7331	0.6004	0.4333	0.2948	0.3273	0.5251	0.7592	0.8898	0.9378 (89)
MIT 2	17.8648	18.2640	18.7209	19.2509	19.6314	19.8569	19.9208	19.9153	19.7875	19.3016	18.5175	17.8045 (90)
Living area fraction										fLA = Living area / (4) =		0.6494 (91)
MIT	18.4203	18.8269	19.2950	19.8423	20.2519	20.5049	20.5894	20.5781	20.4194	19.8851	19.0745	18.3543 (92)

Temperature adjustment												0.0000	
adjusted MIT	18.4203	18.8269	19.2950	19.8423	20.2519	20.5049	20.5894	20.5781	20.4194	19.8851	19.0745	18.3543	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9131	0.8691	0.8166	0.7302	0.6159	0.4708	0.3471	0.3798	0.5569	0.7576	0.8747	0.9227	(94)
Useful gains	426.8111	496.8137	521.4696	512.9380	453.1172	341.3854	242.2120	250.5254	348.5372	417.6657	417.1434	406.4021	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	921.7995	906.7371	830.8405	701.7027	547.1203	373.6269	252.4228	263.8234	401.5659	594.0329	769.7458	914.3884	(97)
Space heating kWh	368.2713	275.4685	230.1720	135.9105	69.9383	0.0000	0.0000	0.0000	0.0000	131.2172	253.8738	377.9418	(98a)
Space heating requirement - total per year (kWh/year)												1842.7934	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	368.2713	275.4685	230.1720	135.9105	69.9383	0.0000	0.0000	0.0000	0.0000	131.2172	253.8738	377.9418	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1842.7934	
Space heating per m2											(98c) / (4) =	34.1891	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	594.7738	468.2262	479.8916	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8363	0.8861	0.8680	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	497.4116	414.9147	416.5244	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	818.9413	788.6212	745.5509	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	231.5014	278.0377	244.7957	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	57.8753	69.5094	61.1989	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												188.5837	(107)
Energy for space heating												34.1891	(99)
Energy for space cooling												3.4988	(108)
Total												37.6879	(109)
Fabric Energy Efficiency (DFEE)												37.7	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.1750	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3642	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3095	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3947	0.3869	0.3792	0.3405	0.3328	0.2941	0.2941	0.2863	0.3095	0.3328	0.3482	0.3637	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)

Effective ac	0.5779	0.5749	0.5719	0.5580	0.5554	0.5432	0.5432	0.5410	0.5479	0.5554	0.5606	0.5661 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6600	1.1450	13.3511			(27)
External Wall 1	73.6125	13.4800	60.1325	0.1800	10.8238			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.9950			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	45.3000	0.0700	3.1710	
E18 Party wall between dwellings	6.5000	0.0600	0.3900	
E16 Corner (normal)	9.7500	0.0900	0.8775	
E17 Corner (inverted - internal area greater than external area)	3.2500	-0.0900	-0.2925	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.5875 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 31.5825 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4061	33.2313	33.0599	32.2550	32.1044	31.4034	31.4034	31.2736	31.6734	32.1044	32.4091	32.7276	(38)
Heat transfer coeff	64.9886	64.8138	64.6424	63.8375	63.6869	62.9859	62.9859	62.8560	63.2559	63.6869	63.9916	64.3101	(39)

Average = Sum(39)m / 12 = 63.8368

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2057	1.2025	1.1993	1.1844	1.1816	1.1686	1.1686	1.1662	1.1736	1.1816	1.1872	1.1931	(40)
HLP (average)												1.1844	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8051 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)

Hot water usage for other uses

33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)

Average daily hot water use (litres/day) 51.9428 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	56.6690	55.1150	53.4182	51.3057	49.4214	47.4631	47.0558	48.7491	50.4859	52.4971	54.6282	56.5894	(44)
Energy conte	89.7498	78.4830	82.1018	70.2350	66.5307	58.3614	56.9099	60.3616	62.2542	71.2380	77.8279	88.6053	(45)
Energy content (annual)										Total = Sum(45)m =		862.6586	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145	(64)
										Total per year (kWh/year) = Sum(64)m =		733.2598	(64)
12Total per year (kWh/year)												733	(64)
Electric shower(s)													
	43.6330	38.8774	42.4526	40.5120	41.2722	39.3696	40.6820	41.2722	40.5120	42.4526	41.6543	43.6330	(64a)
						Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =						496.3227	(64a)
Heat gains from water heating, kWh/month													
	29.9801	26.3970	28.0598	25.0529	24.4558	22.2442	22.2638	23.1449	23.3570	25.7512	26.9520	29.7369	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4429	87.9546	79.4429	82.0910	79.4429	82.0910	79.4429	79.4429	82.0910	79.4429	82.0910	79.4429	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	40.2958	39.2812	37.7147	34.7957	32.8707	30.8947	29.9245	31.1087	32.4403	34.6119	37.4333	39.9689	(72)
Total internal gains													
	327.1611	336.2910	322.0982	313.0680	297.4379	287.7179	277.1570	276.7085	284.8027	293.0854	309.6121	319.8916	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.6600	46.7521	0.6300	0.7000	0.7700	95.1583	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	111.4069	186.8966	251.2832	309.1225	347.9771	347.2299	333.9562	304.0328	270.8162	205.0563	132.8397	95.7711	(83)
Total gains	438.5679	523.1875	573.3814	622.1905	645.4149	634.9478	611.1133	580.7412	555.6189	498.1418	442.4518	415.6627	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.3421	25.4104	25.4778	25.7990	25.8600	26.1478	26.1478	26.2018	26.0362	25.8600	25.7369	25.6094	
alpha	2.6895	2.6940	2.6985	2.7199	2.7240	2.7432	2.7432	2.7468	2.7357	2.7240	2.7158	2.7073	
util living area	0.9460	0.9158	0.8769	0.8046	0.6993	0.5533	0.4236	0.4582	0.6390	0.8255	0.9185	0.9523	(86)
MIT	18.6503	19.0199	19.4740	20.0408	20.5022	20.8163	20.9353	20.9181	20.7117	20.1130	19.2967	18.5909	(87)
Th 2	19.9154	19.9180	19.9206	19.9325	19.9348	19.9452	19.9452	19.9472	19.9412	19.9348	19.9302	19.9255	(88)
util rest of house	0.9377	0.9034	0.8585	0.7747	0.6518	0.4821	0.3324	0.3664	0.5717	0.7924	0.9044	0.9449	(89)
MIT 2	17.8000	18.1612	18.6025	19.1482	19.5683	19.8367	19.9183	19.9110	19.7576	19.2292	18.4463	17.7488	(90)
Living area fraction									fLA = Living area / (4) =			0.6494	(91)
MIT	18.3521	18.7188	19.1684	19.7278	20.1747	20.4728	20.5787	20.5650	20.3772	19.8031	18.9985	18.2956	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3521	18.7188	19.1684	19.7278	20.1747	20.4728	20.5787	20.5650	20.3772	19.8031	18.9985	18.2956	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9225	0.8867	0.8435	0.7684	0.6632	0.5189	0.3883	0.4216	0.6009	0.7878	0.8894	0.9306	(94)
Useful gains	404.5933	463.9342	483.6700	478.0849	428.0508	329.4818	237.3111	244.8203	333.8565	392.4588	393.5037	386.7976	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	913.2270	895.6502	818.9173	691.2180	539.7306	369.9051	250.6004	261.7932	397.0684	586.1163	761.4031	906.4905	(97)
Space heating kWh	378.4235	290.1131	249.4240	153.4559	83.0898	0.0000	0.0000	0.0000	0.0000	144.0812	264.8876	386.6516	(98a)
Space heating requirement - total per year (kWh/year)												1950.1266	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	378.4235	290.1131	249.4240	153.4559	83.0898	0.0000	0.0000	0.0000	0.0000	144.0812	264.8876	386.6516	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1950.1266	
Space heating per m2										(98c) / (4) =		36.1805	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	592.0672	466.0954	477.7060	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7970	0.8552	0.8352	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	471.8826	398.6229	398.9966	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	713.4896	687.2025	653.2262	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	173.9571	214.7032	189.1468	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fC = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	43.4893	53.6758	47.2867	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												144.4518	(107)
Energy for space heating												36.1805	(99)
Energy for space cooling												2.6800	(108)
Total												38.8605	(109)
Fabric Energy Efficiency (TFEE)												38.9	(109)

Full SAP Calculation Printout

Property Reference	Flat 12	**Issued on Date**	27/07/2025
Assessment Reference	Flat 12	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	5.07	**TER**	15.92
Environmental	96 A	**% DER < TER**			68.15
CO_2 Emissions (t/year)	0.25	**DFEE**	37.69	**TFEE**	38.86
Compliance Check	See BREL	**% DFEE < TFEE**			3.02
% DPER < TPER	37.45	**DPER**	53.30	**TPER**	85.22

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.1750	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3647	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3100	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3952	0.3875	0.3797	0.3410	0.3332	0.2945	0.2945	0.2867	0.3100	0.3332	0.3487	0.3642	(22b)
Effective ac	0.5781	0.5751	0.5721	0.5581	0.5555	0.5434	0.5434	0.5411	0.5480	0.5555	0.5608	0.5663	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	73.6125	16.5100	57.1025	0.1800	10.2784			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.9191			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	2.9445	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	31.8636	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4185	33.2432	33.0713	32.2642	32.1132	31.4102	31.4102	31.2801	31.6810	32.1132	32.4187	32.7381	(38)
Heat transfer coeff	65.2820	65.1067	64.9349	64.1278	63.9768	63.2738	63.2738	63.1436	63.5446	63.9768	64.2823	64.6016	(39)
Average = Sum(39)m / 12 =												64.1271	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2112	1.2079	1.2047	1.1898	1.1870	1.1739	1.1739	1.1715	1.1789	1.1870	1.1926	1.1985	(40)
HLP (average)												1.1897	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051	(42)
Hot water usage for mixer showers													
	61.2950	60.3739	59.0316	56.4634	54.5681	52.4545	51.2531	52.5852	54.0455	56.3149	58.9383	61.0602	(42a)
Hot water usage for baths													
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)
Hot water usage for other uses													
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)
Average daily hot water use (litres/day)												108.4548	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	117.9640	115.4889	112.4498	107.7691	103.9895	99.9176	98.3089	101.3344	104.5314	108.8119	113.5665	117.6495	(44)
Energy conte	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(45)
Energy content (annual)										Total = Sum(45)m =		1801.4233	
Distribution loss (46)m = 0.15 x (45)m													
	28.0239	24.6682	25.9247	22.1296	20.9985	18.4291	17.8344	18.8210	19.3347	22.1485	24.2694	27.6316	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
										Total per year (kWh/year) = Sum(64)m =		1801.4233	(64)
12Total per year (kWh/year)												1801	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	62.1197	54.6812	57.4663	49.0539	46.5466	40.8511	39.5329	41.7198	42.8585	49.0959	53.7973	61.2501	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.3632	87.8664	79.3632	82.0086	79.3632	82.0086	79.3632	79.3632	82.0086	79.3632	82.0086	79.3632	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	83.4942	81.3708	77.2397	68.1304	62.5627	56.7376	53.1357	56.0750	59.5257	65.9891	74.7184	82.3254	(72)
Total internal gains													
	373.2798	381.2923	364.5435	349.3203	330.0501	313.4784	300.2885	301.5951	311.8057	327.3830	349.8148	365.1684	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	513.6295	616.7445	681.1126	738.7608	768.4450	750.9340	721.0206	684.6251	652.9843	585.7135	517.1657	485.8202	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.2281	25.2961	25.3630	25.6822	25.7429	26.0289	26.0289	26.0825	25.9179	25.7429	25.6205	25.4939	
alpha	2.6819	2.6864	2.6909	2.7121	2.7162	2.7353	2.7353	2.7388	2.7279	2.7162	2.7080	2.6996	
util living area													
	0.9250	0.8847	0.8340	0.7483	0.6321	0.4883	0.3681	0.3999	0.5752	0.7756	0.8897	0.9335	(86)
MIT	19.2718	19.5657	19.9041	20.2975	20.5983	20.7863	20.8534	20.8439	20.7211	20.3291	19.7428	19.2220	(87)
Th 2	19.9111	19.9137	19.9162	19.9282	19.9305	19.9409	19.9409	19.9429	19.9369	19.9305	19.9259	19.9212	(88)
util rest of house													
	0.9141	0.8689	0.8115	0.7145	0.5828	0.4207	0.2859	0.3163	0.5083	0.7378	0.8719	0.9238	(89)
MIT 2	17.9140	18.2789	18.6956	19.1751	19.5187	19.7221	19.7792	19.7749	19.6601	19.2265	18.5153	17.8592	(90)
Living area fraction										fLA = Living area / (4) =		0.6494	(91)
MIT	18.7957	19.1145	19.4804	19.9039	20.2197	20.4132	20.4767	20.4690	20.3490	19.9424	19.3124	18.7441	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7957	19.1145	19.4804	19.9039	20.2197	20.4132	20.4767	20.4690	20.3490	19.9424	19.3124	18.7441	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9007	0.8555	0.8014	0.7137	0.5968	0.4517	0.3282	0.3589	0.5354	0.7383	0.8600	0.9108	(94)
Useful gains	462.6451	527.6269	545.8240	527.2206	458.6051	339.1901	236.6634	245.6870	349.5864	432.4129	444.7729	442.5041	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	946.3076	925.4598	842.8778	705.6561	545.0645	367.8204	245.2951	256.9340	397.0932	597.6996	785.0382	939.5740	(97)
Space heating kWh	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98a)
Space heating requirement - total per year (kWh/year)												1778.7803	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1778.7803	
Space heating per m2											(98c) / (4) =	33.0015	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	359.8449	267.3437	221.0080	128.4736	64.3258	0.0000	0.0000	0.0000	0.0000	122.9733	244.9910	369.8200	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	143.9955	106.9803	88.4386	51.4100	25.7406	0.0000	0.0000	0.0000	0.0000	49.2090	98.0356	147.9872	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.6968	93.9204	98.7042	84.2550	79.9485	70.1658	67.9018	71.6580	73.6138	84.3271	92.4022	105.2032	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9274	11.9753	10.7825	7.8997	6.1019	4.9853	5.5664	7.2354	9.3981	12.3308	13.9276	15.3423	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	711.7968	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1028.7969	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	120.4728	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1861.0665	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	711.7968	0.1552	110.4863	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1028.7969	0.1416	145.6552	(264)
Space and water heating			256.1415	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.4728	0.1443	17.3880	(268)
Total CO2, kg/year			273.5295	(272)

EPC Dwelling Carbon Dioxide Emission Rate (DER) 5.0700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	711.7968	1.5746	1120.8270	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1028.7969	1.5235	1567.4115	(278)
Space and water heating			2688.2385	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.4728	1.5338	184.7853	(282)
Total Primary energy kWh/year			2873.0237	(286)
Dwelling Primary energy Rate (DPER)			53.3000	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b) x	3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.1750	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3642 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3095 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3947	0.3869	0.3792	0.3405	0.3328	0.2941	0.2941	0.2863	0.3095	0.3328	0.3482	0.3637	(22b)
Effective ac	0.5779	0.5749	0.5719	0.5580	0.5554	0.5432	0.5432	0.5410	0.5479	0.5554	0.5606	0.5661	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6600	1.1450	13.3511			(27)
External Wall 1	73.6125	13.4800	60.1325	0.1800	10.8238			(29a)
Total net area of external elements Aum(A, m2)			73.6125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.9950			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
List of Thermal Bridges		

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	45.3000	0.0700	3.1710
E18 Party wall between dwellings	6.5000	0.0600	0.3900
E16 Corner (normal)	9.7500	0.0900	0.8775
E17 Corner (inverted - internal area greater than external area)	3.2500	-0.0900	-0.2925

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		5.5875 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	31.5825 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4061	33.2313	33.0599	32.2550	32.1044	31.4034	31.4034	31.2736	31.6734	32.1044	32.4091	32.7276	(38)
Heat transfer coeff	64.9886	64.8138	64.6424	63.8375	63.6869	62.9859	62.9859	62.8560	63.2559	63.6869	63.9916	64.3101	(39)
Average = Sum(39)m / 12 =												63.8368	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2057	1.2025	1.1993	1.1844	1.1816	1.1686	1.1686	1.1662	1.1736	1.1816	1.1872	1.1931	(40)
HLP (average)												1.1844	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051	(42)
Hot water usage for mixer showers													
	54.4845	53.6657	52.4725	50.1897	48.5050	46.6262	45.5583	46.7424	48.0404	50.0577	52.3896	54.2757	(42a)
Hot water usage for baths													
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)
Hot water usage for other uses													
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)
Average daily hot water use (litres/day)												102.1757	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.1535	108.7807	105.8907	101.4954	97.9264	94.0893	92.6141	95.4916	98.5264	102.5547	107.0178	110.8651	(44)
Energy conte	176.0399	154.9022	162.7501	138.9421	131.8278	115.6938	112.0087	118.2385	121.4929	139.1658	152.4665	173.5879	(45)
Energy content (annual)										Total = Sum(45)m =		1697.1161	
Distribution loss (46)m = 0.15 x (45)m													
	26.4060	23.2353	24.4125	20.8413	19.7742	17.3541	16.8013	17.7358	18.2239	20.8749	22.8700	26.0382	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.6348	196.9879	209.3450	184.0340	178.4227	160.7856	158.6036	164.8334	166.5847	185.7607	197.5583	220.1828	(62)
WWHRS	-24.9080	-22.0289	-23.0674	-19.1007	-17.8012	-15.2326	-14.2781	-15.1833	-15.7602	-18.5795	-21.0484	-24.4468	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
										Total per year (kWh/year) = Sum(64)m =		2014.2986	(64)
12Total per year (kWh/year)												2014	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8092	85.1736	91.3903	82.2717	81.1086	74.5417	74.5188	76.5902	76.4699	83.5485	86.7686	94.9939	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4429	87.9546	79.4429	82.0910	79.4429	82.0910	79.4429	79.4429	82.0910	79.4429	82.0910	79.4429	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	128.7758	126.7464	122.8365	114.2663	109.0170	103.5301	100.1597	102.9439	106.2081	112.2964	120.5119	127.6800	(72)
Total internal gains													
	418.6410	426.7561	410.2200	395.5386	376.5841	360.3532	347.3922	348.5436	358.5705	373.7700	395.6906	410.6027	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.6600	46.7521	0.6300	0.7000	0.7700	95.1583	(78)

Solar gains	111.4069	186.8966	251.2832	309.1225	347.9771	347.2299	333.9562	304.0328	270.8162	205.0563	132.8397	95.7711	(83)
Total gains	530.0479	613.6527	661.5031	704.6611	724.5612	707.5832	681.3485	652.5764	629.3867	578.8263	528.5304	506.3738	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.3421	25.4104	25.4778	25.7990	25.8600	26.1478	26.1478	26.2018	26.0362	25.8600	25.7369	25.6094	
alpha	2.6895	2.6940	2.6985	2.7199	2.7240	2.7432	2.7432	2.7468	2.7357	2.7240	2.7158	2.7073	
util living area													
	0.9199	0.8853	0.8414	0.7638	0.6542	0.5101	0.3856	0.4154	0.5887	0.7787	0.8846	0.9273	(86)
MIT	18.9050	19.2450	19.6629	20.1735	20.5822	20.8503	20.9488	20.9359	20.7664	20.2525	19.5123	18.8505	(87)
Th 2	19.9154	19.9180	19.9206	19.9325	19.9348	19.9452	19.9452	19.9472	19.9412	19.9348	19.9302	19.9255	(88)
util rest of house													
	0.9084	0.8696	0.8195	0.7310	0.6054	0.4411	0.3006	0.3297	0.5217	0.7412	0.8663	0.9169	(89)
MIT 2	17.5168	17.9384	18.4541	19.0758	19.5459	19.8336	19.9184	19.9115	19.7541	19.1847	18.2871	17.4553	(90)

Living area fraction											fLA = Living area / (4) =	0.6494	(91)
MIT	18.4182	18.7868	19.2390	19.7886	20.2188	20.4938	20.5875	20.5767	20.4115	19.8780	19.0827	18.3612	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4182	18.7868	19.2390	19.7886	20.2188	20.4938	20.5875	20.5767	20.4115	19.8780	19.0827	18.3612	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8888	0.8502	0.8038	0.7262	0.6191	0.4780	0.3532	0.3819	0.5526	0.7390	0.8490	0.8978	(94)
Useful gains	471.0891	521.7432	531.7198	511.6993	448.5660	338.2000	240.6418	249.2249	347.8256	427.7356	448.7285	454.6085	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	917.5241	900.0569	823.4797	695.0988	542.5388	371.2269	251.1554	262.5295	399.2381	590.8902	766.7926	910.7103	(97)
Space heating kWh													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98a)
Space heating requirement - total per year (kWh/year)												1695.1401	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1695.1401	
Space heating per m2											(98c) / (4) =	31.4497	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	332.1477	254.2268	217.0693	132.0476	69.9158	0.0000	0.0000	0.0000	0.0000	121.3870	229.0061	339.3397	(98)
Space heating efficiency (main heating system 1)													
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)													
	359.8566	275.4354	235.1780	143.0635	75.7484	0.0000	0.0000	0.0000	0.0000	131.5136	248.1106	367.6487	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2137	84.8968	84.4037	83.5658	82.3306	79.8000	79.8000	79.8000	79.8000	83.3537	84.6447	85.2816	(217)
Fuel for water heating, kWh/month													
	232.0363	206.0844	220.6983	197.3693	195.0933	182.3973	180.8591	187.5314	189.0031	200.5684	208.5304	229.5174	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5067	13.2423	11.9232	8.7354	6.7475	5.5128	6.1553	8.0009	10.3924	13.6353	15.4011	16.9654	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0405	-18.1101	-27.7562	-33.3524	-37.8875	-36.0892	-35.6643	-32.7117	-27.8479	-21.6386	-13.6384	-10.2826	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7436	-8.0966	-16.5107	-25.4205	-34.2237	-34.5988	-34.1781	-28.6457	-20.6253	-11.7651	-5.0580	-2.9432	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1836.5548	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2429.6887	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												133.2182	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-532.8285	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3952.6333	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1836.5548	0.2100	385.6765	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2429.6887	0.2100	510.2346	(264)

Space and water heating			895.9111	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.2182	0.1443	19.2275	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	0.1332	-40.9064	
PV Unit electricity exported	-225.8092	0.1252	-28.2685	
Total			-69.1749	(269)
Total CO2, kg/year			857.8930	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.9200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1836.5548	1.1300	2075.3069	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2429.6887	1.1300	2745.5483	(278)
Space and water heating			4820.8552	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.2182	1.5338	204.3346	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	1.4923	-458.1785	
PV Unit electricity exported	-225.8092	0.4595	-103.7575	
Total			-561.9360	(283)
Total Primary energy kWh/year			4593.3546	(286)
Target Primary Energy Rate (TPER)			85.2200	(287)

Summary for Input Data

elmhurst energy

Property Reference	Flat 13	**Issued on Date**	27/07/2025
Assessment Reference	Flat 13	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.62	**TER**	15.03
Environmental	96 A	**% DER < TER**			69.26
CO_2 Emissions (t/year)	0.31	**DFEE**	37.74	**TFEE**	42.97
Compliance Check	See BREL	**% DFEE < TFEE**			12.16
% DPER < TPER	39.59	**DPER**	48.43	**TPER**	80.17

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, End-Terrace	
Position of Flat	Top-floor flat	
Which Floor	4	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	18.50 m	74.40 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	60.13	39.48	0.00	None	20.65	Calculate Wall Area

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.11	9.00	74.40	74.40	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	74.40

12.0 Opening Types

Summary for Input Data

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0
N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	12.53	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		11.27	0.00	0.00	Yes
E3 Sill		10.46	0.00	0.00	Yes
E4 Jamb		15.30	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		18.50	0.00	0.00	No
E16 Corner (normal)		6.50	0.00	0.00	Yes
E18 Party wall between dwellings		6.50	0.00	0.00	Yes
E15 Flat roof with parapet		18.50	0.00	0.00	No

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
Controls SAP Code	2207	
Delayed Start Stat	No	
HETAS approved System	No	

Summary for Input Data

Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 13	**Issued on Date**	27/07/2025
Assessment Reference	Flat 13	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.62	**TER**	15.03
Environmental	96 A	**% DER < TER**			69.26
CO_2 Emissions (t/year)	0.31	**DFEE**	37.74	**TFEE**	42.97
Compliance Check	See BREL	**% DFEE < TFEE**			12.16
% DPER < TPER	39.59	**DPER**	48.43	**TPER**	80.17

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	241.8000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0827	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3332	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2832	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3611	0.3540	0.3470	0.3116	0.3045	0.2691	0.2691	0.2620	0.2832	0.3045	0.3186	0.3328	(22b)
Effective ac	0.5652	0.5627	0.5602	0.5485	0.5464	0.5362	0.5362	0.5343	0.5401	0.5464	0.5508	0.5554	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			18.8300	1.1450	21.5611			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	60.1250	20.6500	39.4750	0.1800	7.1055			(29a)
External Roof 1	74.4000		74.4000	0.1100	8.1840			(30)
Total net area of external elements Aum(A, m2)			134.5250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.6706			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	5.3810	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	44.0516	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.0999	44.8978	44.6998	43.7696	43.5956	42.7855	42.7855	42.6355	43.0975	43.5956	43.9477	44.3157	(38)
Heat transfer coeff	89.1514	88.9494	88.7514	87.8212	87.6472	86.8370	86.8370	86.6870	87.1491	87.6472	87.9992	88.3673	(39)

Average = Sum(39)m / 12 = 87.8204

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1983	1.1956	1.1929	1.1804	1.1781	1.1672	1.1672	1.1651	1.1714	1.1781	1.1828	1.1877	(40)
HLP (average)												1.1804	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3480 (42)

Hot water usage for mixer showers

71.5372	70.4622	68.8956	65.8982	63.6862	61.2194	59.8173	61.3720	63.0763	65.7249	68.7866	71.2631	(42a)

Hot water usage for baths

27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)

Hot water usage for other uses

38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)

Average daily hot water use (litres/day) 126.5828 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	137.6820	134.7926	131.2451	125.7821	121.3706	116.6179	114.7407	118.2723	122.0041	127.0002	132.5494	137.3150	(44)
Energy conte	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(45)
Energy content (annual)										Total = Sum(45)m =		2102.5281	
Distribution loss (46)m = 0.15 x (45)m	32.7082	28.7914	30.2578	25.8284	24.5082	21.5093	20.8153	21.9669	22.5665	25.8507	28.3261	32.2503	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
										Total per year (kWh/year) = Sum(64)m =		2102.5281	(64)
12Total per year (kWh/year)												2103	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	72.5032	63.8210	67.0715	57.2530	54.3265	47.6789	46.1407	48.6932	50.0224	57.3024	62.7896	71.4882	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.5799	115.7849	104.5799	108.0659	104.5799	108.0659	104.5799	104.5799	108.0659	104.5799	108.0659	104.5799	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)	97.4505	94.9717	90.1499	79.5180	73.0195	66.2208	62.0171	65.4479	69.4755	77.0193	87.2078	96.0863	(72)
Total internal gains	470.5923	481.4701	460.0214	441.3331	416.7783	396.7715	379.9334	381.2127	394.1482	412.7484	440.9931	460.0797	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	12.5300	46.7521	0.6300	0.7000	0.7700	179.0291	(78)

Solar gains	199.5023	332.3288	439.9726	528.9132	583.7342	577.3249	557.3928	515.7465	470.0882	362.8210	237.4668	171.7651	(83)
Total gains	670.0946	813.7989	899.9941	970.2463	1000.5125	974.0964	937.3262	896.9592	864.2363	775.5694	678.4600	631.8448	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.4997	25.5576	25.6146	25.8859	25.9373	26.1793	26.1793	26.2246	26.0856	25.9373	25.8336	25.7260	
alpha	2.7000	2.7038	2.7076	2.7257	2.7292	2.7453	2.7453	2.7483	2.7390	2.7292	2.7222	2.7151	
util living area	0.9328	0.8932	0.8445	0.7639	0.6532	0.5107	0.3863	0.4166	0.5902	0.7879	0.8993	0.9410	(86)
MIT	19.2377	19.5393	19.8795	20.2705	20.5773	20.7760	20.8499	20.8401	20.7124	20.3104	19.7113	19.1825	(87)
Th 2	19.9214	19.9236	19.9257	19.9357	19.9376	19.9464	19.9464	19.9480	19.9430	19.9376	19.9338	19.9298	(88)
util rest of house	0.9229	0.8783	0.8230	0.7312	0.6045	0.4418	0.3013	0.3308	0.5232	0.7512	0.8827	0.9322	(89)
MIT 2	17.8793	18.2544	18.6743	19.1516	19.5045	19.7193	19.7830	19.7780	19.6586	19.2121	18.4834	17.8164	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	18.5183	18.8589	19.2412	19.6779	20.0092	20.2164	20.2849	20.2777	20.1543	19.7288	19.0610	18.4591	(92)
Temperature adjustment												0.0000	

adjusted MIT	18.5183	18.8589	19.2412	19.6779	20.0092	20.2164	20.2849	20.2777	20.1543	19.7288	19.0610	18.4591	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9069	0.8610	0.8074	0.7225	0.6080	0.4602	0.3294	0.3586	0.5374	0.7431	0.8664	0.9171	(94)
Useful gains	607.6973	700.6606	726.6262	700.9845	608.2678	448.3043	308.7581	321.6143	464.4562	576.3554	587.8266	579.4602	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1267.5822	1241.6314	1130.8031	946.5313	728.2738	487.7127	319.9832	336.1426	527.6293	800.1130	1052.5616	1260.0338	(97)
Space heating kWh	490.9544	363.5324	300.7076	176.7937	89.2844	0.0000	0.0000	0.0000	0.0000	166.4757	334.6092	506.3468	(98a)
Space heating requirement - total per year (kWh/year)												2428.7042	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	490.9544	363.5324	300.7076	176.7937	89.2844	0.0000	0.0000	0.0000	0.0000	166.4757	334.6092	506.3468	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2428.7042	
Space heating per m2											(98c) / (4) =	32.6439	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	490.9544	363.5324	300.7076	176.7937	89.2844	0.0000	0.0000	0.0000	0.0000	166.4757	334.6092	506.3468	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	196.4603	145.4711	120.3312	70.7458	35.7281	0.0000	0.0000	0.0000	0.0000	66.6169	133.8972	202.6198	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	124.5315	109.6190	115.2021	98.3377	93.3113	81.8934	79.2513	83.6355	85.9185	98.4226	107.8474	122.7882	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.6704	15.7803	14.2085	10.4097	8.0408	6.5694	7.3351	9.5344	12.3842	16.2488	18.3530	20.2171	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	971.8704	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1200.7585	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	158.7516	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2331.3805	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	971.8704	0.1552	150.8472	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1200.7585	0.1416	170.0012	(264)
Space and water heating			320.8485	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	158.7516	0.1443	22.9128	(268)

Total CO2, kg/year	343.7612	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	4.6200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	971.8704	1.5746	1530.3188	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1200.7585	1.5235	1829.4017	(278)
Space and water heating			3359.7205	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	158.7516	1.5338	243.4985	(282)
Total Primary energy kWh/year			3603.2190	(286)
Dwelling Primary energy Rate (DPER)			48.4300	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.8000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3741 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3180 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4054	0.3974	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736	(22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5505	0.5584	0.5640	0.5698	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			16.7800	1.1450	19.2137			(27)
External Wall 1	60.1250	18.6000	41.5250	0.1800	7.4745			(29a)
External Roof 1	74.4000		74.4000	0.1100	8.1840			(30)
Total net area of external elements Aum(A, m2)			134.5250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.6922			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	11.2700	0.0500	0.5635
E3 Sill	10.4600	0.0500	0.5230
E4 Jamb	15.3000	0.0500	0.7650
E7 Party floor between dwellings (in blocks of flats)	18.5000	0.0700	1.2950
E16 Corner (normal)	6.5000	0.0900	0.5850
E18 Party wall between dwellings	6.5000	0.0600	0.3900
E15 Flat roof with parapet	18.5000	0.5600	10.3600

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	14.4815	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	51.1737	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4540	46.1994	45.9498	44.7775	44.5582	43.5372	43.5372	43.3482	43.9305	44.5582	45.0019	45.4658	(38)

Heat transfer coeff

	97.6277	97.3731	97.1235	95.9513	95.7320	94.7110	94.7110	94.5219	95.1042	95.7320	96.1756	96.6395 (39)
Average = Sum(39)m / 12 =												95.9502
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3122	1.3088	1.3054	1.2897	1.2867	1.2730	1.2730	1.2705	1.2783	1.2867	1.2927	1.2989 (40)
HLP (average)												1.2897
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480 (42)
Hot water usage for mixer showers												
	63.5887	62.6330	61.2405	58.5762	56.6100	54.4173	53.1710	54.5529	56.0678	58.4221	61.1437	63.3450 (42a)
Hot water usage for baths												
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756 (42b)
Hot water usage for other uses												
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763 (42c)
Average daily hot water use (litres/day)												119.2545 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	129.7334	126.9634	123.5900	118.4601	114.2943	109.8157	108.0944	111.4532	114.9956	119.6974	124.9064	129.3969	(44)
Energy conte	205.4660	180.7942	189.9533	162.1659	153.8621	135.0313	130.7308	138.0024	141.8011	162.4282	177.9521	202.6043	(45)
Energy content (annual)										Total = Sum(45)m =		1980.7916	
Distribution loss (46)m = 0.15 x (45)m													
	30.8199	27.1191	28.4930	24.3249	23.0793	20.2547	19.6096	20.7004	21.2702	24.3642	26.6928	30.3906	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	252.0609	222.8799	236.5482	207.2577	200.4570	180.1231	177.3257	184.5973	186.8930	209.0231	223.0439	249.1992	(62)
WWHRS	-29.0701	-25.7098	-26.9218	-22.2923	-20.7757	-17.7779	-16.6639	-17.7204	-18.3937	-21.6841	-24.5655	-28.5317	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
										Total per year (kWh/year) = Sum(64)m =		2259.3020	(64)
12Total per year (kWh/year)												2259	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	105.5934	93.7827	100.4354	89.9936	88.4351	80.9714	80.7439	83.1617	83.2223	91.2833	95.2425	104.6418	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5626	115.7658	104.5626	108.0481	104.5626	108.0481	104.5626	104.5626	108.0481	104.5626	108.0481	104.5626	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	141.9266	139.5575	134.9938	124.9912	118.8643	112.4602	108.5268	111.7765	115.5866	122.6926	132.2813	140.6476	(72)
Total internal gains													
	515.0512	526.0368	504.8481	486.7884	462.6059	442.9932	426.4258	427.5240	440.2414	458.4045	486.0489	504.6238	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308	(74)
South	11.1700	46.7521	0.6300	0.7000	0.7700	159.5974	(78)

Solar gains	177.8282	296.2195	392.1528	471.4001	520.2343	514.5107	496.7521	459.6554	418.9863	323.3947	211.6674	153.1050	(83)
Total gains	692.8794	822.2563	897.0009	958.1886	982.8402	957.5039	923.1780	887.1794	859.2277	781.7992	697.7163	657.7288	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	23.2857	23.3466	23.4066	23.6926	23.7469	24.0028	24.0028	24.0509	23.9036	23.7469	23.6373	23.5239	
alpha	2.5524	2.5564	2.5604	2.5795	2.5831	2.6002	2.6002	2.6034	2.5936	2.5831	2.5758	2.5683	
util living area													
	0.9320	0.8984	0.8569	0.7858	0.6844	0.5454	0.4182	0.4478	0.6192	0.8015	0.9007	0.9392	(86)
MIT	18.5826	18.9625	19.4262	19.9911	20.4614	20.7914	20.9238	20.9067	20.6918	20.0869	19.2502	18.5202	(87)
Th 2	19.8313	19.8340	19.8366	19.8489	19.8513	19.8620	19.8620	19.8640	19.8579	19.8513	19.8466	19.8417	(88)
util rest of house													

	0.9216	0.8835	0.8355	0.7529	0.6337	0.4700	0.3215	0.3512	0.5477	0.7642	0.8836	0.9297	(89)
MIT 2	17.0660	17.5389	18.1133	18.8048	19.3511	19.7078	19.8232	19.8134	19.6127	18.9362	17.9149	16.9942	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	17.7794	18.2086	18.7309	19.3629	19.8734	20.2176	20.3410	20.3277	20.1203	19.4775	18.5431	17.7121	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.7794	18.2086	18.7309	19.3629	19.8734	20.2176	20.3410	20.3277	20.1203	19.4775	18.5431	17.7121	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8974	0.8575	0.8113	0.7372	0.6348	0.4947	0.3635	0.3921	0.5653	0.7503	0.8593	0.9066	(94)
Useful gains	621.7868	705.0835	727.7274	706.3942	623.8829	473.7115	335.6165	347.8953	485.6997	586.5814	599.5184	596.3239	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	1315.9648	1295.9002	1187.9117	1003.9241	782.4581	532.0452	354.3119	371.2582	572.5603	849.8606	1100.5452	1305.8032	(97)
Space heating kWh													
	516.4684	397.0288	342.3771	214.2215	117.9800	0.0000	0.0000	0.0000	0.0000	195.8797	360.7394	527.8526	(98a)
Space heating requirement - total per year (kWh/year)												2672.5475	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	516.4684	397.0288	342.3771	214.2215	117.9800	0.0000	0.0000	0.0000	0.0000	195.8797	360.7394	527.8526	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2672.5475	
Space heating per m2											(98c) / (4) =	35.9213	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	516.4684	397.0288	342.3771	214.2215	117.9800	0.0000	0.0000	0.0000	0.0000	195.8797	360.7394	527.8526	(98)
Space heating efficiency (main heating system 1)													
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)													
	559.5541	430.1504	370.9395	232.0926	127.8223	0.0000	0.0000	0.0000	0.0000	212.2207	390.8335	571.8880	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.8792	85.5966	85.1529	84.3899	83.1398	79.8000	79.8000	79.8000	79.8000	84.1599	85.3823	85.9425	(217)
Fuel for water heating, kWh/month													
	259.6563	230.3480	246.1763	219.1794	216.1194	203.4401	201.3305	209.1188	211.1520	222.5989	232.4586	256.7616	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.7260	17.4294	15.6933	11.4976	8.8811	7.2559	8.1016	10.5308	13.6784	17.9468	20.2709	22.3299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.4607	-24.6716	-37.6751	-45.0891	-51.0410	-48.5313	-47.9380	-44.0442	-37.6205	-29.3823	-18.6085	-14.0654	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.3266	-11.5023	-23.4280	-36.0371	-48.4965	-49.0418	-48.4678	-40.6495	-29.2887	-16.7260	-7.1987	-4.1905	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2895.5011	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2708.3401	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	175.3417	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-735.4813	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	5129.7016	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2895.5011	0.2100	608.0552	(261)

Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2708.3401	0.2100	568.7514	(264)
Space and water heating			1176.8067	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	175.3417	0.1443	25.3072	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	0.1333	-55.3461	
PV Unit electricity exported	-320.3536	0.1252	-40.1090	
Total			-95.4551	(269)
Total CO2, kg/year			1118.5881	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.0300	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2895.5011	1.1300	3271.9163	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2708.3401	1.1300	3060.4243	(278)
Space and water heating			6332.3406	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	175.3417	1.5338	268.9449	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	1.4927	-619.6474	
PV Unit electricity exported	-320.3536	0.4595	-147.2169	
Total			-766.8643	(283)
Total Primary energy kWh/year			5964.5220	(286)
Target Primary Energy Rate (TPER)			80.1700	(287)

Full SAP Calculation Printout

Property Reference	Flat 13	**Issued on Date**	27/07/2025
Assessment Reference	Flat 13	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.62	**TER**	15.03
Environmental	96 A	**% DER < TER**			69.26
CO_2 Emissions (t/year)	0.31	**DFEE**	37.74	**TFEE**	42.97
Compliance Check	See BREL	**% DFEE < TFEE**			12.16
% DPER < TPER	39.59	**DPER**	48.43	**TPER**	80.17

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000 (1b)	x	3.2500 (2b)	=	241.8000	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	241.8000	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3746	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3184	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4059	0.3980	0.3900	0.3502	0.3423	0.3025	0.3025	0.2945	0.3184	0.3423	0.3582	0.3741	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000 (23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5824	0.5792	0.5761	0.5613	0.5586	0.5457	0.5457	0.5434	0.5507	0.5586	0.5641	0.5700	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			18.8300	1.1450	21.5611			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	60.1250	20.6500	39.4750	0.1800	7.1055			(29a)
External Roof 1	74.4000		74.4000	0.1100	8.1840			(30)
Total net area of external elements Aum(A, m2)			134.5250					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.6706			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)	5.3810 (36)
Point Thermal bridges (36a) =	0.0000
Total fabric heat loss (33) + (36) + (36a) =	44.0516 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4715	46.2162	45.9660	44.7906	44.5707	43.5470	43.5470	43.3574	43.9413	44.5707	45.0156	45.4807	(38)

Heat transfer coeff

	90.5231	90.2678	90.0175	88.8422	88.6223	87.5985	87.5985	87.4090	87.9929	88.6223	89.0671	89.5322 (39)
Average = Sum(39)m / 12 =												88.8411

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2167	1.2133	1.2099	1.1941	1.1912	1.1774	1.1774	1.1749	1.1827	1.1912	1.1971	1.2034	(40)
HLP (average)												1.1941	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3480 (42)

Hot water usage for mixer showers

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)

Hot water usage for baths

	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756 (42b)

Hot water usage for other uses

	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763 (42c)

Average daily hot water use (litres/day) 60.6278 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	66.1447	64.3304	62.3495	59.8839	57.6843	55.3985	54.9234	56.9003	58.9278	61.2753	63.7627	66.0519	(44)
Energy conte	104.7571	91.6056	95.8289	81.9780	77.6542	68.1189	66.4251	70.4544	72.6639	83.1500	90.8417	103.4213	(45)
Energy content (annual)										Total = Sum(45)m =		1006.8990	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(64)
									Total per year (kWh/year) = Sum(64)m =			855.8642	(64)
12Total per year (kWh/year)												856	(64)
Electric shower(s)													
	50.9239	45.3736	49.5463	47.2814	48.1686	45.9482	47.4798	48.1686	47.2814	49.5463	48.6146	50.9239	(64a)
						Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =						579.2565	(64a)
Heat gains from water heating, kWh/month													
	34.9919	30.8096	32.7502	29.2407	28.5437	25.9623	25.9853	27.0137	27.2614	30.0559	31.4575	34.7080	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5799	115.7849	104.5799	108.0659	104.5799	108.0659	104.5799	104.5799	108.0659	104.5799	108.0659	104.5799	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	47.0321	45.8476	44.0191	40.6121	38.3651	36.0588	34.9265	36.3088	37.8631	40.3978	43.6910	46.6505	(72)
Total internal gains													
	417.1739	429.3460	410.8907	399.4271	379.1239	366.6095	352.8428	352.0735	362.5357	373.1269	394.4764	407.6440	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	12.5300	46.7521	0.6300	0.7000	0.7700	179.0291	(78)

Solar gains	199.5023	332.3288	439.9726	528.9132	583.7342	577.3249	557.3928	515.7465	470.0882	362.8210	237.4668	171.7651	(83)
Total gains	616.6762	761.6748	850.8633	928.3404	962.8581	943.9344	910.2356	867.8201	832.6239	735.9479	631.9432	579.4090	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.1133	25.1843	25.2543	25.5885	25.6519	25.9517	25.9517	26.0080	25.8354	25.6519	25.5238	25.3912	
alpha	2.6742	2.6790	2.6836	2.7059	2.7101	2.7301	2.7301	2.7339	2.7224	2.7101	2.7016	2.6927	
util living area													
	0.9441	0.9071	0.8608	0.7812	0.6715	0.5261	0.3991	0.4312	0.6083	0.8066	0.9132	0.9515	(86)
MIT	18.6481	19.0688	19.5475	20.1086	20.5468	20.8358	20.9432	20.9284	20.7425	20.1630	19.3172	18.5788	(87)
Th 2	19.9067	19.9094	19.9121	19.9247	19.9271	19.9381	19.9381	19.9402	19.9339	19.9271	19.9223	19.9173	(88)
util rest of house													
	0.9355	0.8936	0.8406	0.7494	0.6228	0.4558	0.3113	0.3426	0.5406	0.7714	0.8983	0.9440	(89)
MIT 2	17.7918	18.2016	18.6644	19.2016	19.5969	19.8423	19.9149	19.9090	19.7722	19.2666	18.4599	17.7313	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)

MIT	18.1946	18.6096	19.0798	19.6283	20.0438	20.3097	20.3986	20.3886	20.2287	19.6883	18.8632	18.1300	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.1946	18.6096	19.0798	19.6283	20.0438	20.3097	20.3986	20.3886	20.2287	19.6883	18.8632	18.1300	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9183	0.8741	0.8227	0.7397	0.6285	0.4813	0.3503	0.3812	0.5604	0.7625	0.8803	0.9278	(94)
Useful gains	566.2743	665.7968	699.9918	686.6976	605.1101	454.3521	318.8969	330.8074	466.6134	561.1685	556.3125	537.5742	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1257.7853	1237.5331	1132.4040	953.1233	739.4433	500.1595	332.7537	348.6381	539.2775	805.4263	1047.7146	1247.1821	(97)
Space heating kWh	514.4842	384.2068	321.7147	191.8265	99.9439	0.0000	0.0000	0.0000	0.0000	181.7278	353.8095	527.9483	(98a)
Space heating requirement - total per year (kWh/year)												2575.6616	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	514.4842	384.2068	321.7147	191.8265	99.9439	0.0000	0.0000	0.0000	0.0000	181.7278	353.8095	527.9483	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2575.6616	
Space heating per m2											(98c) / (4) =	34.6191	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	823.4263	648.2292	664.3082	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8175	0.8718	0.8544	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	673.1102	565.1339	567.5536	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1063.5721	1026.2251	978.6832	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	281.1325	343.0518	305.8804	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	70.2831	85.7630	76.4701	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												232.5162	(107)
Energy for space heating												34.6191	(99)
Energy for space cooling												3.1252	(108)
Total												37.7443	(109)
Fabric Energy Efficiency (DFEE)												37.7	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.8000	(5)

2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3741	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3180	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4054	0.3974	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0.0000 (23c)

Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5505	0.5584	0.5640	0.5698 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			16.7800	1.1450	19.2137			(27)
External Wall 1	60.1250	18.6000	41.5250	0.1800	7.4745			(29a)
External Roof 1	74.4000		74.4000	0.1100	8.1840			(30)
Total net area of external elements Aum(A, m2)			134.5250					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6922			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	11.2700	0.0500	0.5635
E3 Sill	10.4600	0.0500	0.5230
E4 Jamb	15.3000	0.0500	0.7650
E7 Party floor between dwellings (in blocks of flats)	18.5000	0.0700	1.2950
E16 Corner (normal)	6.5000	0.0900	0.5850
E18 Party wall between dwellings	6.5000	0.0600	0.3900
E15 Flat roof with parapet	18.5000	0.5600	10.3600

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 14.4815 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 51.1737 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4540	46.1994	45.9498	44.7775	44.5582	43.5372	43.5372	43.3482	43.9305	44.5582	45.0019	45.4658	(38)
Heat transfer coeff	97.6277	97.3731	97.1235	95.9513	95.7320	94.7110	94.7110	94.5219	95.1042	95.7320	96.1756	96.6395	(39)

Average = Sum(39)m / 12 = 95.9502

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3122	1.3088	1.3054	1.2897	1.2867	1.2730	1.2730	1.2705	1.2783	1.2867	1.2927	1.2989	(40)
HLP (average)												1.2897	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3480 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)

Hot water usage for other uses

38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)

Average daily hot water use (litres/day) 60.6278 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	66.1447	64.3304	62.3495	59.8839	57.6843	55.3985	54.9234	56.9003	58.9278	61.2753	63.7627	66.0519	(44)
Energy conte	104.7571	91.6056	95.8289	81.9780	77.6542	68.1189	66.4251	70.4544	72.6639	83.1500	90.8417	103.4213	(45)

Energy content (annual) Total = Sum(45)m = 1006.8990

Distribution loss (46)m = 0.15 x (45)m

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month

89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(62)
WWHRS 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

Output from w/h

89.0435	77.8648	81.4545	69.6813	66.0061	57.9010	56.4613	59.8863	61.7643	70.6775	77.2154	87.9081	(64)

Total per year (kWh/year) = Sum(64)m = 855.8642 (64)

12Total per year (kWh/year) 856 (64)

Electric shower(s)

50.9239	45.3736	49.5463	47.2814	48.1686	45.9482	47.4798	48.1686	47.2814	49.5463	48.6146	50.9239	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 579.2565 (64a)

Heat gains from water heating, kWh/month

34.9919	30.8096	32.7502	29.2407	28.5437	25.9623	25.9853	27.0137	27.2614	30.0559	31.4575	34.7080	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.5626	115.7658	104.5626	108.0481	104.5626	108.0481	104.5626	104.5626	108.0481	104.5626	108.0481	104.5626	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)	47.0321	45.8476	44.0191	40.6121	38.3651	36.0588	34.9265	36.3088	37.8631	40.3978	43.6910	46.6505	(72)
Total internal gains	417.1567	429.3269	410.8734	399.4093	379.1067	366.5917	352.8255	352.0563	362.5179	373.1096	394.4585	407.6267	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308	(74)
South	11.1700	46.7521	0.6300	0.7000	0.7700	159.5974	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	177.8282	296.2195	392.1528	471.4001	520.2343	514.5107	496.7521	459.6554	418.9863	323.3947	211.6674	153.1050	(83)
Total gains	594.9849	725.5464	803.0262	870.8094	899.3410	881.1024	849.5777	811.7116	781.5042	696.5043	606.1260	560.7317	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	23.2857	23.3466	23.4066	23.6926	23.7469	24.0028	24.0028	24.0509	23.9036	23.7469	23.6373	23.5239	
alpha	2.5524	2.5564	2.5604	2.5795	2.5831	2.6002	2.6002	2.6034	2.5936	2.5831	2.5758	2.5683	
util living area	0.9501	0.9199	0.8820	0.8148	0.7173	0.5782	0.4480	0.4809	0.6562	0.8347	0.9243	0.9563	(86)
MIT	18.3851	18.7872	19.2777	19.8838	20.3931	20.7598	20.9103	20.8895	20.6442	19.9748	19.0816	18.3194	(87)
Th 2	19.8313	19.8340	19.8366	19.8489	19.8513	19.8620	19.8620	19.8640	19.8579	19.8513	19.8466	19.8417	(88)
util rest of house	0.9421	0.9075	0.8634	0.7844	0.6681	0.5016	0.3465	0.3798	0.5851	0.8011	0.9104	0.9493	(89)
MIT 2	17.4847	17.8782	18.3554	18.9404	19.4070	19.7217	19.8259	19.8165	19.6338	19.0403	18.1814	17.4273	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	17.9083	18.3058	18.7893	19.3842	19.8709	20.2100	20.3360	20.3213	20.1091	19.4799	18.6049	17.8470	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.9083	18.3058	18.7893	19.3842	19.8709	20.2100	20.3360	20.3213	20.1091	19.4799	18.6049	17.8470	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9246	0.8870	0.8431	0.7704	0.6690	0.5264	0.3905	0.4224	0.6020	0.7884	0.8914	0.9329	(94)
Useful gains	550.1212	643.5907	677.0591	670.8964	601.6485	463.7780	331.7261	342.8287	470.4870	549.1303	540.3172	523.1147	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1328.5445	1305.3659	1193.5824	1005.9719	782.2142	531.3330	353.8427	370.6462	571.4912	850.0899	1106.4917	1318.8355	(97)
Space heating kWh	579.1470	444.7130	384.2933	241.2544	134.3409	0.0000	0.0000	0.0000	0.0000	223.9140	407.6456	592.0163	(98a)
Space heating requirement - total per year (kWh/year)												3007.3244	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	579.1470	444.7130	384.2933	241.2544	134.3409	0.0000	0.0000	0.0000	0.0000	223.9140	407.6456	592.0163	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3007.3244	
Space heating per m2										(98c) / (4) =		40.4210	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	890.2832	700.8613	718.3665	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7595	0.8229	0.8026	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	676.1276	576.7343	576.5833	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	990.1514	955.3447	913.1200	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	226.0972	281.6861	250.3833	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	56.5243	70.4215	62.5958	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												189.5416	(107)
Energy for space heating												40.4210	(99)
Energy for space cooling												2.5476	(108)
Total												42.9686	(109)
Fabric Energy Efficiency (TFEE)												43.0	(109)

Full SAP Calculation Printout

Property Reference	Flat 13	**Issued on Date**	27/07/2025
Assessment Reference	Flat 13	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.62	**TER**	15.03
Environmental	96 A	**% DER < TER**			69.26
CO_2 Emissions (t/year)	0.31	**DFEE**	37.74	**TFEE**	42.97
Compliance Check	See BREL	**% DFEE < TFEE**			12.16
% DPER < TPER	39.59	**DPER**	48.43	**TPER**	80.17

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	241.8000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0827	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3332	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2832	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3611	0.3540	0.3470	0.3116	0.3045	0.2691	0.2691	0.2620	0.2832	0.3045	0.3186	0.3328	(22b)
Effective ac	0.5652	0.5627	0.5602	0.5485	0.5464	0.5362	0.5362	0.5343	0.5401	0.5464	0.5508	0.5554	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			18.8300	1.1450	21.5611			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	60.1250	20.6500	39.4750	0.1800	7.1055			(29a)
External Roof 1	74.4000		74.4000	0.1100	8.1840			(30)
Total net area of external elements Aum(A, m2)			134.5250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.6706			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	5.3810	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	44.0516	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.0999	44.8978	44.6998	43.7696	43.5956	42.7855	42.7855	42.6355	43.0975	43.5956	43.9477	44.3157	(38)
Heat transfer coeff	89.1514	88.9494	88.7514	87.8212	87.6472	86.8370	86.8370	86.6870	87.1491	87.6472	87.9992	88.3673	(39)

Average = Sum(39)m / 12 = 87.8204

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1983	1.1956	1.1929	1.1804	1.1781	1.1672	1.1672	1.1651	1.1714	1.1781	1.1828	1.1877	(40)
HLP (average)												1.1804	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3480 (42)

Hot water usage for mixer showers

71.5372	70.4622	68.8956	65.8982	63.6862	61.2194	59.8173	61.3720	63.0763	65.7249	68.7866	71.2631	(42a)

Hot water usage for baths

27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756	(42b)

Hot water usage for other uses

38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763	(42c)

Average daily hot water use (litres/day) 126.5828 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	137.6820	134.7926	131.2451	125.7821	121.3706	116.6179	114.7407	118.2723	122.0041	127.0002	132.5494	137.3150	(44)
Energy conte	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(45)
Energy content (annual)										Total = Sum(45)m =		2102.5281	
Distribution loss (46)m = 0.15 x (45)m	32.7082	28.7914	30.2578	25.8284	24.5082	21.5093	20.8153	21.9669	22.5665	25.8507	28.3261	32.2503	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
										Total per year (kWh/year) = Sum(64)m =		2102.5281	(64)
12Total per year (kWh/year)												2103	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	72.5032	63.8210	67.0715	57.2530	54.3265	47.6789	46.1407	48.6932	50.0224	57.3024	62.7896	71.4882	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.5799	115.7849	104.5799	108.0659	104.5799	108.0659	104.5799	104.5799	108.0659	104.5799	108.0659	104.5799	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)	97.4505	94.9717	90.1499	79.5180	73.0195	66.2208	62.0171	65.4479	69.4755	77.0193	87.2078	96.0863	(72)
Total internal gains	470.5923	481.4701	460.0214	441.3331	416.7783	396.7715	379.9334	381.2127	394.1482	412.7484	440.9931	460.0797	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	12.5300	46.7521	0.6300	0.7000	0.7700	179.0291	(78)

Solar gains	199.5023	332.3288	439.9726	528.9132	583.7342	577.3249	557.3928	515.7465	470.0882	362.8210	237.4668	171.7651	(83)
Total gains	670.0946	813.7989	899.9941	970.2463	1000.5125	974.0964	937.3262	896.9592	864.2363	775.5694	678.4600	631.8448	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.4997	25.5576	25.6146	25.8859	25.9373	26.1793	26.1793	26.2246	26.0856	25.9373	25.8336	25.7260	
alpha	2.7000	2.7038	2.7076	2.7257	2.7292	2.7453	2.7453	2.7483	2.7390	2.7292	2.7222	2.7151	
util living area	0.9328	0.8932	0.8445	0.7639	0.6532	0.5107	0.3863	0.4166	0.5902	0.7879	0.8993	0.9410	(86)
MIT	19.2377	19.5393	19.8795	20.2705	20.5773	20.7760	20.8499	20.8401	20.7124	20.3104	19.7113	19.1825	(87)
Th 2	19.9214	19.9236	19.9257	19.9357	19.9376	19.9464	19.9464	19.9480	19.9430	19.9376	19.9338	19.9298	(88)
util rest of house	0.9229	0.8783	0.8230	0.7312	0.6045	0.4418	0.3013	0.3308	0.5232	0.7512	0.8827	0.9322	(89)
MIT 2	17.8793	18.2544	18.6743	19.1516	19.5045	19.7193	19.7830	19.7780	19.6586	19.2121	18.4834	17.8164	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	18.5183	18.8589	19.2412	19.6779	20.0092	20.2164	20.2849	20.2777	20.1543	19.7288	19.0610	18.4591	(92)
Temperature adjustment												0.0000	

adjusted MIT	18.5183	18.8589	19.2412	19.6779	20.0092	20.2164	20.2849	20.2777	20.1543	19.7288	19.0610	18.4591	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9069	0.8610	0.8074	0.7225	0.6080	0.4602	0.3294	0.3586	0.5374	0.7431	0.8664	0.9171	(94)
Useful gains	607.6973	700.6606	726.6262	700.9845	608.2678	448.3043	308.7581	321.6143	464.4562	576.3554	587.8266	579.4602	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1267.5822	1241.6314	1130.8031	946.5313	728.2738	487.7127	319.9832	336.1426	527.6293	800.1130	1052.5616	1260.0338	(97)
Space heating kWh	490.9544	363.5324	300.7076	176.7937	89.2844	0.0000	0.0000	0.0000	0.0000	166.4757	334.6092	506.3468	(98a)
Space heating requirement - total per year (kWh/year)												2428.7042	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	490.9544	363.5324	300.7076	176.7937	89.2844	0.0000	0.0000	0.0000	0.0000	166.4757	334.6092	506.3468	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2428.7042	
Space heating per m2											(98c) / (4) =	32.6439	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	490.9544	363.5324	300.7076	176.7937	89.2844	0.0000	0.0000	0.0000	0.0000	166.4757	334.6092	506.3468	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	196.4603	145.4711	120.3312	70.7458	35.7281	0.0000	0.0000	0.0000	0.0000	66.6169	133.8972	202.6198	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	218.0546	191.9428	201.7188	172.1894	163.3881	143.3953	138.7690	146.4458	150.4433	172.3380	188.8409	215.0021	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	124.5315	109.6190	115.2021	98.3377	93.3113	81.8934	79.2513	83.6355	85.9185	98.4226	107.8474	122.7882	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.6704	15.7803	14.2085	10.4097	8.0408	6.5694	7.3351	9.5344	12.3842	16.2488	18.3530	20.2171	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	971.8704	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1200.7585	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	158.7516	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2331.3805	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	971.8704	0.1552	150.8472	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1200.7585	0.1416	170.0012	(264)
Space and water heating			320.8485	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	158.7516	0.1443	22.9128	(268)

Total CO2, kg/year	343.7612	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	4.6200	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	971.8704	1.5746	1530.3188	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1200.7585	1.5235	1829.4017	(278)
Space and water heating			3359.7205	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	158.7516	1.5338	243.4985	(282)
Total Primary energy kWh/year			3603.2190	(286)
Dwelling Primary energy Rate (DPER)			48.4300	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	74.4000	(1b)	x 3.2500	(2b) =	241.8000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		241.8000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1241 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3741 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3180 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4054	0.3974	0.3895	0.3498	0.3418	0.3021	0.3021	0.2941	0.3180	0.3418	0.3577	0.3736	(22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5505	0.5584	0.5640	0.5698	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			16.7800	1.1450	19.2137			(27)
External Wall 1	60.1250	18.6000	41.5250	0.1800	7.4745			(29a)
External Roof 1	74.4000		74.4000	0.1100	8.1840			(30)
Total net area of external elements Aum(A, m2)			134.5250					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.6922			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	11.2700	0.0500	0.5635
E3 Sill	10.4600	0.0500	0.5230
E4 Jamb	15.3000	0.0500	0.7650
E7 Party floor between dwellings (in blocks of flats)	18.5000	0.0700	1.2950
E16 Corner (normal)	6.5000	0.0900	0.5850
E18 Party wall between dwellings	6.5000	0.0600	0.3900
E15 Flat roof with parapet	18.5000	0.5600	10.3600

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	14.4815	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	51.1737	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.4540	46.1994	45.9498	44.7775	44.5582	43.5372	43.5372	43.3482	43.9305	44.5582	45.0019	45.4658	(38)

Heat transfer coeff

	97.6277	97.3731	97.1235	95.9513	95.7320	94.7110	94.7110	94.5219	95.1042	95.7320	96.1756	96.6395 (39)
Average = Sum(39)m / 12 =												95.9502
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3122	1.3088	1.3054	1.2897	1.2867	1.2730	1.2730	1.2705	1.2783	1.2867	1.2927	1.2989 (40)
HLP (average)												1.2897
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3480 (42)
Hot water usage for mixer showers												
	63.5887	62.6330	61.2405	58.5762	56.6100	54.4173	53.1710	54.5529	56.0678	58.4221	61.1437	63.3450 (42a)
Hot water usage for baths												
	27.4684	27.0605	26.4860	25.4268	24.6337	23.7542	23.2792	23.8496	24.4707	25.4118	26.4928	27.3756 (42b)
Hot water usage for other uses												
	38.6763	37.2699	35.8635	34.4571	33.0507	31.6443	31.6443	33.0507	34.4571	35.8635	37.2699	38.6763 (42c)
Average daily hot water use (litres/day)												119.2545 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	129.7334	126.9634	123.5900	118.4601	114.2943	109.8157	108.0944	111.4532	114.9956	119.6974	124.9064	129.3969	(44)
Energy conte	205.4660	180.7942	189.9533	162.1659	153.8621	135.0313	130.7308	138.0024	141.8011	162.4282	177.9521	202.6043	(45)
Energy content (annual)										Total = Sum(45)m =		1980.7916	
Distribution loss (46)m = 0.15 x (45)m													
	30.8199	27.1191	28.4930	24.3249	23.0793	20.2547	19.6096	20.7004	21.2702	24.3642	26.6928	30.3906	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	252.0609	222.8799	236.5482	207.2577	200.4570	180.1231	177.3257	184.5973	186.8930	209.0231	223.0439	249.1992	(62)
WWHRS	-29.0701	-25.7098	-26.9218	-22.2923	-20.7757	-17.7779	-16.6639	-17.7204	-18.3937	-21.6841	-24.5655	-28.5317	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
										Total per year (kWh/year) = Sum(64)m =		2259.3020	(64)
12Total per year (kWh/year)												2259	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	105.5934	93.7827	100.4354	89.9936	88.4351	80.9714	80.7439	83.1617	83.2223	91.2833	95.2425	104.6418	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	117.4022	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	104.5626	115.7658	104.5626	108.0481	104.5626	108.0481	104.5626	104.5626	108.0481	104.5626	108.0481	104.5626	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	207.3413	209.4929	204.0710	192.5286	177.9583	164.2642	155.1158	152.9642	158.3861	169.9286	184.4988	198.1929	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	34.7402	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	-93.9218	(71)
Water heating gains (Table 5)													
	141.9266	139.5575	134.9938	124.9912	118.8643	112.4602	108.5268	111.7765	115.5866	122.6926	132.2813	140.6476	(72)
Total internal gains													
	515.0512	526.0368	504.8481	486.7884	462.6059	442.9932	426.4258	427.5240	440.2414	458.4045	486.0489	504.6238	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308	(74)
South	11.1700	46.7521	0.6300	0.7000	0.7700	159.5974	(78)

Solar gains	177.8282	296.2195	392.1528	471.4001	520.2343	514.5107	496.7521	459.6554	418.9863	323.3947	211.6674	153.1050	(83)
Total gains	692.8794	822.2563	897.0009	958.1886	982.8402	957.5039	923.1780	887.1794	859.2277	781.7992	697.7163	657.7288	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	23.2857	23.3466	23.4066	23.6926	23.7469	24.0028	24.0028	24.0509	23.9036	23.7469	23.6373	23.5239	
alpha	2.5524	2.5564	2.5604	2.5795	2.5831	2.6002	2.6002	2.6034	2.5936	2.5831	2.5758	2.5683	
util living area													
	0.9320	0.8984	0.8569	0.7858	0.6844	0.5454	0.4182	0.4478	0.6192	0.8015	0.9007	0.9392	(86)
MIT	18.5826	18.9625	19.4262	19.9911	20.4614	20.7914	20.9238	20.9067	20.6918	20.0869	19.2502	18.5202	(87)
Th 2	19.8313	19.8340	19.8366	19.8489	19.8513	19.8620	19.8620	19.8640	19.8579	19.8513	19.8466	19.8417	(88)
util rest of house													

	0.9216	0.8835	0.8355	0.7529	0.6337	0.4700	0.3215	0.3512	0.5477	0.7642	0.8836	0.9297	(89)
MIT 2	17.0660	17.5389	18.1133	18.8048	19.3511	19.7078	19.8232	19.8134	19.6127	18.9362	17.9149	16.9942	(90)
Living area fraction										fLA = Living area / (4) =		0.4704	(91)
MIT	17.7794	18.2086	18.7309	19.3629	19.8734	20.2176	20.3410	20.3277	20.1203	19.4775	18.5431	17.7121	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.7794	18.2086	18.7309	19.3629	19.8734	20.2176	20.3410	20.3277	20.1203	19.4775	18.5431	17.7121	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8974	0.8575	0.8113	0.7372	0.6348	0.4947	0.3635	0.3921	0.5653	0.7503	0.8593	0.9066	(94)
Useful gains	621.7868	705.0835	727.7274	706.3942	623.8829	473.7115	335.6165	347.8953	485.6997	586.5814	599.5184	596.3239	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	1315.9648	1295.9002	1187.9117	1003.9241	782.4581	532.0452	354.3119	371.2582	572.5603	849.8606	1100.5452	1305.8032	(97)
Space heating kWh													
	516.4684	397.0288	342.3771	214.2215	117.9800	0.0000	0.0000	0.0000	0.0000	195.8797	360.7394	527.8526	(98a)
Space heating requirement - total per year (kWh/year)												2672.5475	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	516.4684	397.0288	342.3771	214.2215	117.9800	0.0000	0.0000	0.0000	0.0000	195.8797	360.7394	527.8526	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2672.5475	
Space heating per m2											(98c) / (4) =	35.9213	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	516.4684	397.0288	342.3771	214.2215	117.9800	0.0000	0.0000	0.0000	0.0000	195.8797	360.7394	527.8526	(98)
Space heating efficiency (main heating system 1)													
	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)													
	559.5541	430.1504	370.9395	232.0926	127.8223	0.0000	0.0000	0.0000	0.0000	212.2207	390.8335	571.8880	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	222.9908	197.1701	209.6263	184.9654	179.6813	162.3452	160.6617	166.8768	168.4993	187.3390	198.4784	220.6674	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.8792	85.5966	85.1529	84.3899	83.1398	79.8000	79.8000	79.8000	79.8000	84.1599	85.3823	85.9425	(217)
Fuel for water heating, kWh/month													
	259.6563	230.3480	246.1763	219.1794	216.1194	203.4401	201.3305	209.1188	211.1520	222.5989	232.4586	256.7616	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.7260	17.4294	15.6933	11.4976	8.8811	7.2559	8.1016	10.5308	13.6784	17.9468	20.2709	22.3299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.4607	-24.6716	-37.6751	-45.0891	-51.0410	-48.5313	-47.9380	-44.0442	-37.6205	-29.3823	-18.6085	-14.0654	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.3266	-11.5023	-23.4280	-36.0371	-48.4965	-49.0418	-48.4678	-40.6495	-29.2887	-16.7260	-7.1987	-4.1905	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2895.5011	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2708.3401	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	175.3417	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-735.4813	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	5129.7016	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2895.5011	0.2100	608.0552	(261)

Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2708.3401	0.2100	568.7514	(264)
Space and water heating			1176.8067	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	175.3417	0.1443	25.3072	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	0.1333	-55.3461	
PV Unit electricity exported	-320.3536	0.1252	-40.1090	
Total			-95.4551	(269)
Total CO2, kg/year			1118.5881	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.0300	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2895.5011	1.1300	3271.9163	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2708.3401	1.1300	3060.4243	(278)
Space and water heating			6332.3406	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	175.3417	1.5338	268.9449	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-415.1277	1.4927	-619.6474	
PV Unit electricity exported	-320.3536	0.4595	-147.2169	
Total			-766.8643	(283)
Total Primary energy kWh/year			5964.5220	(286)
Target Primary Energy Rate (TPER)			80.1700	(287)

Summary for Input Data

elmhurst energy

Property Reference	Flat 14	**Issued on Date**	27/07/2025
Assessment Reference	Flat 14	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.97	**TER**	16.09
Environmental	96 A	**% DER < TER**			69.11
CO_2 Emissions (t/year)	0.25	**DFEE**	36.10	**TFEE**	39.70
Compliance Check	See BREL	**% DFEE < TFEE**			9.08
% DPER < TPER	39.41	**DPER**	52.20	**TPER**	86.15

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Top-floor flat	
Which Floor	4	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	9.60 m	54.00 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	31.20	14.69	0.00	None	16.51	Calculate Wall Area

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	54.00	54.00	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	70.00	74.40

12.0 Opening Types

Summary for Input Data

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0
N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		9.60	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes
E15 Flat roof with parapet		9.60	0.00	0.00	No

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
In Winter	249.90	
In Summer	175.10	
Controls SAP Code	2207	

Summary for Input Data

Delayed Start Stat	No
HETAS approved System	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2 — None

26.0 Heat Networks — None

27.0 Secondary Heating — None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder — None

Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No

31.0 Thermal Store — None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 14	**Issued on Date**	27/07/2025
Assessment Reference	Flat 14	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.97	**TER**	16.09
Environmental	96 A	**% DER < TER**			69.11
CO_2 Emissions (t/year)	0.25	**DFEE**	36.10	**TFEE**	39.70
Compliance Check	See BREL	**% DFEE < TFEE**			9.08
% DPER < TPER	39.41	**DPER**	52.20	**TPER**	86.15

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
External Roof 1	54.0000		54.0000	0.1000	5.4000			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.6848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	3.4080	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	30.0928	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	63.5680	63.3926	63.2206	62.4130	62.2619	61.5584	61.5584	61.4281	61.8294	62.2619	62.5676	62.8872	(39)

Average = Sum(39)m / 12 = 62.4123

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1772	1.1739	1.1708	1.1558	1.1530	1.1400	1.1400	1.1376	1.1450	1.1530	1.1587	1.1646	(40)
HLP (average)												1.1558	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)

Hot water usage for baths

23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)

Hot water usage for other uses

33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)

Average daily hot water use (litres/day) 108.5529 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)											Total = Sum(45)m =	1803.0542	
Distribution loss (46)m = 0.15 x (45)m	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.9564	26.0283	26.0991	26.4368	26.5010	26.8038	26.8038	26.8606	26.6863	26.5010	26.3715	26.2375	
alpha	2.7304	2.7352	2.7399	2.7625	2.7667	2.7869	2.7869	2.7907	2.7791	2.7667	2.7581	2.7492	
util living area	0.9237	0.8821	0.8300	0.7420	0.6238	0.4792	0.3598	0.3913	0.5663	0.7699	0.8872	0.9324	(86)
MIT	19.3342	19.6258	19.9569	20.3379	20.6239	20.7990	20.8597	20.8512	20.7383	20.3655	19.7954	19.2850	(87)
Th 2	19.9383	19.9409	19.9435	19.9555	19.9578	19.9683	19.9683	19.9703	19.9643	19.9578	19.9532	19.9484	(88)
util rest of house	0.9128	0.8663	0.8075	0.7084	0.5754	0.4137	0.2810	0.3110	0.5010	0.7323	0.8693	0.9226	(89)
MIT 2	18.0110	18.3728	18.7801	19.2441	19.5701	19.7596	19.8113	19.8077	19.7018	19.2903	18.5999	17.9572	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.8686	19.1850	19.5428	19.9531	20.2532	20.4333	20.4908	20.4840	20.3736	19.9872	19.3748	18.8178	(92)
Temperature adjustment												0.0000	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
adjusted MIT	18.8686	19.1850	19.5428	19.9531	20.2532	20.4333	20.4908	20.4840	20.3736	19.9872	19.3748	18.8178	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8996	0.8534	0.7980	0.7083	0.5898	0.4440	0.3216	0.3518	0.5278	0.7335	0.8579	0.9099	(94)
Useful gains	462.5325	526.7545	543.9215	523.6392	453.4593	333.5814	231.9916	241.0180	344.9000	429.9209	444.1019	442.5071	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	926.1002	905.5611	824.5764	689.8559	532.5354	359.0895	239.5124	250.8731	387.8933	584.4650	768.0026	919.2730	(97)
Space heating kWh	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98a)
Space heating requirement - total per year (kWh/year)												1689.6714	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1689.6714	
Space heating per m2											(98c) / (4) =	31.2902	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	138.0130	101.8640	83.5563	47.8896	23.5424	0.0000	0.0000	0.0000	0.0000	46.0107	93.3207	141.9423	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	676.1390	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1029.7283	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1826.5380	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	676.1390	0.1553	105.0198	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			250.8068	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)

Total CO2, kg/year	268.2233	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	4.9700	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	676.1390	1.5750	1064.9303	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2633.7607	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2818.8495	(286)
Dwelling Primary energy Rate (DPER)			52.2000	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
External Roof 1	54.0000		54.0000	0.1100	5.9400			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.3200			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	9.6000	0.0700	0.6720	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
E15 Flat roof with parapet	9.6000	0.5600	5.3760	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	8.2695	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	32.5895	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	66.0524	65.8774	65.7059	64.9005	64.7498	64.0483	64.0483	63.9184	64.3185	64.7498	65.0547	65.3734	(39)

Average = Sum(39)m / 12 = 64.8998

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2232	1.2200	1.2168	1.2019	1.1991	1.1861	1.1861	1.1837	1.1911	1.1991	1.2047	1.2106	(40)
HLP (average)												1.2018	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)

Hot water usage for baths

23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)

Hot water usage for other uses

33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)

Average daily hot water use (litres/day) 102.2682 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	

Distribution loss (46)m = 0.15 x (45)m

26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)

Water storage loss:

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.3938 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.7527 (55)

Total storage loss

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)

If cylinder contains dedicated solar storage

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Primary loss

Combi loss

Total heat required for water heating calculated for each month

222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

WWHRS

PV diverter

Solar input

FGHRS

Output from w/h

197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)

Total per year (kWh/year) = Sum(64)m = 2015.6255 (64)

12Total per year (kWh/year) 2016 (64)

Electric shower(s)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month

95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	24.9802	25.0465	25.1119	25.4235	25.4827	25.7618	25.7618	25.8142	25.6536	25.4827	25.3633	25.2396	
alpha	2.6653	2.6698	2.6741	2.6949	2.6988	2.7175	2.7175	2.7209	2.7102	2.6988	2.6909	2.6826	
util living area													
	0.9208	0.8868	0.8436	0.7671	0.6586	0.5151	0.3902	0.4202	0.5935	0.7818	0.8861	0.9281	(86)
MIT	18.8626	19.2040	19.6266	20.1453	20.5642	20.8419	20.9453	20.9316	20.7549	20.2278	19.4766	18.8076	(87)
Th 2	19.9015	19.9041	19.9066	19.9185	19.9207	19.9312	19.9312	19.9331	19.9271	19.9207	19.9162	19.9115	(88)
util rest of house													
	0.9093	0.8711	0.8217	0.7342	0.6094	0.4451	0.3034	0.3328	0.5257	0.7442	0.8678	0.9177	(89)

MIT 2	17.4556	17.8791	18.4010	19.0330	19.5154	19.8134	19.9026	19.8953	19.7311	19.1462	18.2345	17.3934	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.3675	18.7378	19.1954	19.7539	20.1952	20.4800	20.5784	20.5670	20.3947	19.8472	19.0396	18.3100	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3675	18.7378	19.1954	19.7539	20.1952	20.4800	20.5784	20.5670	20.3947	19.8472	19.0396	18.3100	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8894	0.8513	0.8055	0.7287	0.6226	0.4821	0.3569	0.3858	0.5565	0.7414	0.8502	0.8984	(94)
Useful gains	472.0438	523.1150	533.5349	514.2218	451.7526	341.5966	243.5385	252.1189	350.7597	429.7113	449.9163	455.4794	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	929.1935	911.6011	834.1629	704.4258	550.0627	376.6054	254.8114	266.3472	404.8666	598.7553	776.7265	922.4167	(97)
Space heating kWh	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98a)
Space heating requirement - total per year (kWh/year)												1743.4123	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1743.4123	
Space heating per m2											(98c) / (4) =	32.2854	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	368.4933	282.8415	242.3263	148.3715	79.2446	0.0000	0.0000	0.0000	0.0000	136.2608	254.9332	376.3828	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2633	84.9538	84.4695	83.6444	82.4123	79.8000	79.8000	79.8000	79.8000	83.4288	84.7038	85.3303	(217)
Fuel for water heating, kWh/month	232.0619	206.0877	220.6762	197.3136	195.0252	182.5113	180.9699	187.6483	189.1231	200.5187	208.5253	229.5447	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1888.8540	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2430.0059	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4004.4808	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1888.8540	0.2100	396.6593	(261)
Total CO2 associated with community systems			0.0000	(373)

Water heating (other fuel)	2430.0059	0.2100	510.3012	(264)
Space and water heating			906.9606	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			868.8459	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.0900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1888.8540	1.1300	2134.4050	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2430.0059	1.1300	2745.9066	(278)
Space and water heating			4880.3117	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4652.1392	(286)
Target Primary Energy Rate (TPER)			86.1500	(287)

Full SAP Calculation Printout

Property Reference	Flat 14	**Issued on Date**	27/07/2025
Assessment Reference	Flat 14	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.97	**TER**	16.09
Environmental	96 A	**% DER < TER**			69.11
CO_2 Emissions (t/year)	0.25	**DFEE**	36.10	**TFEE**	39.70
Compliance Check	See BREL	**% DFEE < TFEE**			9.08
% DPER < TPER	39.41	**DPER**	52.20	**TPER**	86.15

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000 (1b)	x	3.2500 (2b)	=	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	175.5000	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000	(23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
External Roof 1	54.0000		54.0000	0.1000	5.4000			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.6848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)	3.4080 (36)
Point Thermal bridges (36a) =	0.0000
Total fabric heat loss (33) + (36) + (36a) =	30.0928 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)

Heat transfer coeff

	63.5680	63.3926	63.2206	62.4130	62.2619	61.5584	61.5584	61.4281	61.8294	62.2619	62.5676	62.8872 (39)
Average = Sum(39)m / 12 =												62.4123

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1772	1.1739	1.1708	1.1558	1.1530	1.1400	1.1400	1.1376	1.1450	1.1530	1.1587	1.1646	(40)
HLP (average)												1.1558	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)

Hot water usage for baths

	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948 (42b)

Hot water usage for other uses

	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458 (42c)

Average daily hot water use (litres/day) 51.9898 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406	(44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855	(45)
Energy content (annual)										Total = Sum(45)m =		863.4398	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(64)
										Total per year (kWh/year) = Sum(64)m =		733.9239	(64)
12Total per year (kWh/year)												734	(64)
Electric shower(s)													
	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					496.7719	(64a)
Heat gains from water heating, kWh/month													
	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051	(72)
Total internal gains													
	327.5507	336.6878	322.4815	313.4359	297.7842	288.0471	277.4722	277.0221	285.1259	293.4234	309.9724	320.2696	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	467.9005	572.1401	639.0506	702.8764	736.1791	725.5027	698.2043	660.0521	626.3045	551.7539	477.3233	440.9215	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.9564	26.0283	26.0991	26.4368	26.5010	26.8038	26.8038	26.8606	26.6863	26.5010	26.3715	26.2375	
alpha	2.7304	2.7352	2.7399	2.7625	2.7667	2.7869	2.7869	2.7907	2.7791	2.7667	2.7581	2.7492	
util living area													
	0.9373	0.8980	0.8478	0.7600	0.6414	0.4928	0.3705	0.4042	0.5836	0.7902	0.9037	0.9452	(86)
MIT	18.8004	19.2087	19.6736	20.2142	20.6197	20.8698	20.9565	20.9436	20.7819	20.2473	19.4430	18.7320	(87)
Th 2	19.9383	19.9409	19.9435	19.9555	19.9578	19.9683	19.9683	19.9703	19.9643	19.9578	19.9532	19.9484	(88)
util rest of house													
	0.9280	0.8838	0.8268	0.7274	0.5931	0.4263	0.2898	0.3219	0.5178	0.7542	0.8878	0.9370	(89)
MIT 2	17.9616	18.3582	18.8058	19.3201	19.6821	19.8926	19.9505	19.9457	19.8277	19.3652	18.6019	17.9020	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)

MIT	18.5052	18.9094	19.3683	19.8996	20.2898	20.5259	20.6025	20.5925	20.4462	19.9369	19.1470	18.4400	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5052	18.9094	19.3683	19.8996	20.2898	20.5259	20.6025	20.5925	20.4462	19.9369	19.1470	18.4400	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9124	0.8675	0.8138	0.7255	0.6092	0.4631	0.3401	0.3725	0.5496	0.7534	0.8732	0.9222	(94)
Useful gains	426.9264	496.3229	520.0797	509.9454	448.4799	335.9649	237.4676	245.8463	344.1882	415.6867	416.8038	406.5992	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	902.9987	888.0946	813.5396	686.5175	534.8173	364.7918	246.3881	257.5359	392.3805	581.3352	753.7535	895.5114	(97)
Space heating kWh	354.1978	263.2706	218.3342	127.1319	64.2351	0.0000	0.0000	0.0000	0.0000	123.2425	242.6038	363.7507	(98a)
Space heating requirement - total per year (kWh/year)												1756.7664	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	354.1978	263.2706	218.3342	127.1319	64.2351	0.0000	0.0000	0.0000	0.0000	123.2425	242.6038	363.7507	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1756.7664	
Space heating per m2											(98c) / (4) =	32.5327	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	578.6491	455.5323	466.8539	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8478	0.8955	0.8782	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	490.5723	407.9362	410.0020	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	819.3656	789.0286	745.9590	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	236.7312	283.5327	249.9521	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	59.1828	70.8832	62.4880	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												192.5540	(107)
Energy for space heating												32.5327	(99)
Energy for space cooling												3.5658	(108)
Total												36.0985	(109)
Fabric Energy Efficiency (DFEE)												36.1	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3640	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0.0000 (23c)

Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
External Roof 1	54.0000		54.0000	0.1100	5.9400			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.3200			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	9.6000	0.0700	0.6720
E18 Party wall between dwellings	13.0000	0.0600	0.7800
E15 Flat roof with parapet	9.6000	0.5600	5.3760

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.2695 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 32.5895 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	66.0524	65.8774	65.7059	64.9005	64.7498	64.0483	64.0483	63.9184	64.3185	64.7498	65.0547	65.3734	(39)
Average = Sum(39)m / 12 =												64.8998	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2232	1.2200	1.2168	1.2019	1.1991	1.1861	1.1861	1.1837	1.1911	1.1991	1.2047	1.2106	(40)
HLP (average)												1.2018	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)

Hot water usage for other uses

33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)

Average daily hot water use (litres/day) 51.9898 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406	(44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855	(45)
Energy content (annual)										Total = Sum(45)m =		863.4398	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(64)
										Total per year (kWh/year) = Sum(64)m =		733.9239	(64)
12Total per year (kWh/year)												734	(64)
Electric shower(s)	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												496.7719	(64a)
Heat gains from water heating, kWh/month	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051	(72)
Total internal gains	327.6311	336.7768	322.5619	313.5190	297.8646	288.1301	277.5526	277.1024	285.2089	293.5037	310.0554	320.3500	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	439.2133	523.9695	574.2486	623.1479	646.4210	635.9423	612.0672	581.6368	556.4634	498.8863	443.1046	416.2716	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	24.9802	25.0465	25.1119	25.4235	25.4827	25.7618	25.7618	25.8142	25.6536	25.4827	25.3633	25.2396	
alpha	2.6653	2.6698	2.6741	2.6949	2.6988	2.7175	2.7175	2.7209	2.7102	2.6988	2.6909	2.6826	
util living area	0.9465	0.9167	0.8785	0.8073	0.7033	0.5582	0.4284	0.4631	0.6436	0.8279	0.9194	0.9527	(86)
MIT	18.6087	18.9792	19.4374	20.0114	20.4827	20.8067	20.9311	20.9131	20.6988	20.0872	19.2612	18.5490	(87)
Th 2	19.9015	19.9041	19.9066	19.9185	19.9207	19.9312	19.9312	19.9331	19.9271	19.9207	19.9162	19.9115	(88)
util rest of house	0.9382	0.9044	0.8601	0.7774	0.6555	0.4860	0.3354	0.3696	0.5756	0.7949	0.9053	0.9453	(89)
MIT 2	17.7500	18.1121	18.5576	19.1105	19.5402	19.8171	19.9027	19.8949	19.7356	19.1951	18.4023	17.6984	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.3066	18.6741	19.1278	19.6945	20.1511	20.4585	20.5692	20.5548	20.3599	19.7733	18.9590	18.2497	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3066	18.6741	19.1278	19.6945	20.1511	20.4585	20.5692	20.5548	20.3599	19.7733	18.9590	18.2497	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9229	0.8875	0.8448	0.7705	0.6664	0.5229	0.3922	0.4255	0.6045	0.7897	0.8901	0.9308	(94)
Useful gains	405.3319	465.0043	485.1047	480.1513	430.7707	332.5453	240.0303	247.4957	336.3792	393.9951	394.3965	387.4708	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	925.1682	907.4030	829.7220	700.5654	547.2058	375.2291	254.2230	265.5692	402.6284	593.9718	771.4837	918.4790	(97)
Space heating kWh	386.7582	297.2919	256.3953	158.6982	86.6277	0.0000	0.0000	0.0000	0.0000	148.7826	271.5027	395.0701	(98a)
Space heating requirement - total per year (kWh/year)												2001.1268	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	386.7582	297.2919	256.3953	158.6982	86.6277	0.0000	0.0000	0.0000	0.0000	148.7826	271.5027	395.0701	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2001.1268	
Space heating per m2											(98c) / (4) =	37.0579	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	602.0538	473.9572	485.7796	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7902	0.8494	0.8290	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	475.7317	402.5711	402.6952	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	714.5946	688.2625	654.2208	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	171.9813	212.5544	187.1351	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	42.9953	53.1386	46.7838	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												142.9177	(107)
Energy for space heating												37.0579	(99)
Energy for space cooling												2.6466	(108)
Total												39.7045	(109)
Fabric Energy Efficiency (TFEE)												39.7	(109)

Full SAP Calculation Printout

Property Reference	Flat 14	**Issued on Date**	27/07/2025
Assessment Reference	Flat 14	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.97	**TER**	16.09
Environmental	96 A	**% DER < TER**			69.11
CO_2 Emissions (t/year)	0.25	**DFEE**	36.10	**TFEE**	39.70
Compliance Check	See BREL	**% DFEE < TFEE**			9.08
% DPER < TPER	39.41	**DPER**	52.20	**TPER**	86.15

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3645	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
External Roof 1	54.0000		54.0000	0.1000	5.4000			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.6848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	3.4080	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	30.0928	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	63.5680	63.3926	63.2206	62.4130	62.2619	61.5584	61.5584	61.4281	61.8294	62.2619	62.5676	62.8872	(39)

Average = Sum(39)m / 12 = 62.4123

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1772	1.1739	1.1708	1.1558	1.1530	1.1400	1.1400	1.1376	1.1450	1.1530	1.1587	1.1646	(40)
HLP (average)												1.1558	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)

Hot water usage for baths

23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)

Hot water usage for other uses

33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)

Average daily hot water use (litres/day) 108.5529 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)											Total = Sum(45)m =	1803.0542	
Distribution loss (46)m = 0.15 x (45)m	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.9564	26.0283	26.0991	26.4368	26.5010	26.8038	26.8038	26.8606	26.6863	26.5010	26.3715	26.2375	
alpha	2.7304	2.7352	2.7399	2.7625	2.7667	2.7869	2.7869	2.7907	2.7791	2.7667	2.7581	2.7492	
util living area	0.9237	0.8821	0.8300	0.7420	0.6238	0.4792	0.3598	0.3913	0.5663	0.7699	0.8872	0.9324	(86)
MIT	19.3342	19.6258	19.9569	20.3379	20.6239	20.7990	20.8597	20.8512	20.7383	20.3655	19.7954	19.2850	(87)
Th 2	19.9383	19.9409	19.9435	19.9555	19.9578	19.9683	19.9683	19.9703	19.9643	19.9578	19.9532	19.9484	(88)
util rest of house	0.9128	0.8663	0.8075	0.7084	0.5754	0.4137	0.2810	0.3110	0.5010	0.7323	0.8693	0.9226	(89)
MIT 2	18.0110	18.3728	18.7801	19.2441	19.5701	19.7596	19.8113	19.8077	19.7018	19.2903	18.5999	17.9572	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.8686	19.1850	19.5428	19.9531	20.2532	20.4333	20.4908	20.4840	20.3736	19.9872	19.3748	18.8178	(92)
Temperature adjustment												0.0000	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
adjusted MIT	18.8686	19.1850	19.5428	19.9531	20.2532	20.4333	20.4908	20.4840	20.3736	19.9872	19.3748	18.8178	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8996	0.8534	0.7980	0.7083	0.5898	0.4440	0.3216	0.3518	0.5278	0.7335	0.8579	0.9099	(94)
Useful gains	462.5325	526.7545	543.9215	523.6392	453.4593	333.5814	231.9916	241.0180	344.9000	429.9209	444.1019	442.5071	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	926.1002	905.5611	824.5764	689.8559	532.5354	359.0895	239.5124	250.8731	387.8933	584.4650	768.0026	919.2730	(97)
Space heating kWh	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98a)
Space heating requirement - total per year (kWh/year)												1689.6714	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1689.6714	
Space heating per m2											(98c) / (4) =	31.2902	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	138.0130	101.8640	83.5563	47.8896	23.5424	0.0000	0.0000	0.0000	0.0000	46.0107	93.3207	141.9423	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	676.1390	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1029.7283	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1826.5380	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	676.1390	0.1553	105.0198	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			250.8068	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)

Total CO2, kg/year	268.2233	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	4.9700	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	676.1390	1.5750	1064.9303	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2633.7607	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2818.8495	(286)
Dwelling Primary energy Rate (DPER)			52.2000	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
External Roof 1	54.0000		54.0000	0.1100	5.9400			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.3200			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	9.6000	0.0700	0.6720	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
E15 Flat roof with parapet	9.6000	0.5600	5.3760	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.2695	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		32.5895	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	66.0524	65.8774	65.7059	64.9005	64.7498	64.0483	64.0483	63.9184	64.3185	64.7498	65.0547	65.3734	(39)

Average = Sum(39)m / 12 = 64.8998

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2232	1.2200	1.2168	1.2019	1.1991	1.1861	1.1861	1.1837	1.1911	1.1991	1.2047	1.2106	(40)
HLP (average)												1.2018	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)

Hot water usage for baths

23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)

Hot water usage for other uses

33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)

Average daily hot water use (litres/day) 102.2682 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	

Distribution loss (46)m = 0.15 x (45)m

26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)

Water storage loss:

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.3938 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.7527 (55)

Total storage loss

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)

If cylinder contains dedicated solar storage

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Primary loss

Combi loss

Total heat required for water heating calculated for each month

222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

WWHRS

PV diverter

Solar input

FGHRS

Output from w/h

197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)

Total per year (kWh/year) = Sum(64)m = 2015.6255 (64)

12Total per year (kWh/year) 2016 (64)

Electric shower(s)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month

95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	24.9802	25.0465	25.1119	25.4235	25.4827	25.7618	25.7618	25.8142	25.6536	25.4827	25.3633	25.2396	
alpha	2.6653	2.6698	2.6741	2.6949	2.6988	2.7175	2.7175	2.7209	2.7102	2.6988	2.6909	2.6826	
util living area													
	0.9208	0.8868	0.8436	0.7671	0.6586	0.5151	0.3902	0.4202	0.5935	0.7818	0.8861	0.9281	(86)
MIT	18.8626	19.2040	19.6266	20.1453	20.5642	20.8419	20.9453	20.9316	20.7549	20.2278	19.4766	18.8076	(87)
Th 2	19.9015	19.9041	19.9066	19.9185	19.9207	19.9312	19.9312	19.9331	19.9271	19.9207	19.9162	19.9115	(88)
util rest of house													
	0.9093	0.8711	0.8217	0.7342	0.6094	0.4451	0.3034	0.3328	0.5257	0.7442	0.8678	0.9177	(89)

MIT 2	17.4556	17.8791	18.4010	19.0330	19.5154	19.8134	19.9026	19.8953	19.7311	19.1462	18.2345	17.3934	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.3675	18.7378	19.1954	19.7539	20.1952	20.4800	20.5784	20.5670	20.3947	19.8472	19.0396	18.3100	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3675	18.7378	19.1954	19.7539	20.1952	20.4800	20.5784	20.5670	20.3947	19.8472	19.0396	18.3100	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8894	0.8513	0.8055	0.7287	0.6226	0.4821	0.3569	0.3858	0.5565	0.7414	0.8502	0.8984	(94)
Useful gains	472.0438	523.1150	533.5349	514.2218	451.7526	341.5966	243.5385	252.1189	350.7597	429.7113	449.9163	455.4794	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	929.1935	911.6011	834.1629	704.4258	550.0627	376.6054	254.8114	266.3472	404.8666	598.7553	776.7265	922.4167	(97)
Space heating kWh	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98a)
Space heating requirement - total per year (kWh/year)												1743.4123	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1743.4123	
Space heating per m2											(98c) / (4) =	32.2854	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	368.4933	282.8415	242.3263	148.3715	79.2446	0.0000	0.0000	0.0000	0.0000	136.2608	254.9332	376.3828	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2633	84.9538	84.4695	83.6444	82.4123	79.8000	79.8000	79.8000	79.8000	83.4288	84.7038	85.3303	(217)
Fuel for water heating, kWh/month	232.0619	206.0877	220.6762	197.3136	195.0252	182.5113	180.9699	187.6483	189.1231	200.5187	208.5253	229.5447	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1888.8540	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2430.0059	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4004.4808	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1888.8540	0.2100	396.6593	(261)
Total CO2 associated with community systems			0.0000	(373)

Water heating (other fuel)	2430.0059	0.2100	510.3012	(264)
Space and water heating			906.9606	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			868.8459	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.0900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1888.8540	1.1300	2134.4050	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2430.0059	1.1300	2745.9066	(278)
Space and water heating			4880.3117	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4652.1392	(286)
Target Primary Energy Rate (TPER)			86.1500	(287)

Summary for Input Data

elmhurst energy

Property Reference	Flat 15	**Issued on Date**	27/07/2025
Assessment Reference	Flat 15	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.50	**TER**	14.36
Environmental	96 A	**% DER < TER**			68.66
CO_2 Emissions (t/year)	0.3	**DFEE**	34.77	**TFEE**	39.06
Compliance Check	See BREL	**% DFEE < TFEE**			10.98
% DPER < TPER	38.38	**DPER**	47.19	**TPER**	76.59

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Top-floor flat	
Which Floor	4	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	13.00 m	72.60 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	42.25	25.74	0.00	None	16.51	Calculate Wall Area

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	72.60	72.60	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	70.00	74.40

12.0 Opening Types

Summary for Input Data

elmhurst energy

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0
N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		13.00	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes
E15 Flat roof with parapet		13.00	0.00	0.00	No

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
In Winter	249.90	
In Summer	175.10	
Controls SAP Code	2207	

Summary for Input Data

Delayed Start Stat	No
HETAS approved System	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2 — None

26.0 Heat Networks — None

27.0 Secondary Heating — None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder — None

Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No

31.0 Thermal Store — None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 15	**Issued on Date**	27/07/2025
Assessment Reference	Flat 15	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.50	**TER**	14.36
Environmental	96 A	**% DER < TER**			68.66
CO_2 Emissions (t/year)	0.3	**DFEE**	34.77	**TFEE**	39.06
Compliance Check	See BREL	**% DFEE < TFEE**			10.98
% DPER < TPER	38.38	**DPER**	47.19	**TPER**	76.59

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3353 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1000	7.2600			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.5338			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		4.5940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	35.1278 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	79.1992	78.9997	78.8040	77.8852	77.7133	76.9130	76.9130	76.7648	77.2212	77.7133	78.0610	78.4246	(39)

Average = Sum(39)m / 12 = 77.8843

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0909	1.0881	1.0855	1.0728	1.0704	1.0594	1.0594	1.0574	1.0637	1.0704	1.0752	1.0802	(40)
HLP (average)												1.0728	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 125.2310 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)											Total = Sum(45)m =	2080.0760	
Distribution loss (46)m = 0.15 x (45)m	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.0095	28.0803	28.1500	28.4821	28.5451	28.8421	28.8421	28.8978	28.7270	28.5451	28.4179	28.2862	
alpha	2.8673	2.8720	2.8767	2.8988	2.9030	2.9228	2.9228	2.9265	2.9151	2.9030	2.8945	2.8857	
util living area	0.9397	0.9076	0.8664	0.7911	0.6813	0.5338	0.4048	0.4376	0.6191	0.8113	0.9101	0.9466	(86)
MIT	19.3627	19.6199	19.9274	20.3019	20.5997	20.7923	20.8610	20.8517	20.7286	20.3459	19.7993	19.3190	(87)
Th 2	20.0083	20.0105	20.0127	20.0231	20.0251	20.0341	20.0341	20.0358	20.0306	20.0251	20.0211	20.0170	(88)
util rest of house	0.9310	0.8949	0.8478	0.7618	0.6361	0.4683	0.3233	0.3552	0.5561	0.7786	0.8956	0.9389	(89)
MIT 2	18.0979	18.4195	18.8018	19.2633	19.6093	19.8203	19.8806	19.8759	19.7582	19.3272	18.6573	18.0495	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.7077	18.9982	19.3444	19.7640	20.0868	20.2889	20.3533	20.3463	20.2260	19.8183	19.2079	18.6615	(92)
Temperature adjustment												0.0000	

adjusted MIT	18.7077	18.9982	19.3444	19.7640	20.0868	20.2889	20.3533	20.3463	20.2260	19.8183	19.2079	18.6615	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9170	0.8795	0.8335	0.7533	0.6391	0.4863	0.3509	0.3826	0.5696	0.7708	0.8812	0.9256	(94)
Useful gains	553.6890	624.1343	641.4259	620.7315	542.5384	402.7298	278.9718	290.1905	415.4272	512.5189	530.2266	531.0740	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1141.0783	1113.7539	1012.1909	846.1446	651.7623	437.5486	288.6748	302.9375	473.0583	716.3839	945.1526	1134.1393	(97)
Space heating kWh	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98a)

Space heating requirement - total per year (kWh/year) 2184.5542

Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)

Solar heating contribution - total per year (kWh/year) 0.0000

Space heating kWh	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98c)

Space heating requirement after solar contribution - total per year (kWh/year) 2184.5542

Space heating per m2 (98c) / (4) = 30.0903 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	249.9000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	174.8770	131.6624	110.3838	64.9450	32.5180	0.0000	0.0000	0.0000	0.0000	60.6945	119.5465	179.5441	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year	
Space heating fuel - main system 1	874.1714 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	175.1000
Water heating fuel used	1187.9361 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	156.5610 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2218.6684 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	874.1714	0.1551	135.6108	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			303.7967	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)

Total CO2, kg/year	326.3933	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	4.5000	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	874.1714	1.5743	1376.2199	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			3186.0861	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3426.2245	(286)
Dwelling Primary energy Rate (DPER)			47.1900	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		235.9500	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3771 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1100	7.9860			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.2598			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	13.0000	0.0700	0.9100
E18 Party wall between dwellings	13.0000	0.0600	0.7800
E15 Flat roof with parapet	13.0000	0.5600	7.2800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	10.4115	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	41.6713	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	87.1071	86.8545	86.6069	85.4442	85.2266	84.2139	84.2139	84.0263	84.6040	85.2266	85.6667	86.1268	(39)

Average = Sum(39)m / 12 = 85.4431

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1998	1.1963	1.1929	1.1769	1.1739	1.1600	1.1600	1.1574	1.1653	1.1739	1.1800	1.1863	(40)
HLP (average)												1.1769	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 117.9810 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
										Total per year (kWh/year) = Sum(64)m =		2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

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6. Solar gains

[Jan]

	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.4667	25.5408	25.6138	25.9624	26.0286	26.3417	26.3417	26.4004	26.2202	26.0286	25.8949	25.7566	
alpha	2.6978	2.7027	2.7076	2.7308	2.7352	2.7561	2.7561	2.7600	2.7480	2.7352	2.7263	2.7171	
util living area	0.9340	0.9033	0.8638	0.7917	0.6865	0.5420	0.4134	0.4450	0.6226	0.8072	0.9035	0.9406	(86)
MIT	18.7863	19.1286	19.5572	20.0929	20.5311	20.8282	20.9401	20.9251	20.7339	20.1778	19.4092	18.7344	(87)
Th 2	19.9201	19.9229	19.9257	19.9385	19.9409	19.9522	19.9522	19.9542	19.9478	19.9409	19.9360	19.9310	(88)
util rest of house	0.9243	0.8896	0.8441	0.7610	0.6387	0.4716	0.3243	0.3556	0.5555	0.7724	0.8875	0.9318	(89)

MIT 2	17.3730	17.8001	18.3323	18.9900	19.4995	19.8223	19.9203	19.9119	19.7315	19.1069	18.1667	17.3148	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.0544	18.4406	18.9228	19.5217	19.9968	20.3072	20.4120	20.4004	20.2148	19.6232	18.7657	17.9992	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.0544	18.4406	18.9228	19.5217	19.9968	20.3072	20.4120	20.4004	20.2148	19.6232	18.7657	17.9992	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9024	0.8662	0.8224	0.7474	0.6414	0.4964	0.3645	0.3949	0.5736	0.7605	0.8657	0.9108	(94)
Useful gains	585.0460	653.3334	669.7999	649.9335	573.9180	434.1320	306.6905	317.8699	444.8169	540.4172	559.9705	563.2691	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1198.1029	1176.0607	1075.9014	907.5598	707.1108	480.6288	321.0196	336.1381	517.3327	769.0174	999.3590	1188.4818	(97)
Space heating kWh	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98a)
Space heating requirement - total per year (kWh/year)												2345.7096	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2345.7096	
Space heating per m2											(98c) / (4) =	32.3101	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	494.1651	380.5772	327.3451	200.9653	107.3624	0.0000	0.0000	0.0000	0.0000	184.2671	342.7516	503.9635	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.6463	85.3578	84.8973	84.0844	82.7982	79.8000	79.8000	79.8000	79.8000	83.8616	85.1180	85.7077	(217)
Fuel for water heating, kWh/month	258.1629	229.0524	244.8668	218.1996	215.2946	201.8711	199.8040	207.5092	209.5004	221.5984	231.2559	255.2962	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2541.3972	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2692.4115	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-717.6874	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4775.0720	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2541.3972	0.2100	533.6934	(261)
Total CO2 associated with community systems			0.0000	(373)

Water heating (other fuel)	2692.4115	0.2100	565.4064	(264)
Space and water heating			1099.0998	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			1042.8431	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.3600	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2541.3972	1.1300	2871.7789	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2692.4115	1.1300	3042.4250	(278)
Space and water heating			5914.2038	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			5560.4698	(286)
Target Primary Energy Rate (TPER)			76.5900	(287)

Full SAP Calculation Printout

Property Reference	Flat 15	**Issued on Date**	27/07/2025
Assessment Reference	Flat 15	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.50	**TER**	14.36
Environmental	96 A	**% DER < TER**			68.66
CO_2 Emissions (t/year)	0.3	**DFEE**	34.77	**TFEE**	39.06
Compliance Check	See BREL	**% DFEE < TFEE**			10.98
% DPER < TPER	38.38	**DPER**	47.19	**TPER**	76.59

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000 (1b)	x	3.2500 (2b)	=	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys		0 * 80 =	0.0000 (6a)
Number of open flues		0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000 (6d)
Number of flues attached to other heater		0 * 35 =	0.0000 (6e)
Number of blocked chimneys		0 * 20 =	0.0000 (6f)
Number of intermittent extract fans		3 * 10 =	30.0000 (7a)
Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		30.0000 / (5) =	0.1271 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0100 (17)
Infiltration rate			0.3776 (18)
Number of sides sheltered			2 (19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.3210 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4093	0.4012	0.3932	0.3531	0.3451	0.3049	0.3049	0.2969	0.3210	0.3451	0.3611	0.3772	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000	(23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5838	0.5805	0.5773	0.5623	0.5595	0.5465	0.5465	0.5441	0.5515	0.5595	0.5652	0.5711	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1000	7.2600			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.5338			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	4.5940	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	35.1278	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4530	45.1998	44.9516	43.7857	43.5676	42.5522	42.5522	42.3641	42.9433	43.5676	44.0088	44.4702	(38)

Heat transfer coeff

	80.5808	80.3276	80.0794	78.9135	78.6954	77.6800	77.6800	77.4919	78.0711	78.6954	79.1367	79.5980 (39)
Average = Sum(39)m / 12 =												78.9125

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1099	1.1064	1.1030	1.0870	1.0840	1.0700	1.0700	1.0674	1.0754	1.0840	1.0900	1.0964	(40)
HLP (average)												1.0869	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846 (42b)
Hot water usage for other uses												
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617 (42c)
Average daily hot water use (litres/day)												59.9802 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	65.4382	63.6432	61.6835	59.2442	57.0682	54.8067	54.3368	56.2925	58.2983	60.6207	63.0816	65.3463	(44)
Energy conte	103.6381	90.6271	94.8053	81.1024	76.8248	67.3913	65.7156	69.7019	71.8877	82.2617	89.8713	102.3165	(45)
Energy content (annual)											Total = Sum(45)m =	996.1436	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(64)
											Total per year (kWh/year) = Sum(64)m =	846.7221	(64)
12Total per year (kWh/year)												847	(64)
Electric shower(s)													
	50.3803	44.8892	49.0173	46.7766	47.6544	45.4576	46.9729	47.6544	46.7766	49.0173	48.0956	50.3803	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	573.0725	(64a)
Heat gains from water heating, kWh/month													
	34.6182	30.4806	32.4005	28.9284	28.2389	25.6851	25.7078	26.7252	26.9703	29.7349	31.1216	34.3373	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	46.5298	45.3580	43.5490	40.1784	37.9554	35.6737	34.5535	35.9210	37.4587	39.9663	43.2244	46.1523	(72)
Total internal gains													
	410.5675	422.5556	404.3804	393.1308	373.1846	360.9144	347.3867	346.6448	356.9362	367.3227	388.3041	401.2205	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	550.9173	658.0078	720.9495	782.5713	811.5795	798.3701	768.1188	729.6748	698.1149	625.6533	555.6551	521.8723	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	27.5293	27.6161	27.7017	28.1109	28.1889	28.5573	28.5573	28.6266	28.4143	28.1889	28.0317	27.8692	
alpha	2.8353	2.8411	2.8468	2.8741	2.8793	2.9038	2.9038	2.9084	2.8943	2.8793	2.8688	2.8579	
util living area													
	0.9515	0.9222	0.8838	0.8105	0.7027	0.5522	0.4204	0.4554	0.6407	0.8321	0.9249	0.9574	(86)
MIT	18.7945	19.1549	19.5901	20.1327	20.5625	20.8469	20.9487	20.9342	20.7518	20.1934	19.4162	18.7413	(87)
Th 2	19.9927	19.9956	19.9984	20.0115	20.0140	20.0254	20.0254	20.0276	20.0210	20.0140	20.0090	20.0038	(88)
util rest of house													
	0.9442	0.9110	0.8668	0.7824	0.6578	0.4854	0.3358	0.3701	0.5773	0.8012	0.9122	0.9510	(89)
MIT 2	17.9944	18.3475	18.7714	19.2959	19.6880	19.9331	20.0033	19.9975	19.8601	19.3653	18.6180	17.9499	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)

MIT	18.3801	18.7368	19.1661	19.6993	20.1096	20.3737	20.4591	20.4491	20.2900	19.7645	19.0028	18.3314	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3801	18.7368	19.1661	19.6993	20.1096	20.3737	20.4591	20.4491	20.2900	19.7645	19.0028	18.3314	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9292	0.8938	0.8503	0.7726	0.6625	0.5102	0.3744	0.4082	0.5957	0.7924	0.8963	0.9370	(94)
Useful gains	511.9302	588.1378	613.0258	604.6154	537.6616	407.3336	287.5677	297.8172	415.8822	495.7557	498.0475	489.0162	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	1134.5887	1111.4735	1014.2911	852.2121	661.7951	448.4991	299.7713	313.7695	483.2580	721.2065	941.9463	1124.8306	(97)
Space heating kWh													
	463.2579	351.6816	298.5414	178.2696	92.3553	0.0000	0.0000	0.0000	0.0000	167.7354	319.6071	473.0459	(98a)
Space heating requirement - total per year (kWh/year)												2344.4943	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	463.2579	351.6816	298.5414	178.2696	92.3553	0.0000	0.0000	0.0000	0.0000	167.7354	319.6071	473.0459	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2344.4943	
Space heating per m2											(98c) / (4) =	32.2933	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W													
	0.0000	0.0000	0.0000	0.0000	0.0000	730.1917	574.8318	588.9387	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8135	0.8702	0.8509	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	594.0225	500.2312	501.1104	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	215.7611	267.9380	235.3479	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)													
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	53.9403	66.9845	58.8370	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												179.7617	(107)
Energy for space heating												32.2933	(99)
Energy for space cooling												2.4761	(108)
Total												34.7694	(109)
Fabric Energy Efficiency (DFEE)												34.8	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0.0000 (23c)

Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1100	7.9860			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2598			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	13.0000	0.0700	0.9100
E18 Party wall between dwellings	13.0000	0.0600	0.7800
E15 Flat roof with parapet	13.0000	0.5600	7.2800

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.4115 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 41.6713 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	87.1071	86.8545	86.6069	85.4442	85.2266	84.2139	84.2139	84.0263	84.6040	85.2266	85.6667	86.1268	(39)
Average = Sum(39)m / 12 =												85.4431	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1998	1.1963	1.1929	1.1769	1.1739	1.1600	1.1600	1.1574	1.1653	1.1739	1.1800	1.1863	(40)
HLP (average)												1.1769	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 59.9802 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	65.4382	63.6432	61.6835	59.2442	57.0682	54.8067	54.3368	56.2925	58.2983	60.6207	63.0816	65.3463	(44)
Energy conte	103.6381	90.6271	94.8053	81.1024	76.8248	67.3913	65.7156	69.7019	71.8877	82.2617	89.8713	102.3165	(45)
Energy content (annual)										Total = Sum(45)m =		996.1436	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(64)
										Total per year (kWh/year) = Sum(64)m =		846.7221	(64)
12Total per year (kWh/year)												847	(64)
Electric shower(s)	50.3803	44.8892	49.0173	46.7766	47.6544	45.4576	46.9729	47.6544	46.7766	49.0173	48.0956	50.3803	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												573.0725	(64a)
Heat gains from water heating, kWh/month	34.6182	30.4806	32.4005	28.9284	28.2389	25.6851	25.7078	26.7252	26.9703	29.7349	31.1216	34.3373	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	46.5298	45.3580	43.5490	40.1784	37.9554	35.6737	34.5535	35.9210	37.4587	39.9663	43.2244	46.1523	(72)
Total internal gains	410.5675	422.5556	404.3804	393.1308	373.1846	360.9144	347.3867	346.6448	356.9362	367.3227	388.3041	401.2205	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	550.9173	658.0078	720.9495	782.5713	811.5795	798.3701	768.1188	729.6748	698.1149	625.6533	555.6551	521.8723	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.4667	25.5408	25.6138	25.9624	26.0286	26.3417	26.3417	26.4004	26.2202	26.0286	25.8949	25.7566	
alpha	2.6978	2.7027	2.7076	2.7308	2.7352	2.7561	2.7561	2.7600	2.7480	2.7352	2.7263	2.7171	
util living area	0.9535	0.9265	0.8913	0.8242	0.7236	0.5788	0.4466	0.4822	0.6647	0.8441	0.9291	0.9590	(86)
MIT	18.5770	18.9415	19.3978	19.9786	20.4601	20.7970	20.9274	20.9084	20.6844	20.0583	19.2302	18.5219	(87)
Th 2	19.9201	19.9229	19.9257	19.9385	19.9409	19.9522	19.9522	19.9542	19.9478	19.9409	19.9360	19.9310	(88)
util rest of house	0.9462	0.9154	0.8745	0.7961	0.6774	0.5070	0.3524	0.3880	0.5981	0.8133	0.9165	0.9526	(89)
MIT 2	17.7319	18.0895	18.5349	19.0976	19.5398	19.8308	19.9216	19.9132	19.7444	19.1858	18.3871	17.6851	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.1393	18.5002	18.9509	19.5223	19.9835	20.2966	20.4065	20.3930	20.1975	19.6064	18.7936	18.0885	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.1393	18.5002	18.9509	19.5223	19.9835	20.2966	20.4065	20.3930	20.1975	19.6064	18.7936	18.0885	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9305	0.8971	0.8563	0.7836	0.6794	0.5318	0.3946	0.4291	0.6151	0.8021	0.8995	0.9380	(94)
Useful gains	512.6254	590.2969	617.3313	613.2577	551.4022	424.5506	303.1012	313.0764	429.4068	501.8213	499.8246	489.4975	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1205.5039	1181.2392	1078.3370	907.6177	705.9715	479.7312	320.5570	335.5166	515.8757	767.5857	1001.7491	1196.1742	(97)
Space heating kWh	515.5016	397.1132	342.9882	211.9392	114.9996	0.0000	0.0000	0.0000	0.0000	197.7287	361.3856	525.7675	(98a)
Space heating requirement - total per year (kWh/year)												2667.4236	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	515.5016	397.1132	342.9882	211.9392	114.9996	0.0000	0.0000	0.0000	0.0000	197.7287	361.3856	525.7675	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2667.4236	
Space heating per m2										(98c) / (4) =		36.7414	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	791.6106	623.1828	638.6002	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7765	0.8386	0.8170	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	614.7219	522.6052	521.7358	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	200.8576	251.2916	220.0026	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	50.2144	62.8229	55.0007	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												168.0380	(107)
Energy for space heating												36.7414	(99)
Energy for space cooling												2.3146	(108)
Total												39.0559	(109)
Fabric Energy Efficiency (TFEE)												39.1	(109)

Full SAP Calculation Printout

Property Reference	Flat 15	**Issued on Date**	27/07/2025
Assessment Reference	Flat 15	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.50	**TER**	14.36
Environmental	96 A	**% DER < TER**			68.66
CO_2 Emissions (t/year)	0.3	**DFEE**	34.77	**TFEE**	39.06
Compliance Check	See BREL	**% DFEE < TFEE**			10.98
% DPER < TPER	38.38	**DPER**	47.19	**TPER**	76.59

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3353 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1000	7.2600			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.5338			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		4.5940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	35.1278 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	79.1992	78.9997	78.8040	77.8852	77.7133	76.9130	76.9130	76.7648	77.2212	77.7133	78.0610	78.4246	(39)

Average = Sum(39)m / 12 = 77.8843

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0909	1.0881	1.0855	1.0728	1.0704	1.0594	1.0594	1.0574	1.0637	1.0704	1.0752	1.0802	(40)
HLP (average)												1.0728	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 125.2310 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)											Total = Sum(45)m =	2080.0760	
Distribution loss (46)m = 0.15 x (45)m	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.0095	28.0803	28.1500	28.4821	28.5451	28.8421	28.8421	28.8978	28.7270	28.5451	28.4179	28.2862	
alpha	2.8673	2.8720	2.8767	2.8988	2.9030	2.9228	2.9228	2.9265	2.9151	2.9030	2.8945	2.8857	
util living area	0.9397	0.9076	0.8664	0.7911	0.6813	0.5338	0.4048	0.4376	0.6191	0.8113	0.9101	0.9466	(86)
MIT	19.3627	19.6199	19.9274	20.3019	20.5997	20.7923	20.8610	20.8517	20.7286	20.3459	19.7993	19.3190	(87)
Th 2	20.0083	20.0105	20.0127	20.0231	20.0251	20.0341	20.0341	20.0358	20.0306	20.0251	20.0211	20.0170	(88)
util rest of house	0.9310	0.8949	0.8478	0.7618	0.6361	0.4683	0.3233	0.3552	0.5561	0.7786	0.8956	0.9389	(89)
MIT 2	18.0979	18.4195	18.8018	19.2633	19.6093	19.8203	19.8806	19.8759	19.7582	19.3272	18.6573	18.0495	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.7077	18.9982	19.3444	19.7640	20.0868	20.2889	20.3533	20.3463	20.2260	19.8183	19.2079	18.6615	(92)
Temperature adjustment												0.0000	

adjusted MIT	18.7077	18.9982	19.3444	19.7640	20.0868	20.2889	20.3533	20.3463	20.2260	19.8183	19.2079	18.6615	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9170	0.8795	0.8335	0.7533	0.6391	0.4863	0.3509	0.3826	0.5696	0.7708	0.8812	0.9256	(94)
Useful gains	553.6890	624.1343	641.4259	620.7315	542.5384	402.7298	278.9718	290.1905	415.4272	512.5189	530.2266	531.0740	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1141.0783	1113.7539	1012.1909	846.1446	651.7623	437.5486	288.6748	302.9375	473.0583	716.3839	945.1526	1134.1393	(97)
Space heating kWh	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98a)

Space heating requirement - total per year (kWh/year) 2184.5542

Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)

Solar heating contribution - total per year (kWh/year) 0.0000

Space heating kWh	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98c)

Space heating requirement after solar contribution - total per year (kWh/year) 2184.5542

Space heating per m2 (98c) / (4) = 30.0903 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	249.9000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	174.8770	131.6624	110.3838	64.9450	32.5180	0.0000	0.0000	0.0000	0.0000	60.6945	119.5465	179.5441	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year	
Space heating fuel - main system 1	874.1714 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	175.1000
Water heating fuel used	1187.9361 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	156.5610 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2218.6684 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	874.1714	0.1551	135.6108	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			303.7967	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)

Total CO2, kg/year	326.3933	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	4.5000	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	874.1714	1.5743	1376.2199	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			3186.0861	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3426.2245	(286)
Dwelling Primary energy Rate (DPER)			47.1900	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		235.9500	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3771 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1100	7.9860			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.2598			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	13.0000	0.0700	0.9100
E18 Party wall between dwellings	13.0000	0.0600	0.7800
E15 Flat roof with parapet	13.0000	0.5600	7.2800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	10.4115	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	41.6713	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	87.1071	86.8545	86.6069	85.4442	85.2266	84.2139	84.2139	84.0263	84.6040	85.2266	85.6667	86.1268	(39)

Average = Sum(39)m / 12 = 85.4431

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1998	1.1963	1.1929	1.1769	1.1739	1.1600	1.1600	1.1574	1.1653	1.1739	1.1800	1.1863	(40)
HLP (average)												1.1769	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 117.9810 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
										Total per year (kWh/year) = Sum(64)m =		2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

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6. Solar gains

[Jan]

	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.4667	25.5408	25.6138	25.9624	26.0286	26.3417	26.3417	26.4004	26.2202	26.0286	25.8949	25.7566	
alpha	2.6978	2.7027	2.7076	2.7308	2.7352	2.7561	2.7561	2.7600	2.7480	2.7352	2.7263	2.7171	
util living area	0.9340	0.9033	0.8638	0.7917	0.6865	0.5420	0.4134	0.4450	0.6226	0.8072	0.9035	0.9406	(86)
MIT	18.7863	19.1286	19.5572	20.0929	20.5311	20.8282	20.9401	20.9251	20.7339	20.1778	19.4092	18.7344	(87)
Th 2	19.9201	19.9229	19.9257	19.9385	19.9409	19.9522	19.9522	19.9542	19.9478	19.9409	19.9360	19.9310	(88)
util rest of house	0.9243	0.8896	0.8441	0.7610	0.6387	0.4716	0.3243	0.3556	0.5555	0.7724	0.8875	0.9318	(89)

MIT 2	17.3730	17.8001	18.3323	18.9900	19.4995	19.8223	19.9203	19.9119	19.7315	19.1069	18.1667	17.3148	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.0544	18.4406	18.9228	19.5217	19.9968	20.3072	20.4120	20.4004	20.2148	19.6232	18.7657	17.9992	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.0544	18.4406	18.9228	19.5217	19.9968	20.3072	20.4120	20.4004	20.2148	19.6232	18.7657	17.9992	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9024	0.8662	0.8224	0.7474	0.6414	0.4964	0.3645	0.3949	0.5736	0.7605	0.8657	0.9108	(94)
Useful gains	585.0460	653.3334	669.7999	649.9335	573.9180	434.1320	306.6905	317.8699	444.8169	540.4172	559.9705	563.2691	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1198.1029	1176.0607	1075.9014	907.5598	707.1108	480.6288	321.0196	336.1381	517.3327	769.0174	999.3590	1188.4818	(97)
Space heating kWh	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98a)
Space heating requirement - total per year (kWh/year)												2345.7096	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2345.7096	
Space heating per m2											(98c) / (4) =	32.3101	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	494.1651	380.5772	327.3451	200.9653	107.3624	0.0000	0.0000	0.0000	0.0000	184.2671	342.7516	503.9635	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.6463	85.3578	84.8973	84.0844	82.7982	79.8000	79.8000	79.8000	79.8000	83.8616	85.1180	85.7077	(217)
Fuel for water heating, kWh/month	258.1629	229.0524	244.8668	218.1996	215.2946	201.8711	199.8040	207.5092	209.5004	221.5984	231.2559	255.2962	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2541.3972	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2692.4115	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-717.6874	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4775.0720	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2541.3972	0.2100	533.6934	(261)
Total CO2 associated with community systems			0.0000	(373)

Water heating (other fuel)	2692.4115	0.2100	565.4064	(264)
Space and water heating			1099.0998	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			1042.8431	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.3600	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2541.3972	1.1300	2871.7789	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2692.4115	1.1300	3042.4250	(278)
Space and water heating			5914.2038	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			5560.4698	(286)
Target Primary Energy Rate (TPER)			76.5900	(287)

Summary for Input Data

elmhurst energy

Property Reference	Flat 16	**Issued on Date**	27/07/2025
Assessment Reference	Flat 16	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.97	**TER**	16.09
Environmental	96 A	**% DER < TER**			69.11
CO_2 Emissions (t/year)	0.25	**DFEE**	36.10	**TFEE**	39.70
Compliance Check	See BREL	**% DFEE < TFEE**			9.08
% DPER < TPER	39.41	**DPER**	52.20	**TPER**	86.15

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Top-floor flat	
Which Floor	4	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	9.60 m	54.00 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	31.20	14.69	0.00	None	16.51	Calculate Wall Area

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	54.00	54.00	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	70.00	74.40

12.0 Opening Types

Summary for Input Data

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0
N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		9.60	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes
E15 Flat roof with parapet		9.60	0.00	0.00	No

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
In Winter	249.90	
In Summer	175.10	
Controls SAP Code	2207	

Summary for Input Data

Delayed Start Stat	No
HETAS approved System	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2 — None

26.0 Heat Networks — None

27.0 Secondary Heating — None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder — None

Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No

31.0 Thermal Store — None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 16	**Issued on Date**	27/07/2025
Assessment Reference	Flat 16	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.97	**TER**	16.09
Environmental	96 A	**% DER < TER**			69.11
CO_2 Emissions (t/year)	0.25	**DFEE**	36.10	**TFEE**	39.70
Compliance Check	See BREL	**% DFEE < TFEE**			9.08
% DPER < TPER	39.41	**DPER**	52.20	**TPER**	86.15

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3645 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
External Roof 1	54.0000		54.0000	0.1000	5.4000			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.6848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		3.4080 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	30.0928 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	63.5680	63.3926	63.2206	62.4130	62.2619	61.5584	61.5584	61.4281	61.8294	62.2619	62.5676	62.8872	(39)

Average = Sum(39)m / 12 = 62.4123

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1772	1.1739	1.1708	1.1558	1.1530	1.1400	1.1400	1.1376	1.1450	1.1530	1.1587	1.1646	(40)
HLP (average)												1.1558	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)

Hot water usage for baths

23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)

Hot water usage for other uses

33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)

Average daily hot water use (litres/day) 108.5529 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)											Total = Sum(45)m =	1803.0542	
Distribution loss (46)m = 0.15 x (45)m	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.9564	26.0283	26.0991	26.4368	26.5010	26.8038	26.8038	26.8606	26.6863	26.5010	26.3715	26.2375	
alpha	2.7304	2.7352	2.7399	2.7625	2.7667	2.7869	2.7869	2.7907	2.7791	2.7667	2.7581	2.7492	
util living area	0.9237	0.8821	0.8300	0.7420	0.6238	0.4792	0.3598	0.3913	0.5663	0.7699	0.8872	0.9324	(86)
MIT	19.3342	19.6258	19.9569	20.3379	20.6239	20.7990	20.8597	20.8512	20.7383	20.3655	19.7954	19.2850	(87)
Th 2	19.9383	19.9409	19.9435	19.9555	19.9578	19.9683	19.9683	19.9703	19.9643	19.9578	19.9532	19.9484	(88)
util rest of house	0.9128	0.8663	0.8075	0.7084	0.5754	0.4137	0.2810	0.3110	0.5010	0.7323	0.8693	0.9226	(89)
MIT 2	18.0110	18.3728	18.7801	19.2441	19.5701	19.7596	19.8113	19.8077	19.7018	19.2903	18.5999	17.9572	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.8686	19.1850	19.5428	19.9531	20.2532	20.4333	20.4908	20.4840	20.3736	19.9872	19.3748	18.8178	(92)
Temperature adjustment												0.0000	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
adjusted MIT	18.8686	19.1850	19.5428	19.9531	20.2532	20.4333	20.4908	20.4840	20.3736	19.9872	19.3748	18.8178	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8996	0.8534	0.7980	0.7083	0.5898	0.4440	0.3216	0.3518	0.5278	0.7335	0.8579	0.9099	(94)
Useful gains	462.5325	526.7545	543.9215	523.6392	453.4593	333.5814	231.9916	241.0180	344.9000	429.9209	444.1019	442.5071	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	926.1002	905.5611	824.5764	689.8559	532.5354	359.0895	239.5124	250.8731	387.8933	584.4650	768.0026	919.2730	(97)
Space heating kWh	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98a)
Space heating requirement - total per year (kWh/year)												1689.6714	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1689.6714	
Space heating per m2											(98c) / (4) =	31.2902	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	138.0130	101.8640	83.5563	47.8896	23.5424	0.0000	0.0000	0.0000	0.0000	46.0107	93.3207	141.9423	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	676.1390	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1029.7283	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1826.5380	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	676.1390	0.1553	105.0198	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			250.8068	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)

Total CO2, kg/year	268.2233	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	4.9700	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	676.1390	1.5750	1064.9303	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2633.7607	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2818.8495	(286)
Dwelling Primary energy Rate (DPER)			52.2000	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
External Roof 1	54.0000		54.0000	0.1100	5.9400			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.3200			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	9.6000	0.0700	0.6720	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
E15 Flat roof with parapet	9.6000	0.5600	5.3760	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	8.2695	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	32.5895	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	66.0524	65.8774	65.7059	64.9005	64.7498	64.0483	64.0483	63.9184	64.3185	64.7498	65.0547	65.3734	(39)

Average = Sum(39)m / 12 = 64.8998

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2232	1.2200	1.2168	1.2019	1.1991	1.1861	1.1861	1.1837	1.1911	1.1991	1.2047	1.2106	(40)
HLP (average)												1.2018	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)

Hot water usage for baths

23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)

Hot water usage for other uses

33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)

Average daily hot water use (litres/day) 102.2682 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	

Distribution loss (46)m = 0.15 x (45)m

26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)

Water storage loss:

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.3938 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.7527 (55)

Total storage loss

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)

If cylinder contains dedicated solar storage

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Primary loss

Combi loss

Total heat required for water heating calculated for each month

222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

WWHRS

PV diverter

Solar input

FGHRS

Output from w/h

197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)

Total per year (kWh/year) = Sum(64)m = 2015.6255 (64)

12Total per year (kWh/year) 2016 (64)

Electric shower(s)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month

95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	24.9802	25.0465	25.1119	25.4235	25.4827	25.7618	25.7618	25.8142	25.6536	25.4827	25.3633	25.2396	
alpha	2.6653	2.6698	2.6741	2.6949	2.6988	2.7175	2.7175	2.7209	2.7102	2.6988	2.6909	2.6826	
util living area													
	0.9208	0.8868	0.8436	0.7671	0.6586	0.5151	0.3902	0.4202	0.5935	0.7818	0.8861	0.9281	(86)
MIT	18.8626	19.2040	19.6266	20.1453	20.5642	20.8419	20.9453	20.9316	20.7549	20.2278	19.4766	18.8076	(87)
Th 2	19.9015	19.9041	19.9066	19.9185	19.9207	19.9312	19.9312	19.9331	19.9271	19.9207	19.9162	19.9115	(88)
util rest of house													
	0.9093	0.8711	0.8217	0.7342	0.6094	0.4451	0.3034	0.3328	0.5257	0.7442	0.8678	0.9177	(89)

MIT 2	17.4556	17.8791	18.4010	19.0330	19.5154	19.8134	19.9026	19.8953	19.7311	19.1462	18.2345	17.3934	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.3675	18.7378	19.1954	19.7539	20.1952	20.4800	20.5784	20.5670	20.3947	19.8472	19.0396	18.3100	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3675	18.7378	19.1954	19.7539	20.1952	20.4800	20.5784	20.5670	20.3947	19.8472	19.0396	18.3100	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8894	0.8513	0.8055	0.7287	0.6226	0.4821	0.3569	0.3858	0.5565	0.7414	0.8502	0.8984	(94)
Useful gains	472.0438	523.1150	533.5349	514.2218	451.7526	341.5966	243.5385	252.1189	350.7597	429.7113	449.9163	455.4794	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	929.1935	911.6011	834.1629	704.4258	550.0627	376.6054	254.8114	266.3472	404.8666	598.7553	776.7265	922.4167	(97)
Space heating kWh	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98a)
Space heating requirement - total per year (kWh/year)												1743.4123	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1743.4123	
Space heating per m2											(98c) / (4) =	32.2854	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	368.4933	282.8415	242.3263	148.3715	79.2446	0.0000	0.0000	0.0000	0.0000	136.2608	254.9332	376.3828	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2633	84.9538	84.4695	83.6444	82.4123	79.8000	79.8000	79.8000	79.8000	83.4288	84.7038	85.3303	(217)
Fuel for water heating, kWh/month	232.0619	206.0877	220.6762	197.3136	195.0252	182.5113	180.9699	187.6483	189.1231	200.5187	208.5253	229.5447	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1888.8540	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2430.0059	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4004.4808	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1888.8540	0.2100	396.6593	(261)
Total CO2 associated with community systems			0.0000	(373)

Water heating (other fuel)	2430.0059	0.2100	510.3012	(264)
Space and water heating			906.9606	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			868.8459	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.0900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1888.8540	1.1300	2134.4050	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2430.0059	1.1300	2745.9066	(278)
Space and water heating			4880.3117	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4652.1392	(286)
Target Primary Energy Rate (TPER)			86.1500	(287)

Full SAP Calculation Printout

Property Reference	Flat 16	**Issued on Date**	27/07/2025
Assessment Reference	Flat 16	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.97	**TER**	16.09
Environmental	96 A	**% DER < TER**			69.11
CO_2 Emissions (t/year)	0.25	**DFEE**	36.10	**TFEE**	39.70
Compliance Check	See BREL	**% DFEE < TFEE**			9.08
% DPER < TPER	39.41	**DPER**	52.20	**TPER**	86.15

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3645 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000 (23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
External Roof 1	54.0000		54.0000	0.1000	5.4000			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.6848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)	3.4080 (36)
Point Thermal bridges (36a) =	0.0000
Total fabric heat loss (33) + (36) + (36a) =	30.0928 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)

Heat transfer coeff

	63.5680	63.3926	63.2206	62.4130	62.2619	61.5584	61.5584	61.4281	61.8294	62.2619	62.5676	62.8872 (39)
Average = Sum(39)m / 12 =												62.4123

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1772	1.1739	1.1708	1.1558	1.1530	1.1400	1.1400	1.1376	1.1450	1.1530	1.1587	1.1646	(40)
HLP (average)												1.1558	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)

Hot water usage for baths

	23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948 (42b)

Hot water usage for other uses

	33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458 (42c)

Average daily hot water use (litres/day) 51.9898 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406	(44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855	(45)
Energy content (annual)										Total = Sum(45)m =		863.4398	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(64)
										Total per year (kWh/year) = Sum(64)m =		733.9239	(64)
12Total per year (kWh/year)												734	(64)
Electric shower(s)													
	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					496.7719	(64a)
Heat gains from water heating, kWh/month													
	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051	(72)
Total internal gains													
	327.5507	336.6878	322.4815	313.4359	297.7842	288.0471	277.4722	277.0221	285.1259	293.4234	309.9724	320.2696	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	467.9005	572.1401	639.0506	702.8764	736.1791	725.5027	698.2043	660.0521	626.3045	551.7539	477.3233	440.9215	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.9564	26.0283	26.0991	26.4368	26.5010	26.8038	26.8038	26.8606	26.6863	26.5010	26.3715	26.2375	
alpha	2.7304	2.7352	2.7399	2.7625	2.7667	2.7869	2.7869	2.7907	2.7791	2.7667	2.7581	2.7492	
util living area													
	0.9373	0.8980	0.8478	0.7600	0.6414	0.4928	0.3705	0.4042	0.5836	0.7902	0.9037	0.9452	(86)
MIT	18.8004	19.2087	19.6736	20.2142	20.6197	20.8698	20.9565	20.9436	20.7819	20.2473	19.4430	18.7320	(87)
Th 2	19.9383	19.9409	19.9435	19.9555	19.9578	19.9683	19.9683	19.9703	19.9643	19.9578	19.9532	19.9484	(88)
util rest of house													
	0.9280	0.8838	0.8268	0.7274	0.5931	0.4263	0.2898	0.3219	0.5178	0.7542	0.8878	0.9370	(89)
MIT 2	17.9616	18.3582	18.8058	19.3201	19.6821	19.8926	19.9505	19.9457	19.8277	19.3652	18.6019	17.9020	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)

MIT	18.5052	18.9094	19.3683	19.8996	20.2898	20.5259	20.6025	20.5925	20.4462	19.9369	19.1470	18.4400	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5052	18.9094	19.3683	19.8996	20.2898	20.5259	20.6025	20.5925	20.4462	19.9369	19.1470	18.4400	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9124	0.8675	0.8138	0.7255	0.6092	0.4631	0.3401	0.3725	0.5496	0.7534	0.8732	0.9222	(94)
Useful gains	426.9264	496.3229	520.0797	509.9454	448.4799	335.9649	237.4676	245.8463	344.1882	415.6867	416.8038	406.5992	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	902.9987	888.0946	813.5396	686.5175	534.8173	364.7918	246.3881	257.5359	392.3805	581.3352	753.7535	895.5114	(97)
Space heating kWh	354.1978	263.2706	218.3342	127.1319	64.2351	0.0000	0.0000	0.0000	0.0000	123.2425	242.6038	363.7507	(98a)
Space heating requirement - total per year (kWh/year)												1756.7664	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	354.1978	263.2706	218.3342	127.1319	64.2351	0.0000	0.0000	0.0000	0.0000	123.2425	242.6038	363.7507	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1756.7664	
Space heating per m2											(98c) / (4) =	32.5327	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	578.6491	455.5323	466.8539	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8478	0.8955	0.8782	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	490.5723	407.9362	410.0020	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	819.3656	789.0286	745.9590	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	236.7312	283.5327	249.9521	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	59.1828	70.8832	62.4880	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												192.5540	(107)
Energy for space heating												32.5327	(99)
Energy for space cooling												3.5658	(108)
Total												36.0985	(109)
Fabric Energy Efficiency (DFEE)												36.1	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3640	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0.0000 (23c)

Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
External Roof 1	54.0000		54.0000	0.1100	5.9400			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.3200			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	9.6000	0.0700	0.6720
E18 Party wall between dwellings	13.0000	0.0600	0.7800
E15 Flat roof with parapet	9.6000	0.5600	5.3760

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.2695 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 32.5895 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	66.0524	65.8774	65.7059	64.9005	64.7498	64.0483	64.0483	63.9184	64.3185	64.7498	65.0547	65.3734	(39)
Average = Sum(39)m / 12 =												64.8998	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2232	1.2200	1.2168	1.2019	1.1991	1.1861	1.1861	1.1837	1.1911	1.1991	1.2047	1.2106	(40)
HLP (average)												1.2018	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)

Hot water usage for other uses

33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)

Average daily hot water use (litres/day) 51.9898 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	56.7203	55.1649	53.4666	51.3522	49.4662	47.5061	47.0984	48.7933	50.5317	52.5446	54.6777	56.6406	(44)
Energy conte	89.8311	78.5541	82.1761	70.2986	66.5910	58.4143	56.9614	60.4163	62.3106	71.3025	77.8984	88.6855	(45)
Energy content (annual)										Total = Sum(45)m =		863.4398	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	76.3564	66.7710	69.8497	59.7538	56.6023	49.6521	48.4172	51.3538	52.9640	60.6072	66.2136	75.3827	(64)
										Total per year (kWh/year) = Sum(64)m =		733.9239	(64)
12Total per year (kWh/year)												734	(64)
Electric shower(s)	43.6725	38.9125	42.4910	40.5486	41.3095	39.4053	40.7188	41.3095	40.5486	42.4910	41.6920	43.6725	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												496.7719	(64a)
Heat gains from water heating, kWh/month	30.0072	26.4209	28.0852	25.0756	24.4780	22.2644	22.2840	23.1658	23.3782	25.7745	26.9764	29.7638	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)	40.3323	39.3168	37.7489	34.8272	32.9005	30.9227	29.9516	31.1369	32.4697	34.6432	37.4672	40.0051	(72)
Total internal gains	327.6311	336.7768	322.5619	313.5190	297.8646	288.1301	277.5526	277.1024	285.2089	293.5037	310.0554	320.3500	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	439.2133	523.9695	574.2486	623.1479	646.4210	635.9423	612.0672	581.6368	556.4634	498.8863	443.1046	416.2716	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	24.9802	25.0465	25.1119	25.4235	25.4827	25.7618	25.7618	25.8142	25.6536	25.4827	25.3633	25.2396	
alpha	2.6653	2.6698	2.6741	2.6949	2.6988	2.7175	2.7175	2.7209	2.7102	2.6988	2.6909	2.6826	
util living area	0.9465	0.9167	0.8785	0.8073	0.7033	0.5582	0.4284	0.4631	0.6436	0.8279	0.9194	0.9527	(86)
MIT	18.6087	18.9792	19.4374	20.0114	20.4827	20.8067	20.9311	20.9131	20.6988	20.0872	19.2612	18.5490	(87)
Th 2	19.9015	19.9041	19.9066	19.9185	19.9207	19.9312	19.9312	19.9331	19.9271	19.9207	19.9162	19.9115	(88)
util rest of house	0.9382	0.9044	0.8601	0.7774	0.6555	0.4860	0.3354	0.3696	0.5756	0.7949	0.9053	0.9453	(89)
MIT 2	17.7500	18.1121	18.5576	19.1105	19.5402	19.8171	19.9027	19.8949	19.7356	19.1951	18.4023	17.6984	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.3066	18.6741	19.1278	19.6945	20.1511	20.4585	20.5692	20.5548	20.3599	19.7733	18.9590	18.2497	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3066	18.6741	19.1278	19.6945	20.1511	20.4585	20.5692	20.5548	20.3599	19.7733	18.9590	18.2497	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9229	0.8875	0.8448	0.7705	0.6664	0.5229	0.3922	0.4255	0.6045	0.7897	0.8901	0.9308	(94)
Useful gains	405.3319	465.0043	485.1047	480.1513	430.7707	332.5453	240.0303	247.4957	336.3792	393.9951	394.3965	387.4708	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	925.1682	907.4030	829.7220	700.5654	547.2058	375.2291	254.2230	265.5692	402.6284	593.9718	771.4837	918.4790	(97)
Space heating kWh	386.7582	297.2919	256.3953	158.6982	86.6277	0.0000	0.0000	0.0000	0.0000	148.7826	271.5027	395.0701	(98a)
Space heating requirement - total per year (kWh/year)												2001.1268	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	386.7582	297.2919	256.3953	158.6982	86.6277	0.0000	0.0000	0.0000	0.0000	148.7826	271.5027	395.0701	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2001.1268	
Space heating per m2											(98c) / (4) =	37.0579	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	602.0538	473.9572	485.7796	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7902	0.8494	0.8290	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	475.7317	402.5711	402.6952	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	714.5946	688.2625	654.2208	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	171.9813	212.5544	187.1351	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	42.9953	53.1386	46.7838	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												142.9177	(107)
Energy for space heating												37.0579	(99)
Energy for space cooling												2.6466	(108)
Total												39.7045	(109)
Fabric Energy Efficiency (TFEE)												39.7	(109)

Full SAP Calculation Printout

Property Reference	Flat 16	**Issued on Date**	27/07/2025
Assessment Reference	Flat 16	**Prop Type Ref**	
Property			

SAP Rating	83 B	**DER**	4.97	**TER**	16.09
Environmental	96 A	**% DER < TER**			69.11
CO_2 Emissions (t/year)	0.25	**DFEE**	36.10	**TFEE**	39.70
Compliance Check	See BREL	**% DFEE < TFEE**			9.08
% DPER < TPER	39.41	**DPER**	52.20	**TPER**	86.15

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.5000	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3645 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3098 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3950	0.3872	0.3795	0.3408	0.3330	0.2943	0.2943	0.2866	0.3098	0.3330	0.3485	0.3640	(22b)
Effective ac	0.5780	0.5750	0.5720	0.5581	0.5555	0.5433	0.5433	0.5411	0.5480	0.5555	0.5607	0.5662	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	31.2000	16.5100	14.6900	0.1800	2.6442			(29a)
External Roof 1	54.0000		54.0000	0.1000	5.4000			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.6848			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		3.4080 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	30.0928 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4752	33.2998	33.1278	32.3202	32.1691	31.4656	31.4656	31.3353	31.7366	32.1691	32.4748	32.7943	(38)
Heat transfer coeff	63.5680	63.3926	63.2206	62.4130	62.2619	61.5584	61.5584	61.4281	61.8294	62.2619	62.5676	62.8872	(39)

Average = Sum(39)m / 12 = 62.4123

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1772	1.1739	1.1708	1.1558	1.1530	1.1400	1.1400	1.1376	1.1450	1.1530	1.1587	1.1646	(40)
HLP (average)												1.1558	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

61.3505	60.4285	59.0850	56.5145	54.6175	52.5020	51.2995	52.6328	54.0944	56.3658	58.9916	61.1155	(42a)

Hot water usage for baths

23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)

Hot water usage for other uses

33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)

Average daily hot water use (litres/day) 108.5529 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	118.0708	115.5934	112.5516	107.8667	104.0837	100.0080	98.3979	101.4261	104.6261	108.9104	113.6693	117.7561	(44)
Energy conte	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(45)
Energy content (annual)											Total = Sum(45)m =	1803.0542	
Distribution loss (46)m = 0.15 x (45)m	28.0493	24.6905	25.9481	22.1496	21.0175	18.4457	17.8506	18.8380	19.3522	22.1686	24.2914	27.6566	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
										Total per year (kWh/year) = Sum(64)m =		1803.0542	(64)
12Total per year (kWh/year)												1803	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	62.1759	54.7307	57.5184	49.0983	46.5888	40.8880	39.5687	41.7576	42.8973	49.1403	53.8460	61.3055	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.4935	88.0107	79.4935	82.1433	79.4935	82.1433	79.4935	79.4935	82.1433	79.4935	82.1433	79.4935	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)	83.5698	81.4444	77.3096	68.1921	62.6193	56.7890	53.1838	56.1258	59.5796	66.0488	74.7861	82.3999	(72)
Total internal gains	373.7883	381.8155	365.0423	349.8008	330.5030	313.9133	300.7044	302.0110	312.2358	327.8290	350.2912	365.6644	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	514.1380	617.2678	681.6114	739.2413	768.8980	751.3689	721.4365	685.0410	653.4144	586.1596	517.6422	486.3163	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.9564	26.0283	26.0991	26.4368	26.5010	26.8038	26.8038	26.8606	26.6863	26.5010	26.3715	26.2375	
alpha	2.7304	2.7352	2.7399	2.7625	2.7667	2.7869	2.7869	2.7907	2.7791	2.7667	2.7581	2.7492	
util living area	0.9237	0.8821	0.8300	0.7420	0.6238	0.4792	0.3598	0.3913	0.5663	0.7699	0.8872	0.9324	(86)
MIT	19.3342	19.6258	19.9569	20.3379	20.6239	20.7990	20.8597	20.8512	20.7383	20.3655	19.7954	19.2850	(87)
Th 2	19.9383	19.9409	19.9435	19.9555	19.9578	19.9683	19.9683	19.9703	19.9643	19.9578	19.9532	19.9484	(88)
util rest of house	0.9128	0.8663	0.8075	0.7084	0.5754	0.4137	0.2810	0.3110	0.5010	0.7323	0.8693	0.9226	(89)
MIT 2	18.0110	18.3728	18.7801	19.2441	19.5701	19.7596	19.8113	19.8077	19.7018	19.2903	18.5999	17.9572	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.8686	19.1850	19.5428	19.9531	20.2532	20.4333	20.4908	20.4840	20.3736	19.9872	19.3748	18.8178	(92)
Temperature adjustment												0.0000	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
adjusted MIT	18.8686	19.1850	19.5428	19.9531	20.2532	20.4333	20.4908	20.4840	20.3736	19.9872	19.3748	18.8178	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8996	0.8534	0.7980	0.7083	0.5898	0.4440	0.3216	0.3518	0.5278	0.7335	0.8579	0.9099	(94)
Useful gains	462.5325	526.7545	543.9215	523.6392	453.4593	333.5814	231.9916	241.0180	344.9000	429.9209	444.1019	442.5071	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	926.1002	905.5611	824.5764	689.8559	532.5354	359.0895	239.5124	250.8731	387.8933	584.4650	768.0026	919.2730	(97)
Space heating kWh	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98a)
Space heating requirement - total per year (kWh/year)												1689.6714	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1689.6714	
Space heating per m2											(98c) / (4) =	31.2902	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	249.9000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	344.8944	254.5581	208.8072	119.6760	58.8326	0.0000	0.0000	0.0000	0.0000	114.9808	233.2085	354.7138	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	138.0130	101.8640	83.5563	47.8896	23.5424	0.0000	0.0000	0.0000	0.0000	46.0107	93.3207	141.9423	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.9953	164.6035	172.9876	147.6641	140.1166	122.9716	119.0037	125.5867	129.0144	147.7904	161.9428	184.3775	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.7934	94.0054	98.7936	84.3313	80.0209	70.2293	67.9633	71.7228	73.6804	84.4034	92.4859	105.2984	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9519	11.9950	10.8002	7.9127	6.1120	4.9935	5.5755	7.2473	9.4135	12.3511	13.9505	15.3675	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	676.1390	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1029.7283	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	120.6707	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	1826.5380	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	676.1390	0.1553	105.0198	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.7283	0.1416	145.7870	(264)
Space and water heating			250.8068	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.6707	0.1443	17.4165	(268)

Total CO2, kg/year	268.2233	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	4.9700	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	676.1390	1.5750	1064.9303	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.7283	1.5235	1568.8305	(278)
Space and water heating			2633.7607	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.6707	1.5338	185.0888	(282)
Total Primary energy kWh/year			2818.8495	(286)
Dwelling Primary energy Rate (DPER)			52.2000	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	54.0000	(1b)	x 3.2500	(2b) =	175.5000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.5000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1140 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3640 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3094 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3944	0.3867	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3480	0.3635	(22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5409	0.5479	0.5553	0.5606	0.5661	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6800	1.1450	13.3740			(27)
External Wall 1	31.2000	13.5000	17.7000	0.1800	3.1860			(29a)
External Roof 1	54.0000		54.0000	0.1100	5.9400			(30)
Total net area of external elements Aum(A, m2)			85.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.3200			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485	
E3 Sill	8.1600	0.0500	0.4080	
E4 Jamb	11.7000	0.0500	0.5850	
E7 Party floor between dwellings (in blocks of flats)	9.6000	0.0700	0.6720	
E18 Party wall between dwellings	13.0000	0.0600	0.7800	
E15 Flat roof with parapet	9.6000	0.5600	5.3760	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.2695	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		32.5895	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4628	33.2879	33.1164	32.3110	32.1603	31.4587	31.4587	31.3288	31.7289	32.1603	32.4651	32.7838	(38)
Heat transfer coeff	66.0524	65.8774	65.7059	64.9005	64.7498	64.0483	64.0483	63.9184	64.3185	64.7498	65.0547	65.3734	(39)

Average = Sum(39)m / 12 = 64.8998

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2232	1.2200	1.2168	1.2019	1.1991	1.1861	1.1861	1.1837	1.1911	1.1991	1.2047	1.2106	(40)
HLP (average)												1.2018	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8080 (42)

Hot water usage for mixer showers

54.5338	53.7143	52.5200	50.2351	48.5489	46.6684	45.5995	46.7847	48.0839	50.1030	52.4370	54.3248	(42a)

Hot water usage for baths

23.5745	23.2244	22.7314	21.8223	21.1416	20.3868	19.9791	20.4687	21.0018	21.8094	22.7372	23.4948	(42b)

Hot water usage for other uses

33.1458	31.9405	30.7352	29.5299	28.3246	27.1193	27.1193	28.3246	29.5299	30.7352	31.9405	33.1458	(42c)

Average daily hot water use (litres/day) 102.2682 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	111.2541	108.8791	105.9866	101.5873	98.0150	94.1745	92.6979	95.5780	98.6156	102.6476	107.1147	110.9655	(44)
Energy conte	176.1993	155.0424	162.8974	139.0679	131.9471	115.7985	112.1101	118.3456	121.6029	139.2918	152.6045	173.7451	(45)
Energy content (annual)											Total = Sum(45)m =	1698.6526	

Distribution loss (46)m = 0.15 x (45)m

26.4299	23.2564	24.4346	20.8602	19.7921	17.3698	16.8165	17.7518	18.2404	20.8938	22.8907	26.0618	(46)

Water storage loss:

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.3938 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.7527 (55)

Total storage loss

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)

If cylinder contains dedicated solar storage

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Primary loss

Combi loss

Total heat required for water heating calculated for each month

222.7942	197.1282	209.4923	184.1597	178.5420	160.8904	158.7050	164.9405	166.6947	185.8867	197.6963	220.3400	(62)
-24.9306	-22.0488	-23.0882	-19.1180	-17.8173	-15.2464	-14.2910	-15.1971	-15.7745	-18.5964	-21.0674	-24.4689	(63a)
-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

WWHRS

PV diverter

Solar input

FGHRS

Output from w/h

197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)

Total per year (kWh/year) = Sum(64)m = 2015.6255 (64)

12Total per year (kWh/year) 2016 (64)

Electric shower(s)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month

95.8622	85.2202	91.4393	82.3135	81.1483	74.5765	74.5525	76.6258	76.5064	83.5904	86.8145	95.0462	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	90.4002	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.5739	88.0997	79.5739	82.2264	79.5739	82.2264	79.5739	79.5739	82.2264	79.5739	82.2264	79.5739	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.6049	159.2403	155.1190	146.3453	135.2701	124.8610	117.9070	116.2716	120.3929	129.1666	140.2418	150.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	-72.3201	(71)
Water heating gains (Table 5)													
	128.8470	126.8158	122.9023	114.3244	109.0703	103.5785	100.2050	102.9917	106.2589	112.3527	120.5756	127.7502	(72)
Total internal gains													
	419.1458	427.2758	410.7153	396.0161	377.0344	360.7858	347.8060	348.9572	358.9982	374.2133	396.1638	411.0951	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0100	10.6334	0.6300	0.7000	0.7700	16.2810	(74)
South	6.6700	46.7521	0.6300	0.7000	0.7700	95.3012	(78)

Solar gains	111.5822	187.1927	251.6868	309.6289	348.5565	347.8122	334.5146	304.5344	271.2545	205.3826	133.0492	95.9217	(83)
Total gains	530.7281	614.4685	662.4021	705.6450	725.5909	708.5981	682.3206	653.4916	630.2527	579.5959	529.2130	507.0168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	24.9802	25.0465	25.1119	25.4235	25.4827	25.7618	25.7618	25.8142	25.6536	25.4827	25.3633	25.2396	
alpha	2.6653	2.6698	2.6741	2.6949	2.6988	2.7175	2.7175	2.7209	2.7102	2.6988	2.6909	2.6826	
util living area													
	0.9208	0.8868	0.8436	0.7671	0.6586	0.5151	0.3902	0.4202	0.5935	0.7818	0.8861	0.9281	(86)
MIT	18.8626	19.2040	19.6266	20.1453	20.5642	20.8419	20.9453	20.9316	20.7549	20.2278	19.4766	18.8076	(87)
Th 2	19.9015	19.9041	19.9066	19.9185	19.9207	19.9312	19.9312	19.9331	19.9271	19.9207	19.9162	19.9115	(88)
util rest of house													
	0.9093	0.8711	0.8217	0.7342	0.6094	0.4451	0.3034	0.3328	0.5257	0.7442	0.8678	0.9177	(89)

MIT 2	17.4556	17.8791	18.4010	19.0330	19.5154	19.8134	19.9026	19.8953	19.7311	19.1462	18.2345	17.3934	(90)
Living area fraction										fLA = Living area / (4) =		0.6481	(91)
MIT	18.3675	18.7378	19.1954	19.7539	20.1952	20.4800	20.5784	20.5670	20.3947	19.8472	19.0396	18.3100	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3675	18.7378	19.1954	19.7539	20.1952	20.4800	20.5784	20.5670	20.3947	19.8472	19.0396	18.3100	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8894	0.8513	0.8055	0.7287	0.6226	0.4821	0.3569	0.3858	0.5565	0.7414	0.8502	0.8984	(94)
Useful gains	472.0438	523.1150	533.5349	514.2218	451.7526	341.5966	243.5385	252.1189	350.7597	429.7113	449.9163	455.4794	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	929.1935	911.6011	834.1629	704.4258	550.0627	376.6054	254.8114	266.3472	404.8666	598.7553	776.7265	922.4167	(97)
Space heating kWh	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98a)
Space heating requirement - total per year (kWh/year)												1743.4123	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1743.4123	
Space heating per m2											(98c) / (4) =	32.2854	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	340.1193	261.0627	223.6672	136.9469	73.1427	0.0000	0.0000	0.0000	0.0000	125.7687	235.3034	347.4013	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	368.4933	282.8415	242.3263	148.3715	79.2446	0.0000	0.0000	0.0000	0.0000	136.2608	254.9332	376.3828	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.8636	175.0794	186.4041	165.0418	160.7247	145.6440	144.4140	149.7434	150.9202	167.2903	176.6289	195.8711	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.2633	84.9538	84.4695	83.6444	82.4123	79.8000	79.8000	79.8000	79.8000	83.4288	84.7038	85.3303	(217)
Fuel for water heating, kWh/month	232.0619	206.0877	220.6762	197.3136	195.0252	182.5113	180.9699	187.6483	189.1231	200.5187	208.5253	229.5447	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5339	13.2641	11.9428	8.7498	6.7586	5.5219	6.1654	8.0141	10.4095	13.6578	15.4265	16.9934	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0622	-18.1424	-27.8053	-33.4107	-37.9530	-36.1512	-35.7255	-32.7681	-27.8964	-21.6769	-13.6629	-10.3012	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7511	-8.1129	-16.5437	-25.4712	-34.2920	-34.6680	-34.2465	-28.7031	-20.6667	-11.7888	-5.0682	-2.9491	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1888.8540	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2430.0059	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.4379	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-533.8171	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4004.4808	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1888.8540	0.2100	396.6593	(261)
Total CO2 associated with community systems			0.0000	(373)

Water heating (other fuel)	2430.0059	0.2100	510.3012	(264)
Space and water heating			906.9606	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.4379	0.1443	19.2592	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	0.1332	-40.9780	
PV Unit electricity exported	-226.2614	0.1252	-28.3251	
Total			-69.3031	(269)
Total CO2, kg/year			868.8459	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.0900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1888.8540	1.1300	2134.4050	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2430.0059	1.1300	2745.9066	(278)
Space and water heating			4880.3117	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4379	1.5338	204.6715	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.5557	1.4923	-458.9796	
PV Unit electricity exported	-226.2614	0.4595	-103.9652	
Total			-562.9448	(283)
Total Primary energy kWh/year			4652.1392	(286)
Target Primary Energy Rate (TPER)			86.1500	(287)

Summary for Input Data

elmhurst energy

Property Reference	Flat 17	**Issued on Date**	27/07/2025
Assessment Reference	Flat 17	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.50	**TER**	14.36
Environmental	96 A	**% DER < TER**			68.66
CO_2 Emissions (t/year)	0.3	**DFEE**	34.77	**TFEE**	39.06
Compliance Check	See BREL	**% DFEE < TFEE**			10.98
% DPER < TPER	38.38	**DPER**	47.19	**TPER**	76.59

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Top-floor flat	
Which Floor	4	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	13.00 m	72.60 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	42.25	25.74	0.00	None	16.51	Calculate Wall Area

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	72.60	72.60	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	70.00	74.40

12.0 Opening Types

Summary for Input Data

elmhurst energy

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0
N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		13.00	0.00	0.00	No
E18 Party wall between dwellings		13.00	0.00	0.00	Yes
E15 Flat roof with parapet		13.00	0.00	0.00	No

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
In Winter	249.90	
In Summer	175.10	
Controls SAP Code	2207	

Summary for Input Data

Delayed Start Stat	No
HETAS approved System	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2 — None

26.0 Heat Networks — None

27.0 Secondary Heating — None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder — None

Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No

31.0 Thermal Store — None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 17	**Issued on Date**	27/07/2025
Assessment Reference	Flat 17	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.50	**TER**	14.36
Environmental	96 A	**% DER < TER**			68.66
CO_2 Emissions (t/year)	0.3	**DFEE**	34.77	**TFEE**	39.06
Compliance Check	See BREL	**% DFEE < TFEE**			10.98
% DPER < TPER	38.38	**DPER**	47.19	**TPER**	76.59

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3353 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1000	7.2600			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.5338			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		4.5940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	35.1278 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	79.1992	78.9997	78.8040	77.8852	77.7133	76.9130	76.9130	76.7648	77.2212	77.7133	78.0610	78.4246	(39)

Average = Sum(39)m / 12 = 77.8843

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0909	1.0881	1.0855	1.0728	1.0704	1.0594	1.0594	1.0574	1.0637	1.0704	1.0752	1.0802	(40)
HLP (average)												1.0728	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 125.2310 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)											Total = Sum(45)m =	2080.0760	
Distribution loss (46)m = 0.15 x (45)m	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.0095	28.0803	28.1500	28.4821	28.5451	28.8421	28.8421	28.8978	28.7270	28.5451	28.4179	28.2862	
alpha	2.8673	2.8720	2.8767	2.8988	2.9030	2.9228	2.9228	2.9265	2.9151	2.9030	2.8945	2.8857	
util living area	0.9397	0.9076	0.8664	0.7911	0.6813	0.5338	0.4048	0.4376	0.6191	0.8113	0.9101	0.9466	(86)
MIT	19.3627	19.6199	19.9274	20.3019	20.5997	20.7923	20.8610	20.8517	20.7286	20.3459	19.7993	19.3190	(87)
Th 2	20.0083	20.0105	20.0127	20.0231	20.0251	20.0341	20.0341	20.0358	20.0306	20.0251	20.0211	20.0170	(88)
util rest of house	0.9310	0.8949	0.8478	0.7618	0.6361	0.4683	0.3233	0.3552	0.5561	0.7786	0.8956	0.9389	(89)
MIT 2	18.0979	18.4195	18.8018	19.2633	19.6093	19.8203	19.8806	19.8759	19.7582	19.3272	18.6573	18.0495	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.7077	18.9982	19.3444	19.7640	20.0868	20.2889	20.3533	20.3463	20.2260	19.8183	19.2079	18.6615	(92)
Temperature adjustment												0.0000	

adjusted MIT	18.7077	18.9982	19.3444	19.7640	20.0868	20.2889	20.3533	20.3463	20.2260	19.8183	19.2079	18.6615	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9170	0.8795	0.8335	0.7533	0.6391	0.4863	0.3509	0.3826	0.5696	0.7708	0.8812	0.9256	(94)
Useful gains	553.6890	624.1343	641.4259	620.7315	542.5384	402.7298	278.9718	290.1905	415.4272	512.5189	530.2266	531.0740	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1141.0783	1113.7539	1012.1909	846.1446	651.7623	437.5486	288.6748	302.9375	473.0583	716.3839	945.1526	1134.1393	(97)
Space heating kWh	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98a)

Space heating requirement - total per year (kWh/year) 2184.5542

Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)

Solar heating contribution - total per year (kWh/year) 0.0000

Space heating kWh	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98c)

Space heating requirement after solar contribution - total per year (kWh/year) 2184.5542

Space heating per m2 (98c) / (4) = 30.0903 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	249.9000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	174.8770	131.6624	110.3838	64.9450	32.5180	0.0000	0.0000	0.0000	0.0000	60.6945	119.5465	179.5441	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year	
Space heating fuel - main system 1	874.1714 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	175.1000
Water heating fuel used	1187.9361 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	156.5610 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2218.6684 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	874.1714	0.1551	135.6108	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			303.7967	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)

Total CO2, kg/year	326.3933	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	4.5000	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	874.1714	1.5743	1376.2199	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			3186.0861	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3426.2245	(286)
Dwelling Primary energy Rate (DPER)			47.1900	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		235.9500	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3771 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1100	7.9860			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.2598			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	13.0000	0.0700	0.9100
E18 Party wall between dwellings	13.0000	0.0600	0.7800
E15 Flat roof with parapet	13.0000	0.5600	7.2800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	10.4115	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	41.6713	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	87.1071	86.8545	86.6069	85.4442	85.2266	84.2139	84.2139	84.0263	84.6040	85.2266	85.6667	86.1268	(39)

Average = Sum(39)m / 12 = 85.4431

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1998	1.1963	1.1929	1.1769	1.1739	1.1600	1.1600	1.1574	1.1653	1.1739	1.1800	1.1863	(40)
HLP (average)												1.1769	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 117.9810 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
										Total per year (kWh/year) = Sum(64)m =		2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

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6. Solar gains

[Jan]

	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.4667	25.5408	25.6138	25.9624	26.0286	26.3417	26.3417	26.4004	26.2202	26.0286	25.8949	25.7566	
alpha	2.6978	2.7027	2.7076	2.7308	2.7352	2.7561	2.7561	2.7600	2.7480	2.7352	2.7263	2.7171	
util living area	0.9340	0.9033	0.8638	0.7917	0.6865	0.5420	0.4134	0.4450	0.6226	0.8072	0.9035	0.9406	(86)
MIT	18.7863	19.1286	19.5572	20.0929	20.5311	20.8282	20.9401	20.9251	20.7339	20.1778	19.4092	18.7344	(87)
Th 2	19.9201	19.9229	19.9257	19.9385	19.9409	19.9522	19.9522	19.9542	19.9478	19.9409	19.9360	19.9310	(88)
util rest of house	0.9243	0.8896	0.8441	0.7610	0.6387	0.4716	0.3243	0.3556	0.5555	0.7724	0.8875	0.9318	(89)

MIT 2	17.3730	17.8001	18.3323	18.9900	19.4995	19.8223	19.9203	19.9119	19.7315	19.1069	18.1667	17.3148	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.0544	18.4406	18.9228	19.5217	19.9968	20.3072	20.4120	20.4004	20.2148	19.6232	18.7657	17.9992	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.0544	18.4406	18.9228	19.5217	19.9968	20.3072	20.4120	20.4004	20.2148	19.6232	18.7657	17.9992	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9024	0.8662	0.8224	0.7474	0.6414	0.4964	0.3645	0.3949	0.5736	0.7605	0.8657	0.9108	(94)
Useful gains	585.0460	653.3334	669.7999	649.9335	573.9180	434.1320	306.6905	317.8699	444.8169	540.4172	559.9705	563.2691	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1198.1029	1176.0607	1075.9014	907.5598	707.1108	480.6288	321.0196	336.1381	517.3327	769.0174	999.3590	1188.4818	(97)
Space heating kWh	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98a)
Space heating requirement - total per year (kWh/year)												2345.7096	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2345.7096	
Space heating per m2											(98c) / (4) =	32.3101	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	494.1651	380.5772	327.3451	200.9653	107.3624	0.0000	0.0000	0.0000	0.0000	184.2671	342.7516	503.9635	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.6463	85.3578	84.8973	84.0844	82.7982	79.8000	79.8000	79.8000	79.8000	83.8616	85.1180	85.7077	(217)
Fuel for water heating, kWh/month	258.1629	229.0524	244.8668	218.1996	215.2946	201.8711	199.8040	207.5092	209.5004	221.5984	231.2559	255.2962	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2541.3972	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2692.4115	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-717.6874	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4775.0720	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2541.3972	0.2100	533.6934	(261)
Total CO2 associated with community systems			0.0000	(373)

Water heating (other fuel)	2692.4115	0.2100	565.4064	(264)
Space and water heating			1099.0998	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			1042.8431	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.3600	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2541.3972	1.1300	2871.7789	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2692.4115	1.1300	3042.4250	(278)
Space and water heating			5914.2038	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			5560.4698	(286)
Target Primary Energy Rate (TPER)			76.5900	(287)

Full SAP Calculation Printout

Property Reference	Flat 17	**Issued on Date**	27/07/2025
Assessment Reference	Flat 17	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.50	**TER**	14.36
Environmental	96 A	**% DER < TER**			68.66
CO_2 Emissions (t/year)	0.3	**DFEE**	34.77	**TFEE**	39.06
Compliance Check	See BREL	**% DFEE < TFEE**			10.98
% DPER < TPER	38.38	**DPER**	47.19	**TPER**	76.59

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000 (1b)	x	3.2500 (2b)	=	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	235.9500	(5)

2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3776	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3210	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4093	0.4012	0.3932	0.3531	0.3451	0.3049	0.3049	0.2969	0.3210	0.3451	0.3611	0.3772	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5838	0.5805	0.5773	0.5623	0.5595	0.5465	0.5465	0.5441	0.5515	0.5595	0.5652	0.5711	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1000	7.2600			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.5338			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	4.5940	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	35.1278	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4530	45.1998	44.9516	43.7857	43.5676	42.5522	42.5522	42.3641	42.9433	43.5676	44.0088	44.4702	(38)

Heat transfer coeff

	80.5808	80.3276	80.0794	78.9135	78.6954	77.6800	77.6800	77.4919	78.0711	78.6954	79.1367	79.5980 (39)
Average = Sum(39)m / 12 =												78.9125

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1099	1.1064	1.1030	1.0870	1.0840	1.0700	1.0700	1.0674	1.0754	1.0840	1.0900	1.0964	(40)
HLP (average)												1.0869	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3076 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846 (42b)
Hot water usage for other uses												
	38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617 (42c)
Average daily hot water use (litres/day)												59.9802 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	65.4382	63.6432	61.6835	59.2442	57.0682	54.8067	54.3368	56.2925	58.2983	60.6207	63.0816	65.3463	(44)
Energy conte	103.6381	90.6271	94.8053	81.1024	76.8248	67.3913	65.7156	69.7019	71.8877	82.2617	89.8713	102.3165	(45)
Energy content (annual)											Total = Sum(45)m =	996.1436	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(64)
											Total per year (kWh/year) = Sum(64)m =	846.7221	(64)
12Total per year (kWh/year)												847	(64)
Electric shower(s)													
	50.3803	44.8892	49.0173	46.7766	47.6544	45.4576	46.9729	47.6544	46.7766	49.0173	48.0956	50.3803	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	573.0725	(64a)
Heat gains from water heating, kWh/month													
	34.6182	30.4806	32.4005	28.9284	28.2389	25.6851	25.7078	26.7252	26.9703	29.7349	31.1216	34.3373	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)													
	46.5298	45.3580	43.5490	40.1784	37.9554	35.6737	34.5535	35.9210	37.4587	39.9663	43.2244	46.1523	(72)
Total internal gains													
	410.5675	422.5556	404.3804	393.1308	373.1846	360.9144	347.3867	346.6448	356.9362	367.3227	388.3041	401.2205	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	550.9173	658.0078	720.9495	782.5713	811.5795	798.3701	768.1188	729.6748	698.1149	625.6533	555.6551	521.8723	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	27.5293	27.6161	27.7017	28.1109	28.1889	28.5573	28.5573	28.6266	28.4143	28.1889	28.0317	27.8692	
alpha	2.8353	2.8411	2.8468	2.8741	2.8793	2.9038	2.9038	2.9084	2.8943	2.8793	2.8688	2.8579	
util living area													
	0.9515	0.9222	0.8838	0.8105	0.7027	0.5522	0.4204	0.4554	0.6407	0.8321	0.9249	0.9574	(86)
MIT	18.7945	19.1549	19.5901	20.1327	20.5625	20.8469	20.9487	20.9342	20.7518	20.1934	19.4162	18.7413	(87)
Th 2	19.9927	19.9956	19.9984	20.0115	20.0140	20.0254	20.0254	20.0276	20.0210	20.0140	20.0090	20.0038	(88)
util rest of house													
	0.9442	0.9110	0.8668	0.7824	0.6578	0.4854	0.3358	0.3701	0.5773	0.8012	0.9122	0.9510	(89)
MIT 2	17.9944	18.3475	18.7714	19.2959	19.6880	19.9331	20.0033	19.9975	19.8601	19.3653	18.6180	17.9499	(90)
Living area fraction											fLA = Living area / (4) =	0.4821	(91)

MIT	18.3801	18.7368	19.1661	19.6993	20.1096	20.3737	20.4591	20.4491	20.2900	19.7645	19.0028	18.3314	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3801	18.7368	19.1661	19.6993	20.1096	20.3737	20.4591	20.4491	20.2900	19.7645	19.0028	18.3314	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9292	0.8938	0.8503	0.7726	0.6625	0.5102	0.3744	0.4082	0.5957	0.7924	0.8963	0.9370	(94)
Useful gains	511.9302	588.1378	613.0258	604.6154	537.6616	407.3336	287.5677	297.8172	415.8822	495.7557	498.0475	489.0162	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	1134.5887	1111.4735	1014.2911	852.2121	661.7951	448.4991	299.7713	313.7695	483.2580	721.2065	941.9463	1124.8306	(97)
Space heating kWh													
	463.2579	351.6816	298.5414	178.2696	92.3553	0.0000	0.0000	0.0000	0.0000	167.7354	319.6071	473.0459	(98a)
Space heating requirement - total per year (kWh/year)												2344.4943	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	463.2579	351.6816	298.5414	178.2696	92.3553	0.0000	0.0000	0.0000	0.0000	167.7354	319.6071	473.0459	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2344.4943	
Space heating per m2											(98c) / (4) =	32.2933	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W													
	0.0000	0.0000	0.0000	0.0000	0.0000	730.1917	574.8318	588.9387	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8135	0.8702	0.8509	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	594.0225	500.2312	501.1104	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	215.7611	267.9380	235.3479	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)													
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	53.9403	66.9845	58.8370	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												179.7617	(107)
Energy for space heating												32.2933	(99)
Energy for space cooling												2.4761	(108)
Total												34.7694	(109)
Fabric Energy Efficiency (DFEE)												34.8	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

---

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		235.9500	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0.0000 (23c)

Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1100	7.9860			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2598			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	13.0000	0.0700	0.9100
E18 Party wall between dwellings	13.0000	0.0600	0.7800
E15 Flat roof with parapet	13.0000	0.5600	7.2800

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.4115 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 41.6713 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	87.1071	86.8545	86.6069	85.4442	85.2266	84.2139	84.2139	84.0263	84.6040	85.2266	85.6667	86.1268	(39)
Average = Sum(39)m / 12 =												85.4431	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1998	1.1963	1.1929	1.1769	1.1739	1.1600	1.1600	1.1574	1.1653	1.1739	1.1800	1.1863	(40)
HLP (average)												1.1769	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 59.9802 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	65.4382	63.6432	61.6835	59.2442	57.0682	54.8067	54.3368	56.2925	58.2983	60.6207	63.0816	65.3463	(44)
Energy conte	103.6381	90.6271	94.8053	81.1024	76.8248	67.3913	65.7156	69.7019	71.8877	82.2617	89.8713	102.3165	(45)
Energy content (annual)										Total = Sum(45)m =		996.1436	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	88.0924	77.0330	80.5845	68.9370	65.3010	57.2826	55.8583	59.2466	61.1045	69.9225	76.3906	86.9690	(64)
										Total per year (kWh/year) = Sum(64)m =		846.7221	(64)
12Total per year (kWh/year)												847	(64)
Electric shower(s)	50.3803	44.8892	49.0173	46.7766	47.6544	45.4576	46.9729	47.6544	46.7766	49.0173	48.0956	50.3803	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												573.0725	(64a)
Heat gains from water heating, kWh/month	34.6182	30.4806	32.4005	28.9284	28.2389	25.6851	25.7078	26.7252	26.9703	29.7349	31.1216	34.3373	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	46.5298	45.3580	43.5490	40.1784	37.9554	35.6737	34.5535	35.9210	37.4587	39.9663	43.2244	46.1523	(72)
Total internal gains	410.5675	422.5556	404.3804	393.1308	373.1846	360.9144	347.3867	346.6448	356.9362	367.3227	388.3041	401.2205	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	550.9173	658.0078	720.9495	782.5713	811.5795	798.3701	768.1188	729.6748	698.1149	625.6533	555.6551	521.8723	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.4667	25.5408	25.6138	25.9624	26.0286	26.3417	26.3417	26.4004	26.2202	26.0286	25.8949	25.7566	
alpha	2.6978	2.7027	2.7076	2.7308	2.7352	2.7561	2.7561	2.7600	2.7480	2.7352	2.7263	2.7171	
util living area	0.9535	0.9265	0.8913	0.8242	0.7236	0.5788	0.4466	0.4822	0.6647	0.8441	0.9291	0.9590	(86)
MIT	18.5770	18.9415	19.3978	19.9786	20.4601	20.7970	20.9274	20.9084	20.6844	20.0583	19.2302	18.5219	(87)
Th 2	19.9201	19.9229	19.9257	19.9385	19.9409	19.9522	19.9522	19.9542	19.9478	19.9409	19.9360	19.9310	(88)
util rest of house	0.9462	0.9154	0.8745	0.7961	0.6774	0.5070	0.3524	0.3880	0.5981	0.8133	0.9165	0.9526	(89)
MIT 2	17.7319	18.0895	18.5349	19.0976	19.5398	19.8308	19.9216	19.9132	19.7444	19.1858	18.3871	17.6851	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.1393	18.5002	18.9509	19.5223	19.9835	20.2966	20.4065	20.3930	20.1975	19.6064	18.7936	18.0885	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.1393	18.5002	18.9509	19.5223	19.9835	20.2966	20.4065	20.3930	20.1975	19.6064	18.7936	18.0885	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9305	0.8971	0.8563	0.7836	0.6794	0.5318	0.3946	0.4291	0.6151	0.8021	0.8995	0.9380	(94)
Useful gains	512.6254	590.2969	617.3313	613.2577	551.4022	424.5506	303.1012	313.0764	429.4068	501.8213	499.8246	489.4975	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1205.5039	1181.2392	1078.3370	907.6177	705.9715	479.7312	320.5570	335.5166	515.8757	767.5857	1001.7491	1196.1742	(97)
Space heating kWh	515.5016	397.1132	342.9882	211.9392	114.9996	0.0000	0.0000	0.0000	0.0000	197.7287	361.3856	525.7675	(98a)
Space heating requirement - total per year (kWh/year)												2667.4236	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	515.5016	397.1132	342.9882	211.9392	114.9996	0.0000	0.0000	0.0000	0.0000	197.7287	361.3856	525.7675	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2667.4236	
Space heating per m2										(98c) / (4) =		36.7414	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	791.6106	623.1828	638.6002	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7765	0.8386	0.8170	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	614.7219	522.6052	521.7358	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	893.6908	860.3628	817.4382	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	200.8576	251.2916	220.0026	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	50.2144	62.8229	55.0007	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												168.0380	(107)
Energy for space heating												36.7414	(99)
Energy for space cooling												2.3146	(108)
Total												39.0559	(109)
Fabric Energy Efficiency (TFEE)												39.1	(109)

Full SAP Calculation Printout

Property Reference	Flat 17	**Issued on Date**	27/07/2025
Assessment Reference	Flat 17	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**	4.50	**TER**	14.36
Environmental	96 A	**% DER < TER**			68.66
CO_2 Emissions (t/year)	0.3	**DFEE**	34.77	**TFEE**	39.06
Compliance Check	See BREL	**% DFEE < TFEE**			10.98
% DPER < TPER	38.38	**DPER**	47.19	**TPER**	76.59

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	235.9500	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.0848 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3353 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2850 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3633	0.3562	0.3491	0.3135	0.3063	0.2707	0.2707	0.2636	0.2850	0.3063	0.3206	0.3348	(22b)
Effective ac	0.5660	0.5634	0.5609	0.5491	0.5469	0.5366	0.5366	0.5347	0.5406	0.5469	0.5514	0.5561	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1000	7.2600			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.5338			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		4.5940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	35.1278 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.0714	43.8718	43.6762	42.7574	42.5854	41.7851	41.7851	41.6369	42.0934	42.5854	42.9332	43.2968	(38)
Heat transfer coeff	79.1992	78.9997	78.8040	77.8852	77.7133	76.9130	76.9130	76.7648	77.2212	77.7133	78.0610	78.4246	(39)

Average = Sum(39)m / 12 = 77.8843

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0909	1.0881	1.0855	1.0728	1.0704	1.0594	1.0594	1.0574	1.0637	1.0704	1.0752	1.0802	(40)
HLP (average)												1.0728	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

70.7735	69.7099	68.1601	65.1947	63.0063	60.5659	59.1787	60.7169	62.4029	65.0232	68.0523	70.5024	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 125.2310 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.2117	133.3532	129.8436	124.4389	120.0745	115.3726	113.5155	117.0093	120.7013	125.6439	131.1339	135.8487	(44)
Energy conte	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(45)
Energy content (annual)											Total = Sum(45)m =	2080.0760	
Distribution loss (46)m = 0.15 x (45)m	32.3589	28.4840	29.9347	25.5526	24.2465	21.2796	20.5931	21.7323	22.3255	25.5746	28.0236	31.9059	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
										Total per year (kWh/year) = Sum(64)m =		2080.0760	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	71.7289	63.1395	66.3553	56.6416	53.7464	47.1698	45.6480	48.1733	49.4882	56.6905	62.1191	70.7248	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	96.4098	93.9575	89.1872	78.6689	72.2398	65.5136	61.3548	64.7490	68.7336	76.1969	86.2765	95.0602	(72)
Total internal gains	463.4476	474.1551	453.0186	434.6214	410.4690	390.7544	374.1881	375.4728	388.2111	406.5533	434.3562	453.1284	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	603.7973	709.6074	769.5877	824.0618	848.8639	828.2100	794.9201	758.5028	729.3898	664.8839	601.7072	573.7802	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.0095	28.0803	28.1500	28.4821	28.5451	28.8421	28.8421	28.8978	28.7270	28.5451	28.4179	28.2862	
alpha	2.8673	2.8720	2.8767	2.8988	2.9030	2.9228	2.9228	2.9265	2.9151	2.9030	2.8945	2.8857	
util living area	0.9397	0.9076	0.8664	0.7911	0.6813	0.5338	0.4048	0.4376	0.6191	0.8113	0.9101	0.9466	(86)
MIT	19.3627	19.6199	19.9274	20.3019	20.5997	20.7923	20.8610	20.8517	20.7286	20.3459	19.7993	19.3190	(87)
Th 2	20.0083	20.0105	20.0127	20.0231	20.0251	20.0341	20.0341	20.0358	20.0306	20.0251	20.0211	20.0170	(88)
util rest of house	0.9310	0.8949	0.8478	0.7618	0.6361	0.4683	0.3233	0.3552	0.5561	0.7786	0.8956	0.9389	(89)
MIT 2	18.0979	18.4195	18.8018	19.2633	19.6093	19.8203	19.8806	19.8759	19.7582	19.3272	18.6573	18.0495	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.7077	18.9982	19.3444	19.7640	20.0868	20.2889	20.3533	20.3463	20.2260	19.8183	19.2079	18.6615	(92)
Temperature adjustment												0.0000	

adjusted MIT	18.7077	18.9982	19.3444	19.7640	20.0868	20.2889	20.3533	20.3463	20.2260	19.8183	19.2079	18.6615	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9170	0.8795	0.8335	0.7533	0.6391	0.4863	0.3509	0.3826	0.5696	0.7708	0.8812	0.9256	(94)
Useful gains	553.6890	624.1343	641.4259	620.7315	542.5384	402.7298	278.9718	290.1905	415.4272	512.5189	530.2266	531.0740	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1141.0783	1113.7539	1012.1909	846.1446	651.7623	437.5486	288.6748	302.9375	473.0583	716.3839	945.1526	1134.1393	(97)
Space heating kWh	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98a)

Space heating requirement - total per year (kWh/year) 2184.5542

Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)

Solar heating contribution - total per year (kWh/year) 0.0000

Space heating kWh	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98c)

Space heating requirement after solar contribution - total per year (kWh/year) 2184.5542

Space heating per m2 (98c) / (4) = 30.0903 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	249.9000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	437.0176	329.0243	275.8492	162.2975	81.2626	0.0000	0.0000	0.0000	0.0000	151.6756	298.7468	448.6806	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	174.8770	131.6624	110.3838	64.9450	32.5180	0.0000	0.0000	0.0000	0.0000	60.6945	119.5465	179.5441	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	215.7260	189.8931	199.5648	170.3507	161.6434	141.8641	137.2871	144.8820	148.8367	170.4976	186.8243	212.7062	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	123.2016	108.4484	113.9719	97.2877	92.3149	81.0189	78.4050	82.7424	85.0010	97.3716	106.6958	121.4770	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	19.3990	15.5626	14.0124	10.2661	7.9298	6.4787	7.2338	9.4028	12.2133	16.0246	18.0997	19.9381	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year	
Space heating fuel - main system 1	874.1714 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	175.1000
Water heating fuel used	1187.9361 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	156.5610 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2218.6684 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	874.1714	0.1551	135.6108	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1187.9361	0.1416	168.1858	(264)
Space and water heating			303.7967	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	156.5610	0.1443	22.5966	(268)

Total CO2, kg/year	326.3933	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	4.5000	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	874.1714	1.5743	1376.2199	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1187.9361	1.5235	1809.8662	(278)
Space and water heating			3186.0861	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	156.5610	1.5338	240.1384	(282)
Total Primary energy kWh/year			3426.2245	(286)
Dwelling Primary energy Rate (DPER)			47.1900	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	72.6000	(1b)	x 3.2500	(2b) =	235.9500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		235.9500	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1271 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3771 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3206 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			14.6900	1.1450	16.8206			(27)
External Wall 1	42.2500	16.5100	25.7400	0.1800	4.6332			(29a)
External Roof 1	72.6000		72.6000	0.1100	7.9860			(30)
Total net area of external elements Aum(A, m2)			114.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.2598			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	13.0000	0.0700	0.9100
E18 Party wall between dwellings	13.0000	0.0600	0.7800
E15 Flat roof with parapet	13.0000	0.5600	7.2800

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	10.4115	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	41.6713	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.4357	45.1832	44.9356	43.7729	43.5553	42.5426	42.5426	42.3550	42.9327	43.5553	43.9954	44.4555	(38)
Heat transfer coeff	87.1071	86.8545	86.6069	85.4442	85.2266	84.2139	84.2139	84.0263	84.6040	85.2266	85.6667	86.1268	(39)

Average = Sum(39)m / 12 = 85.4431

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1998	1.1963	1.1929	1.1769	1.1739	1.1600	1.1600	1.1574	1.1653	1.1739	1.1800	1.1863	(40)
HLP (average)												1.1769	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3076 (42)

Hot water usage for mixer showers

62.9098	61.9644	60.5867	57.9508	56.0056	53.8363	52.6033	53.9705	55.4693	57.7984	60.4909	62.6688	(42a)

Hot water usage for baths

27.1765	26.7729	26.2045	25.1566	24.3718	23.5017	23.0317	23.5961	24.2107	25.1417	26.2113	27.0846	(42b)

Hot water usage for other uses

38.2617	36.8703	35.4790	34.0877	32.6963	31.3050	31.3050	32.6963	34.0877	35.4790	36.8703	38.2617	(42c)

Average daily hot water use (litres/day) 117.9810 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	128.3480	125.6076	122.2703	117.1951	113.0738	108.6431	106.9401	110.2630	113.7676	118.4191	123.5725	128.0151	(44)
Energy conte	203.2718	178.8636	187.9248	160.4342	152.2191	133.5894	129.3347	136.5287	140.2868	160.6937	176.0517	200.4406	(45)
Energy content (annual)											Total = Sum(45)m =	1959.6391	
Distribution loss (46)m = 0.15 x (45)m	30.4908	26.8295	28.1887	24.0651	22.8329	20.0384	19.4002	20.4793	21.0430	24.1040	26.4078	30.0661	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	249.8667	220.9493	234.5197	205.5260	198.8140	178.6812	175.9297	183.1236	185.3787	207.2886	221.1436	247.0355	(62)
WWHRS	-28.7597	-25.4353	-26.6344	-22.0544	-20.5539	-17.5881	-16.4860	-17.5312	-18.1973	-21.4526	-24.3032	-28.2271	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
										Total per year (kWh/year) = Sum(64)m =		2241.0331	(64)
12Total per year (kWh/year)												2241	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	104.8638	93.1407	99.7609	89.4178	87.8888	80.4919	80.2797	82.6717	82.7188	90.7066	94.6107	103.9224	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	115.3778	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1368	114.1871	103.1368	106.5747	103.1368	106.5747	103.1368	103.1368	106.5747	103.1368	106.5747	103.1368	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.2876	205.3971	200.0813	188.7645	174.4790	161.0527	152.0832	149.9737	155.2895	166.6063	180.8917	194.3180	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	34.5378	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	-92.3022	(71)
Water heating gains (Table 5)	140.9460	138.6022	134.0873	124.1915	118.1301	111.7943	107.9029	111.1179	114.8873	121.9174	131.4037	139.6807	(72)
Total internal gains	507.9837	518.7998	497.9187	480.1439	456.3592	437.0351	420.7361	421.8416	434.3648	452.2738	479.4835	497.7488	(73)

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6. Solar gains

[Jan]

	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	648.3335	754.2521	814.4878	869.5844	894.7541	874.4907	841.4682	804.8716	775.5434	710.6044	646.8344	618.4007	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.4667	25.5408	25.6138	25.9624	26.0286	26.3417	26.3417	26.4004	26.2202	26.0286	25.8949	25.7566	
alpha	2.6978	2.7027	2.7076	2.7308	2.7352	2.7561	2.7561	2.7600	2.7480	2.7352	2.7263	2.7171	
util living area	0.9340	0.9033	0.8638	0.7917	0.6865	0.5420	0.4134	0.4450	0.6226	0.8072	0.9035	0.9406	(86)
MIT	18.7863	19.1286	19.5572	20.0929	20.5311	20.8282	20.9401	20.9251	20.7339	20.1778	19.4092	18.7344	(87)
Th 2	19.9201	19.9229	19.9257	19.9385	19.9409	19.9522	19.9522	19.9542	19.9478	19.9409	19.9360	19.9310	(88)
util rest of house	0.9243	0.8896	0.8441	0.7610	0.6387	0.4716	0.3243	0.3556	0.5555	0.7724	0.8875	0.9318	(89)

MIT 2	17.3730	17.8001	18.3323	18.9900	19.4995	19.8223	19.9203	19.9119	19.7315	19.1069	18.1667	17.3148	(90)
Living area fraction										fLA = Living area / (4) =		0.4821	(91)
MIT	18.0544	18.4406	18.9228	19.5217	19.9968	20.3072	20.4120	20.4004	20.2148	19.6232	18.7657	17.9992	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.0544	18.4406	18.9228	19.5217	19.9968	20.3072	20.4120	20.4004	20.2148	19.6232	18.7657	17.9992	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9024	0.8662	0.8224	0.7474	0.6414	0.4964	0.3645	0.3949	0.5736	0.7605	0.8657	0.9108	(94)
Useful gains	585.0460	653.3334	669.7999	649.9335	573.9180	434.1320	306.6905	317.8699	444.8169	540.4172	559.9705	563.2691	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1198.1029	1176.0607	1075.9014	907.5598	707.1108	480.6288	321.0196	336.1381	517.3327	769.0174	999.3590	1188.4818	(97)
Space heating kWh	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98a)
Space heating requirement - total per year (kWh/year)												2345.7096	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2345.7096	
Space heating per m2											(98c) / (4) =	32.3101	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	456.1144	351.2727	302.1395	185.4909	99.0955	0.0000	0.0000	0.0000	0.0000	170.0785	316.3597	465.1583	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	494.1651	380.5772	327.3451	200.9653	107.3624	0.0000	0.0000	0.0000	0.0000	184.2671	342.7516	503.9635	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1070	195.5139	207.8853	183.4717	178.2601	161.0931	159.4436	165.5923	167.1814	185.8359	196.8403	218.8084	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.6463	85.3578	84.8973	84.0844	82.7982	79.8000	79.8000	79.8000	79.8000	83.8616	85.1180	85.7077	(217)
Fuel for water heating, kWh/month	258.1629	229.0524	244.8668	218.1996	215.2946	201.8711	199.8040	207.5092	209.5004	221.5984	231.2559	255.2962	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	21.4298	17.1918	15.4793	11.3408	8.7599	7.1570	7.9911	10.3872	13.4919	17.7021	19.9945	22.0254	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.0777	-24.1057	-36.8233	-44.0853	-49.9195	-47.4717	-46.8934	-43.0786	-36.7855	-28.7170	-18.1790	-13.7374	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.1825	-11.1931	-22.8015	-35.0782	-47.2098	-47.7407	-47.1801	-39.5660	-28.5049	-16.2758	-7.0039	-4.0769	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2541.3972	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2692.4115	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	172.9506	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-717.6874	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4775.0720	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2541.3972	0.2100	533.6934	(261)
Total CO2 associated with community systems			0.0000	(373)

Water heating (other fuel)	2692.4115	0.2100	565.4064	(264)
Space and water heating			1099.0998	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	172.9506	0.1443	24.9621	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	0.1333	-54.1093	
PV Unit electricity exported	-311.8133	0.1252	-39.0389	
Total			-93.1481	(269)
Total CO2, kg/year			1042.8431	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.3600	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2541.3972	1.1300	2871.7789	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2692.4115	1.1300	3042.4250	(278)
Space and water heating			5914.2038	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.9506	1.5338	265.2774	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.8741	1.4926	-605.8233	
PV Unit electricity exported	-311.8133	0.4595	-143.2889	
Total			-749.1122	(283)
Total Primary energy kWh/year			5560.4698	(286)
Target Primary Energy Rate (TPER)			76.5900	(287)

Summary for Input Data

Property Reference	Flat 18	**Issued on Date**	27/07/2025
Assessment Reference	Flat 18	**Prop Type Ref**	
Property			

SAP Rating	81 B	**DER**	5.51	**TER**	19.19
Environmental	96 A	**% DER < TER**			71.29
CO_2 Emissions (t/year)	0.27	**DFEE**	44.26	**TFEE**	53.83
Compliance Check	See BREL	**% DFEE < TFEE**			17.78
% DPER < TPER	43.83	**DPER**	57.77	**TPER**	102.84

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, End-Terrace	
Position of Flat	Top-floor flat	
Which Floor	4	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	110.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	22.65 m	53.90 m²	3.25 m

8.0 Living Area	35.00	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	73.61	57.10	0.00	None	16.51	Calculate Wall Area

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	53.90	53.90	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	74.40

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on rubber), carpeted	70.00	74.40

12.0 Opening Types

Summary for Input Data

elmhurst energy

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Solid Door	Manufacturer	Solid Door				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Windows	External Wall 1	North	6.30	0
N	Solid Door	External Wall 1	North	1.82	0
S	Windows	External Wall 1	South	8.39	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		8.97	0.00	0.00	Yes
E3 Sill		8.16	0.00	0.00	Yes
E4 Jamb		11.70	0.00	0.00	Yes
E7 Party floor between dwellings (in blocks of flats)		22.65	0.00	0.00	No
E18 Party wall between dwellings		6.50	0.00	0.00	No
E16 Corner (normal)		9.75	0.00	0.00	No
E17 Corner (inverted – internal area greater than external area)		3.25	0.00	0.00	No
E15 Flat roof with parapet		22.65	0.00	0.00	No

Y-value	0.04	W/m²K
Description	RCDa	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	

21.0 Fixed Cooling System	No	

22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	110.00	6.00	660.00	25

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
In Winter	249.90	
In Summer	175.10	

Summary for Input Data

Controls SAP Code	2207
Delayed Start Stat	No
HETAS approved System	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2 — None

26.0 Heat Networks — None

27.0 Secondary Heating — None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system + pump	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder — None

Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No

31.0 Thermal Store — None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 18	**Issued on Date**	27/07/2025
Assessment Reference	Flat 18	**Prop Type Ref**	
Property			

SAP Rating	81 B	**DER**	5.51	**TER**	19.19
Environmental	96 A	**% DER < TER**			71.29
CO_2 Emissions (t/year)	0.27	**DFEE**	44.26	**TFEE**	53.83
Compliance Check	See BREL	**% DFEE < TFEE**			17.78
% DPER < TPER	43.83	**DPER**	57.77	**TPER**	102.84

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.1750	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3647 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3100 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3952	0.3875	0.3797	0.3410	0.3332	0.2945	0.2945	0.2867	0.3100	0.3332	0.3487	0.3642	(22b)
Effective ac	0.5781	0.5751	0.5721	0.5581	0.5555	0.5434	0.5434	0.5411	0.5480	0.5555	0.5608	0.5663	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	73.6125	16.5100	57.1025	0.1800	10.2784			(29a)
External Roof 1	53.9000		53.9000	0.1000	5.3900			(30)
Total net area of external elements Aum(A, m2)			127.5125					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.3091			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		5.1005 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	39.4096 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4185	33.2432	33.0713	32.2642	32.1132	31.4102	31.4102	31.2801	31.6810	32.1132	32.4187	32.7381	(38)
Heat transfer coeff	72.8280	72.6527	72.4809	71.6738	71.5228	70.8198	70.8198	70.6896	71.0906	71.5228	71.8283	72.1476	(39)

Average = Sum(39)m / 12 = 71.6731

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3512	1.3479	1.3447	1.3298	1.3270	1.3139	1.3139	1.3115	1.3189	1.3270	1.3326	1.3385	(40)
HLP (average)												1.3297	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8051 (42)

Hot water usage for mixer showers

61.2950	60.3739	59.0316	56.4634	54.5681	52.4545	51.2531	52.5852	54.0455	56.3149	58.9383	61.0602	(42a)

Hot water usage for baths

23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)

Hot water usage for other uses

33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)

Average daily hot water use (litres/day) 108.4548 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	117.9640	115.4889	112.4498	107.7691	103.9895	99.9176	98.3089	101.3344	104.5314	108.8119	113.5665	117.6495	(44)
Energy conte	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(45)
Energy content (annual)											Total = Sum(45)m =	1801.4233	
Distribution loss (46)m = 0.15 x (45)m	28.0239	24.6682	25.9247	22.1296	20.9985	18.4291	17.8344	18.8210	19.3347	22.1485	24.2694	27.6316	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
										Total per year (kWh/year) = Sum(64)m =		1801.4233	(64)
12Total per year (kWh/year)												1801	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	62.1197	54.6812	57.4663	49.0539	46.5466	40.8511	39.5329	41.7198	42.8585	49.0959	53.7973	61.2501	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.3632	87.8664	79.3632	82.0086	79.3632	82.0086	79.3632	79.3632	82.0086	79.3632	82.0086	79.3632	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)	83.4942	81.3708	77.2397	68.1304	62.5627	56.7376	53.1357	56.0750	59.5257	65.9891	74.7184	82.3254	(72)
Total internal gains	373.2798	381.2923	364.5435	349.3203	330.0501	313.4784	300.2885	301.5951	311.8057	327.3830	349.8148	365.1684	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	513.6295	616.7445	681.1126	738.7608	768.4450	750.9340	721.0206	684.6251	652.9843	585.7135	517.1657	485.8202	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	22.6142	22.6687	22.7225	22.9783	23.0269	23.2554	23.2554	23.2982	23.1668	23.0269	22.9289	22.8274	
alpha	2.5076	2.5112	2.5148	2.5319	2.5351	2.5504	2.5504	2.5532	2.5445	2.5351	2.5286	2.5218	
util living area	0.9301	0.8941	0.8489	0.7717	0.6637	0.5244	0.4017	0.4349	0.6096	0.7967	0.8987	0.9378	(86)
MIT	19.0234	19.3239	19.6887	20.1280	20.4868	20.7289	20.8243	20.8104	20.6452	20.1779	19.5312	18.9715	(87)
Th 2	19.8010	19.8035	19.8060	19.8176	19.8198	19.8300	19.8300	19.8318	19.8260	19.8198	19.8154	19.8108	(88)
util rest of house	0.9193	0.8784	0.8264	0.7372	0.6113	0.4484	0.3055	0.3378	0.5366	0.7582	0.8810	0.9281	(89)
MIT 2	17.5281	17.9021	18.3533	18.8908	19.3047	19.5662	19.6483	19.6410	19.4873	18.9659	18.1768	17.4701	(90)
Living area fraction										fLA = Living area / (4) =		0.6494	(91)
MIT	18.4991	18.8253	19.2204	19.6942	20.0723	20.3212	20.4120	20.4003	20.2392	19.7529	19.0563	18.4451	(92)
Temperature adjustment												0.0000	

adjusted MIT	18.4991	18.8253	19.2204	19.6942	20.0723	20.3212	20.4120	20.4003	20.2392	19.7529	19.0563	18.4451	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9048	0.8633	0.8138	0.7332	0.6233	0.4816	0.3547	0.3865	0.5638	0.7558	0.8675	0.9142	(94)
Useful gains	464.7188	532.4442	554.2577	541.6654	478.9360	361.6316	255.7398	264.6359	368.1422	442.6722	448.6623	444.1245	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1034.0894	1011.7127	921.9868	773.6608	598.8093	405.1771	269.9622	282.7829	436.4382	654.6427	858.8013	1027.7470	(97)
Space heating kWh	423.6117	322.0684	273.5905	167.0366	89.1857	0.0000	0.0000	0.0000	0.0000	157.7061	295.3001	434.2151	(98a)
Space heating requirement - total per year (kWh/year)												2162.7142	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	423.6117	322.0684	273.5905	167.0366	89.1857	0.0000	0.0000	0.0000	0.0000	157.7061	295.3001	434.2151	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2162.7142	
Space heating per m2											(98c) / (4) =	40.1246	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	423.6117	322.0684	273.5905	167.0366	89.1857	0.0000	0.0000	0.0000	0.0000	157.7061	295.3001	434.2151	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	169.5125	128.8789	109.4800	66.8414	35.6886	0.0000	0.0000	0.0000	0.0000	63.1077	118.1673	173.7555	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.6968	93.9204	98.7042	84.2550	79.9485	70.1658	67.9018	71.6580	73.6138	84.3271	92.4022	105.2032	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9274	11.9753	10.7825	7.8997	6.1019	4.9853	5.5664	7.2354	9.3981	12.3308	13.9276	15.3423	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	865.4319	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1028.7969	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	120.4728	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2014.7016	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	865.4319	0.1549	134.0189	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1028.7969	0.1416	145.6552	(264)
Space and water heating			279.6740	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.4728	0.1443	17.3880	(268)

Total CO2, kg/year	297.0620	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	5.5100	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	865.4319	1.5733	1361.5864	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1028.7969	1.5235	1567.4115	(278)
Space and water heating			2928.9979	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.4728	1.5338	184.7853	(282)
Total Primary energy kWh/year			3113.7832	(286)
Dwelling Primary energy Rate (DPER)			57.7700	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.1750	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3642 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3095 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3947	0.3869	0.3792	0.3405	0.3328	0.2941	0.2941	0.2863	0.3095	0.3328	0.3482	0.3637	(22b)
Effective ac	0.5779	0.5749	0.5719	0.5580	0.5554	0.5432	0.5432	0.5410	0.5479	0.5554	0.5606	0.5661	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6600	1.1450	13.3511			(27)
External Wall 1	73.6125	13.4800	60.1325	0.1800	10.8238			(29a)
External Roof 1	53.9000		53.9000	0.1100	5.9290			(30)
Total net area of external elements Aum(A, m2)			127.5125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.9240			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	22.6500	0.0700	1.5855
E18 Party wall between dwellings	6.5000	0.0600	0.3900
E16 Corner (normal)	9.7500	0.0900	0.8775
E17 Corner (inverted - internal area greater than external area)	3.2500	-0.0900	-0.2925
E15 Flat roof with parapet	22.6500	0.5600	12.6840

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	16.6860	(36)
Point Thermal bridges	(36a) = 0.0000	
Total fabric heat loss	(33) + (36) + (36a) = 48.6100	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4061	33.2313	33.0599	32.2550	32.1044	31.4034	31.4034	31.2736	31.6734	32.1044	32.4091	32.7276	(38)

Heat transfer coeff

	82.0161	81.8413	81.6699	80.8650	80.7144	80.0134	80.0134	79.8835	80.2834	80.7144	81.0191	81.3376 (39)
Average = Sum(39)m / 12 =												80.8643

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.5216	1.5184	1.5152	1.5003	1.4975	1.4845	1.4845	1.4821	1.4895	1.4975	1.5031	1.5090	(40)
HLP (average)												1.5003	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051 (42)
Hot water usage for mixer showers												
	54.4845	53.6657	52.4725	50.1897	48.5050	46.6262	45.5583	46.7424	48.0404	50.0577	52.3896	54.2757 (42a)
Hot water usage for baths												
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737 (42b)
Hot water usage for other uses												
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156 (42c)
Average daily hot water use (litres/day)												102.1757 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.1535	108.7807	105.8907	101.4954	97.9264	94.0893	92.6141	95.4916	98.5264	102.5547	107.0178	110.8651	(44)
Energy conte	176.0399	154.9022	162.7501	138.9421	131.8278	115.6938	112.0087	118.2385	121.4929	139.1658	152.4665	173.5879	(45)
Energy content (annual)										Total = Sum(45)m =		1697.1161	
Distribution loss (46)m = 0.15 x (45)m													
	26.4060	23.2353	24.4125	20.8413	19.7742	17.3541	16.8013	17.7358	18.2239	20.8749	22.8700	26.0382	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.6348	196.9879	209.3450	184.0340	178.4227	160.7856	158.6036	164.8334	166.5847	185.7607	197.5583	220.1828	(62)
WWHRS	-24.9080	-22.0289	-23.0674	-19.1007	-17.8012	-15.2326	-14.2781	-15.1833	-15.7602	-18.5795	-21.0484	-24.4468	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
										Total per year (kWh/year) = Sum(64)m =		2014.2986	(64)
12Total per year (kWh/year)												2014	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8092	85.1736	91.3903	82.2717	81.1086	74.5417	74.5188	76.5902	76.4699	83.5485	86.7686	94.9939	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4429	87.9546	79.4429	82.0910	79.4429	82.0910	79.4429	79.4429	82.0910	79.4429	82.0910	79.4429	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	128.7758	126.7464	122.8365	114.2663	109.0170	103.5301	100.1597	102.9439	106.2081	112.2964	120.5119	127.6800	(72)
Total internal gains													
	418.6410	426.7561	410.2200	395.5386	376.5841	360.3532	347.3922	348.5436	358.5705	373.7700	395.6906	410.6027	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.6600	46.7521	0.6300	0.7000	0.7700	95.1583	(78)

Solar gains	111.4069	186.8966	251.2832	309.1225	347.9771	347.2299	333.9562	304.0328	270.8162	205.0563	132.8397	95.7711	(83)
Total gains	530.0479	613.6527	661.5031	704.6611	724.5612	707.5832	681.3485	652.5764	629.3867	578.8263	528.5304	506.3738	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	20.0807	20.1236	20.1659	20.3666	20.4046	20.5834	20.5834	20.6168	20.5141	20.4046	20.3279	20.2483	
alpha	2.3387	2.3416	2.3444	2.3578	2.3603	2.3722	2.3722	2.3745	2.3676	2.3603	2.3552	2.3499	
util living area													
	0.9305	0.9032	0.8685	0.8068	0.7147	0.5839	0.4583	0.4896	0.6570	0.8190	0.9030	0.9367	(86)
MIT	18.2110	18.5685	19.0563	19.6873	20.2540	20.6817	20.8719	20.8456	20.5489	19.8291	18.9239	18.1505	(87)
Th 2	19.6713	19.6737	19.6761	19.6873	19.6894	19.6992	19.6992	19.7010	19.6954	19.6894	19.6851	19.6807	(88)

util rest of house													
	0.9191	0.8877	0.8468	0.7729	0.6605	0.4982	0.3422	0.3747	0.5783	0.7803	0.8848	0.9262	(89)
MIT 2	16.5128	16.9585	17.5654	18.3408	19.0056	19.4703	19.6379	19.6218	19.3440	18.5299	17.4190	16.4424	(90)
Living area fraction										fLA = Living area / (4) =		0.6494	(91)
MIT	17.6155	18.0039	18.5335	19.2151	19.8163	20.2569	20.4392	20.4165	20.1264	19.3735	18.3962	17.5516	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.6155	18.0039	18.5335	19.2151	19.8163	20.2569	20.4392	20.4165	20.1264	19.3735	18.3962	17.5516	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8958	0.8630	0.8239	0.7588	0.6663	0.5371	0.4107	0.4407	0.6064	0.7695	0.8622	0.9037	(94)
Useful gains	474.7990	529.6108	545.0226	534.7215	482.7591	380.0239	279.8328	287.5967	381.6605	445.3898	455.7127	457.5942	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1092.0878	1072.4419	982.7753	834.1339	655.0987	452.6263	307.1872	320.8490	483.8189	708.1484	915.2075	1085.9825	(97)
Space heating kWh	459.2628	364.7825	325.6880	215.5769	128.2207	0.0000	0.0000	0.0000	0.0000	195.4924	330.8362	467.5209	(98a)
Space heating requirement - total per year (kWh/year)												2487.3804	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	459.2628	364.7825	325.6880	215.5769	128.2207	0.0000	0.0000	0.0000	0.0000	195.4924	330.8362	467.5209	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2487.3804	
Space heating per m2											(98c) / (4) =	46.1481	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.3000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	459.2628	364.7825	325.6880	215.5769	128.2207	0.0000	0.0000	0.0000	0.0000	195.4924	330.8362	467.5209	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	497.5762	395.2140	352.8580	233.5611	138.9173	0.0000	0.0000	0.0000	0.0000	211.8011	358.4358	506.5232	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.8848	85.6681	85.2997	84.6613	83.5594	79.8000	79.8000	79.8000	79.8000	84.4115	85.4472	85.9396	(217)
Fuel for water heating, kWh/month	230.2232	204.2290	218.3802	194.8155	192.2243	182.3973	180.8591	187.5314	189.0031	198.0549	206.5718	227.7599	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5067	13.2423	11.9232	8.7354	6.7475	5.5128	6.1553	8.0009	10.3924	13.6353	15.4011	16.9654	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0405	-18.1101	-27.7562	-33.3524	-37.8875	-36.0892	-35.6643	-32.7117	-27.8479	-21.6386	-13.6384	-10.2826	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7436	-8.0966	-16.5107	-25.4205	-34.2237	-34.5988	-34.1781	-28.6457	-20.6253	-11.7651	-5.0580	-2.9432	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2694.8867	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2412.0497	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.2182	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-532.8285	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4793.3261	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	

Space heating - main system 1	2694.8867	0.2100	565.9262	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2412.0497	0.2100	506.5304	(264)
Space and water heating			1072.4566	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.2182	0.1443	19.2275	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	0.1332	-40.9064	
PV Unit electricity exported	-225.8092	0.1252	-28.2685	
Total			-69.1749	(269)
Total CO2, kg/year			1034.4385	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			19.1900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2694.8867	1.1300	3045.2219	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2412.0497	1.1300	2725.6161	(278)
Space and water heating			5770.8381	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.2182	1.5338	204.3346	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	1.4923	-458.1785	
PV Unit electricity exported	-225.8092	0.4595	-103.7575	
Total			-561.9360	(283)
Total Primary energy kWh/year			5543.3375	(286)
Target Primary Energy Rate (TPER)			102.8400	(287)

Full SAP Calculation Printout

Property Reference	Flat 18	**Issued on Date**	27/07/2025
Assessment Reference	Flat 18	**Prop Type Ref**	
Property			

SAP Rating	81 B	**DER**	5.51	**TER**	19.19
Environmental	96 A	**% DER < TER**			71.29
CO_2 Emissions (t/year)	0.27	**DFEE**	44.26	**TFEE**	53.83
Compliance Check	See BREL	**% DFEE < TFEE**			17.78
% DPER < TPER	43.83	**DPER**	57.77	**TPER**	102.84

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000 (1b)	x	3.2500 (2b)	=	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	175.1750	(5)

2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3647	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3100	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3952	0.3875	0.3797	0.3410	0.3332	0.2945	0.2945	0.2867	0.3100	0.3332	0.3487	0.3642	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5781	0.5751	0.5721	0.5581	0.5555	0.5434	0.5434	0.5411	0.5480	0.5555	0.5608	0.5663	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	73.6125	16.5100	57.1025	0.1800	10.2784			(29a)
External Roof 1	53.9000		53.9000	0.1000	5.3900			(30)
Total net area of external elements Aum(A, m2)			127.5125					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.3091			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)
Thermal bridges (User defined value 0.040 * total exposed area)	5.1005	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	39.4096	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4185	33.2432	33.0713	32.2642	32.1132	31.4102	31.4102	31.2801	31.6810	32.1132	32.4187	32.7381	(38)

Heat transfer coeff

	72.8280	72.6527	72.4809	71.6738	71.5228	70.8198	70.8198	70.6896	71.0906	71.5228	71.8283	72.1476 (39)
Average = Sum(39)m / 12 =												71.6731

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3512	1.3479	1.3447	1.3298	1.3270	1.3139	1.3139	1.3115	1.3189	1.3270	1.3326	1.3385	(40)
HLP (average)												1.3297	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8051 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)

Hot water usage for other uses

33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)

Average daily hot water use (litres/day) 51.9428 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	56.6690	55.1150	53.4182	51.3057	49.4214	47.4631	47.0558	48.7491	50.4859	52.4971	54.6282	56.5894	(44)
Energy conte	89.7498	78.4830	82.1018	70.2350	66.5307	58.3614	56.9099	60.3616	62.2542	71.2380	77.8279	88.6053	(45)
Energy content (annual)										Total = Sum(45)m =		862.6586	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145	(64)
										Total per year (kWh/year) = Sum(64)m =		733.2598	(64)
12Total per year (kWh/year)												733	(64)
Electric shower(s)													
	43.6330	38.8774	42.4526	40.5120	41.2722	39.3696	40.6820	41.2722	40.5120	42.4526	41.6543	43.6330	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		496.3227	(64a)
Heat gains from water heating, kWh/month													
	29.9801	26.3970	28.0598	25.0529	24.4558	22.2442	22.2638	23.1449	23.3570	25.7512	26.9520	29.7369	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.3632	87.8664	79.3632	82.0086	79.3632	82.0086	79.3632	79.3632	82.0086	79.3632	82.0086	79.3632	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	40.2958	39.2812	37.7147	34.7957	32.8707	30.8947	29.9245	31.1087	32.4403	34.6119	37.4333	39.9689	(72)
Total internal gains													
	327.0813	336.2027	322.0185	312.9857	297.3582	287.6355	277.0773	276.6288	284.7203	293.0057	309.5297	319.8119	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	467.4311	571.6550	638.5876	702.4261	735.7531	725.0912	697.8094	659.6588	625.8989	551.3363	476.8807	440.4638	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	22.6142	22.6687	22.7225	22.9783	23.0269	23.2554	23.2554	23.2982	23.1668	23.0269	22.9289	22.8274	
alpha	2.5076	2.5112	2.5148	2.5319	2.5351	2.5504	2.5504	2.5532	2.5445	2.5351	2.5286	2.5218	
util living area													
	0.9420	0.9079	0.8644	0.7877	0.6801	0.5380	0.4130	0.4483	0.6261	0.8145	0.9129	0.9490	(86)
MIT	18.4019	18.8189	19.3258	19.9418	20.4441	20.7860	20.9207	20.9001	20.6664	20.0056	19.1038	18.3307	(87)
Th 2	19.8010	19.8035	19.8060	19.8176	19.8198	19.8300	19.8300	19.8318	19.8260	19.8198	19.8154	19.8108	(88)
util rest of house													
	0.9327	0.8938	0.8434	0.7544	0.6282	0.4612	0.3147	0.3491	0.5531	0.7780	0.8972	0.9408	(89)
MIT 2	17.4807	17.8868	18.3773	18.9662	19.4200	19.7081	19.7991	19.7902	19.6201	19.0422	18.1805	17.4177	(90)
Living area fraction										fLA = Living area / (4) =		0.6494	(91)

MIT	18.0789	18.4920	18.9932	19.5997	20.0850	20.4080	20.5274	20.5109	20.2995	19.6678	18.7801	18.0105	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.0789	18.4920	18.9932	19.5997	20.0850	20.4080	20.5274	20.5109	20.2995	19.6678	18.7801	18.0105	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9156	0.8749	0.8268	0.7476	0.6407	0.5005	0.3747	0.4084	0.5842	0.7726	0.8802	0.9245	(94)
Useful gains	427.9619	500.1645	527.9591	525.1209	471.3827	362.9317	261.4846	269.3994	365.6645	425.9816	419.7672	407.2225	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	1003.4883	987.4978	905.5178	766.8889	599.7188	411.3229	278.1391	290.5984	440.7264	648.5539	838.9593	996.3964	(97)
Space heating kWh													
	428.1916	327.4880	280.9037	174.0730	95.4821	0.0000	0.0000	0.0000	0.0000	165.5938	301.8184	438.3454	(98a)
Space heating requirement - total per year (kWh/year)												2211.8959	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	428.1916	327.4880	280.9037	174.0730	95.4821	0.0000	0.0000	0.0000	0.0000	165.5938	301.8184	438.3454	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2211.8959	
Space heating per m2											(98c) / (4) =	41.0370	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W													
	0.0000	0.0000	0.0000	0.0000	0.0000	665.7062	524.0666	537.2412	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7881	0.8455	0.8241	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	524.6758	443.0893	442.7137	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	818.9413	788.6212	745.5509	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	211.8711	257.0757	225.3109	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)													
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	52.9678	64.2689	56.3277	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												173.5644	(107)
Energy for space heating												41.0370	(99)
Energy for space cooling												3.2201	(108)
Total												44.2571	(109)
Fabric Energy Efficiency (DFEE)												44.3	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.1750	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3642	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3095	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
	0.3947	0.3869	0.3792	0.3405	0.3328	0.2941	0.2941	0.2863	0.3095	0.3328	0.3482	0.3637	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0.0000 (23c)

Effective ac	0.5779	0.5749	0.5719	0.5580	0.5554	0.5432	0.5432	0.5410	0.5479	0.5554	0.5606	0.5661 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6600	1.1450	13.3511			(27)
External Wall 1	73.6125	13.4800	60.1325	0.1800	10.8238			(29a)
External Roof 1	53.9000		53.9000	0.1100	5.9290			(30)
Total net area of external elements Aum(A, m2)			127.5125					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.9240			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 110.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	22.6500	0.0700	1.5855
E18 Party wall between dwellings	6.5000	0.0600	0.3900
E16 Corner (normal)	9.7500	0.0900	0.8775
E17 Corner (inverted - internal area greater than external area)	3.2500	-0.0900	-0.2925
E15 Flat roof with parapet	22.6500	0.5600	12.6840

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 16.6860 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 48.6100 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4061	33.2313	33.0599	32.2550	32.1044	31.4034	31.4034	31.2736	31.6734	32.1044	32.4091	32.7276	(38)
Heat transfer coeff	82.0161	81.8413	81.6699	80.8650	80.7144	80.0134	80.0134	79.8835	80.2834	80.7144	81.0191	81.3376	(39)

Average = Sum(39)m / 12 = 80.8643

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.5216	1.5184	1.5152	1.5003	1.4975	1.4845	1.4845	1.4821	1.4895	1.4975	1.5031	1.5090	(40)
HLP (average)												1.5003	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8051 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)

Hot water usage for other uses

33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)

Average daily hot water use (litres/day) 51.9428 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	56.6690	55.1150	53.4182	51.3057	49.4214	47.4631	47.0558	48.7491	50.4859	52.4971	54.6282	56.5894	(44)
Energy conte	89.7498	78.4830	82.1018	70.2350	66.5307	58.3614	56.9099	60.3616	62.2542	71.2380	77.8279	88.6053	(45)

Energy content (annual) Total = Sum(45)m = 862.6586

Distribution loss (46)m = 0.15 x (45)m

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month

76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145	(62)
WWHRS 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

Output from w/h

76.2873	66.7105	69.7865	59.6997	56.5511	49.6072	48.3734	51.3074	52.9161	60.5523	66.1537	75.3145	(64)

Total per year (kWh/year) = Sum(64)m = 733.2598 (64)

12Total per year (kWh/year) 733 (64)

Electric shower(s)

43.6330	38.8774	42.4526	40.5120	41.2722	39.3696	40.6820	41.2722	40.5120	42.4526	41.6543	43.6330	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 496.3227 (64a)

Heat gains from water heating, kWh/month

29.9801	26.3970	28.0598	25.0529	24.4558	22.2442	22.2638	23.1449	23.3570	25.7512	26.9520	29.7369	(65)

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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.4429	87.9546	79.4429	82.0910	79.4429	82.0910	79.4429	79.4429	82.0910	79.4429	82.0910	79.4429	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)	40.2958	39.2812	37.7147	34.7957	32.8707	30.8947	29.9245	31.1087	32.4403	34.6119	37.4333	39.9689	(72)
Total internal gains	327.1611	336.2910	322.0982	313.0680	297.4379	287.7179	277.1570	276.7085	284.8027	293.0854	309.6121	319.8916	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.6600	46.7521	0.6300	0.7000	0.7700	95.1583	(78)

Solar gains	111.4069	186.8966	251.2832	309.1225	347.9771	347.2299	333.9562	304.0328	270.8162	205.0563	132.8397	95.7711	(83)
Total gains	438.5679	523.1875	573.3814	622.1905	645.4149	634.9478	611.1133	580.7412	555.6189	498.1418	442.4518	415.6627	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	20.0807	20.1236	20.1659	20.3666	20.4046	20.5834	20.5834	20.6168	20.5141	20.4046	20.3279	20.2483	
alpha	2.3387	2.3416	2.3444	2.3578	2.3603	2.3722	2.3722	2.3745	2.3676	2.3603	2.3552	2.3499	
util living area	0.9515	0.9273	0.8967	0.8397	0.7534	0.6248	0.4979	0.5331	0.7020	0.8565	0.9297	0.9567	(86)
MIT	17.9694	18.3484	18.8637	19.5399	20.1527	20.6289	20.8463	20.8137	20.4735	19.6772	18.7130	17.9058	(87)
Th 2	19.6713	19.6737	19.6761	19.6873	19.6894	19.6992	19.6992	19.7010	19.6954	19.6894	19.6851	19.6807	(88)
util rest of house	0.9431	0.9150	0.8784	0.8095	0.7021	0.5388	0.3760	0.4132	0.6254	0.8231	0.9156	0.9492	(89)
MIT 2	16.9758	17.3474	17.8511	18.5068	19.0750	19.4871	19.6406	19.6246	19.3686	18.6523	17.7191	16.9193	(90)
Living area fraction									fLA = Living area / (4) =			0.6494	(91)
MIT	17.6210	17.9974	18.5086	19.1776	19.7748	20.2286	20.4235	20.3967	20.0861	19.3178	18.3645	17.5599	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.6210	17.9974	18.5086	19.1776	19.7748	20.2286	20.4235	20.3967	20.0861	19.3178	18.3645	17.5599	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9257	0.8950	0.8585	0.7957	0.7058	0.5762	0.4470	0.4808	0.6506	0.8118	0.8973	0.9328	(94)
Useful gains	405.9678	468.2473	492.2383	495.0749	455.5556	365.8672	273.1590	279.2269	361.4781	404.3873	397.0214	387.7141	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1092.5380	1071.9100	980.7441	831.1006	651.7554	450.3601	305.9319	319.2722	480.5812	703.6537	912.6372	1086.6596	(97)
Space heating kWh	510.8082	405.6613	363.4483	241.9385	145.9726	0.0000	0.0000	0.0000	0.0000	222.6542	371.2434	520.0155	(98a)
Space heating requirement - total per year (kWh/year)												2781.7420	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	510.8082	405.6613	363.4483	241.9385	145.9726	0.0000	0.0000	0.0000	0.0000	222.6542	371.2434	520.0155	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2781.7420	
Space heating per m2											(98c) / (4) =	51.6093	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	752.1257	592.0989	607.1150	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6847	0.7539	0.7290	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	514.9788	446.3542	442.5583	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	713.4896	687.2025	653.2262	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	142.9278	179.1911	156.7369	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fC = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	35.7319	44.7978	39.1842	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												119.7140	(107)
Energy for space heating												51.6093	(99)
Energy for space cooling												2.2210	(108)
Total												53.8304	(109)
Fabric Energy Efficiency (TFEE)												53.8	(109)

Full SAP Calculation Printout

Property Reference	Flat 18	**Issued on Date**	27/07/2025
Assessment Reference	Flat 18	**Prop Type Ref**	
Property			

SAP Rating	81 B	**DER**	5.51	**TER**	19.19
Environmental	96 A	**% DER < TER**			71.29
CO_2 Emissions (t/year)	0.27	**DFEE**	44.26	**TFEE**	53.83
Compliance Check	See BREL	**% DFEE < TFEE**			17.78
% DPER < TPER	43.83	**DPER**	57.77	**TPER**	102.84

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.1750	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0100 (17)
Infiltration rate		0.3647 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3100 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3952	0.3875	0.3797	0.3410	0.3332	0.2945	0.2945	0.2867	0.3100	0.3332	0.3487	0.3642	(22b)
Effective ac	0.5781	0.5751	0.5721	0.5581	0.5555	0.5434	0.5434	0.5411	0.5480	0.5555	0.5608	0.5663	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			14.6900	1.1450	16.8206			(27)
Solid Door			1.8200	1.0000	1.8200			(26)
External Wall 1	73.6125	16.5100	57.1025	0.1800	10.2784			(29a)
External Roof 1	53.9000		53.9000	0.1000	5.3900			(30)
Total net area of external elements Aum(A, m2)			127.5125					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.3091			(33)
Main dwelling								
Party Floor 1			74.4000					(32d)
Party Ceiling 1			74.4000					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		110.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		5.1005 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	39.4096 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4185	33.2432	33.0713	32.2642	32.1132	31.4102	31.4102	31.2801	31.6810	32.1132	32.4187	32.7381	(38)
Heat transfer coeff	72.8280	72.6527	72.4809	71.6738	71.5228	70.8198	70.8198	70.6896	71.0906	71.5228	71.8283	72.1476	(39)

Average = Sum(39)m / 12 = 71.6731

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3512	1.3479	1.3447	1.3298	1.3270	1.3139	1.3139	1.3115	1.3189	1.3270	1.3326	1.3385	(40)
HLP (average)												1.3297	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8051 (42)

Hot water usage for mixer showers

61.2950	60.3739	59.0316	56.4634	54.5681	52.4545	51.2531	52.5852	54.0455	56.3149	58.9383	61.0602	(42a)

Hot water usage for baths

23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)

Hot water usage for other uses

33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)

Average daily hot water use (litres/day) 108.4548 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	117.9640	115.4889	112.4498	107.7691	103.9895	99.9176	98.3089	101.3344	104.5314	108.8119	113.5665	117.6495	(44)
Energy conte	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(45)
Energy content (annual)											Total = Sum(45)m =	1801.4233	
Distribution loss (46)m = 0.15 x (45)m	28.0239	24.6682	25.9247	22.1296	20.9985	18.4291	17.8344	18.8210	19.3347	22.1485	24.2694	27.6316	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
										Total per year (kWh/year) = Sum(64)m =		1801.4233	(64)
12Total per year (kWh/year)												1801	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	62.1197	54.6812	57.4663	49.0539	46.5466	40.8511	39.5329	41.7198	42.8585	49.0959	53.7973	61.2501	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.3632	87.8664	79.3632	82.0086	79.3632	82.0086	79.3632	79.3632	82.0086	79.3632	82.0086	79.3632	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)	83.4942	81.3708	77.2397	68.1304	62.5627	56.7376	53.1357	56.0750	59.5257	65.9891	74.7184	82.3254	(72)
Total internal gains	373.2798	381.2923	364.5435	349.3203	330.0501	313.4784	300.2885	301.5951	311.8057	327.3830	349.8148	365.1684	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	6.3000	10.6334	0.6300	0.7000	0.7700	20.4731	(74)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)

Solar gains	140.3498	235.4523	316.5691	389.4405	438.3949	437.4556	420.7320	383.0300	341.1786	258.3306	167.3509	120.6519	(83)
Total gains	513.6295	616.7445	681.1126	738.7608	768.4450	750.9340	721.0206	684.6251	652.9843	585.7135	517.1657	485.8202	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	22.6142	22.6687	22.7225	22.9783	23.0269	23.2554	23.2554	23.2982	23.1668	23.0269	22.9289	22.8274	
alpha	2.5076	2.5112	2.5148	2.5319	2.5351	2.5504	2.5504	2.5532	2.5445	2.5351	2.5286	2.5218	
util living area	0.9301	0.8941	0.8489	0.7717	0.6637	0.5244	0.4017	0.4349	0.6096	0.7967	0.8987	0.9378	(86)
MIT	19.0234	19.3239	19.6887	20.1280	20.4868	20.7289	20.8243	20.8104	20.6452	20.1779	19.5312	18.9715	(87)
Th 2	19.8010	19.8035	19.8060	19.8176	19.8198	19.8300	19.8300	19.8318	19.8260	19.8198	19.8154	19.8108	(88)
util rest of house	0.9193	0.8784	0.8264	0.7372	0.6113	0.4484	0.3055	0.3378	0.5366	0.7582	0.8810	0.9281	(89)
MIT 2	17.5281	17.9021	18.3533	18.8908	19.3047	19.5662	19.6483	19.6410	19.4873	18.9659	18.1768	17.4701	(90)
Living area fraction										fLA = Living area / (4) =		0.6494	(91)
MIT	18.4991	18.8253	19.2204	19.6942	20.0723	20.3212	20.4120	20.4003	20.2392	19.7529	19.0563	18.4451	(92)
Temperature adjustment												0.0000	

adjusted MIT	18.4991	18.8253	19.2204	19.6942	20.0723	20.3212	20.4120	20.4003	20.2392	19.7529	19.0563	18.4451	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9048	0.8633	0.8138	0.7332	0.6233	0.4816	0.3547	0.3865	0.5638	0.7558	0.8675	0.9142	(94)
Useful gains	464.7188	532.4442	554.2577	541.6654	478.9360	361.6316	255.7398	264.6359	368.1422	442.6722	448.6623	444.1245	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1034.0894	1011.7127	921.9868	773.6608	598.8093	405.1771	269.9622	282.7829	436.4382	654.6427	858.8013	1027.7470	(97)
Space heating kWh	423.6117	322.0684	273.5905	167.0366	89.1857	0.0000	0.0000	0.0000	0.0000	157.7061	295.3001	434.2151	(98a)
Space heating requirement - total per year (kWh/year)												2162.7142	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	423.6117	322.0684	273.5905	167.0366	89.1857	0.0000	0.0000	0.0000	0.0000	157.7061	295.3001	434.2151	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2162.7142	
Space heating per m2											(98c) / (4) =	40.1246	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	423.6117	322.0684	273.5905	167.0366	89.1857	0.0000	0.0000	0.0000	0.0000	157.7061	295.3001	434.2151	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	169.5125	128.8789	109.4800	66.8414	35.6886	0.0000	0.0000	0.0000	0.0000	63.1077	118.1673	173.7555	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	186.8262	164.4546	172.8311	147.5305	139.9899	122.8603	118.8961	125.4731	128.8977	147.6568	161.7963	184.2108	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	106.6968	93.9204	98.7042	84.2550	79.9485	70.1658	67.9018	71.6580	73.6138	84.3271	92.4022	105.2032	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	14.9274	11.9753	10.7825	7.8997	6.1019	4.9853	5.5664	7.2354	9.3981	12.3308	13.9276	15.3423	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	865.4319	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1028.7969	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	120.4728	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2014.7016	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	865.4319	0.1549	134.0189	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1028.7969	0.1416	145.6552	(264)
Space and water heating			279.6740	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	120.4728	0.1443	17.3880	(268)

Total CO2, kg/year	297.0620	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)	5.5100	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	865.4319	1.5733	1361.5864	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1028.7969	1.5235	1567.4115	(278)
Space and water heating			2928.9979	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	120.4728	1.5338	184.7853	(282)
Total Primary energy kWh/year			3113.7832	(286)
Dwelling Primary energy Rate (DPER)			57.7700	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.9000	(1b)	x 3.2500	(2b) =	175.1750	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		175.1750	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1142 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3642 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3095 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3947	0.3869	0.3792	0.3405	0.3328	0.2941	0.2941	0.2863	0.3095	0.3328	0.3482	0.3637	(22b)
Effective ac	0.5779	0.5749	0.5719	0.5580	0.5554	0.5432	0.5432	0.5410	0.5479	0.5554	0.5606	0.5661	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8200	1.0000	1.8200			(26)
TER Opening Type			11.6600	1.1450	13.3511			(27)
External Wall 1	73.6125	13.4800	60.1325	0.1800	10.8238			(29a)
External Roof 1	53.9000		53.9000	0.1100	5.9290			(30)
Total net area of external elements Aum(A, m2)			127.5125					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.9240			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	110.0000	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.9700	0.0500	0.4485
E3 Sill	8.1600	0.0500	0.4080
E4 Jamb	11.7000	0.0500	0.5850
E7 Party floor between dwellings (in blocks of flats)	22.6500	0.0700	1.5855
E18 Party wall between dwellings	6.5000	0.0600	0.3900
E16 Corner (normal)	9.7500	0.0900	0.8775
E17 Corner (inverted - internal area greater than external area)	3.2500	-0.0900	-0.2925
E15 Flat roof with parapet	22.6500	0.5600	12.6840

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	16.6860	(36)
Point Thermal bridges	(36a) = 0.0000	
Total fabric heat loss	(33) + (36) + (36a) = 48.6100	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.4061	33.2313	33.0599	32.2550	32.1044	31.4034	31.4034	31.2736	31.6734	32.1044	32.4091	32.7276	(38)

Heat transfer coeff

	82.0161	81.8413	81.6699	80.8650	80.7144	80.0134	80.0134	79.8835	80.2834	80.7144	81.0191	81.3376 (39)
Average = Sum(39)m / 12 =												80.8643

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.5216	1.5184	1.5152	1.5003	1.4975	1.4845	1.4845	1.4821	1.4895	1.4975	1.5031	1.5090	(40)
HLP (average)												1.5003	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8051 (42)
Hot water usage for mixer showers												
	54.4845	53.6657	52.4725	50.1897	48.5050	46.6262	45.5583	46.7424	48.0404	50.0577	52.3896	54.2757 (42a)
Hot water usage for baths												
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737 (42b)
Hot water usage for other uses												
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156 (42c)
Average daily hot water use (litres/day)												102.1757 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.1535	108.7807	105.8907	101.4954	97.9264	94.0893	92.6141	95.4916	98.5264	102.5547	107.0178	110.8651	(44)
Energy conte	176.0399	154.9022	162.7501	138.9421	131.8278	115.6938	112.0087	118.2385	121.4929	139.1658	152.4665	173.5879	(45)
Energy content (annual)										Total = Sum(45)m =		1697.1161	
Distribution loss (46)m = 0.15 x (45)m													
	26.4060	23.2353	24.4125	20.8413	19.7742	17.3541	16.8013	17.7358	18.2239	20.8749	22.8700	26.0382	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	222.6348	196.9879	209.3450	184.0340	178.4227	160.7856	158.6036	164.8334	166.5847	185.7607	197.5583	220.1828	(62)
WWHRS	-24.9080	-22.0289	-23.0674	-19.1007	-17.8012	-15.2326	-14.2781	-15.1833	-15.7602	-18.5795	-21.0484	-24.4468	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
										Total per year (kWh/year) = Sum(64)m =		2014.2986	(64)
12Total per year (kWh/year)												2014	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	95.8092	85.1736	91.3903	82.2717	81.1086	74.5417	74.5188	76.5902	76.4699	83.5485	86.7686	94.9939	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	79.4429	87.9546	79.4429	82.0910	79.4429	82.0910	79.4429	79.4429	82.0910	79.4429	82.0910	79.4429	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)													
	128.7758	126.7464	122.8365	114.2663	109.0170	103.5301	100.1597	102.9439	106.2081	112.2964	120.5119	127.6800	(72)
Total internal gains													
	418.6410	426.7561	410.2200	395.5386	376.5841	360.3532	347.3922	348.5436	358.5705	373.7700	395.6906	410.6027	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.6600	46.7521	0.6300	0.7000	0.7700	95.1583	(78)

Solar gains	111.4069	186.8966	251.2832	309.1225	347.9771	347.2299	333.9562	304.0328	270.8162	205.0563	132.8397	95.7711	(83)
Total gains	530.0479	613.6527	661.5031	704.6611	724.5612	707.5832	681.3485	652.5764	629.3867	578.8263	528.5304	506.3738	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	20.0807	20.1236	20.1659	20.3666	20.4046	20.5834	20.5834	20.6168	20.5141	20.4046	20.3279	20.2483	
alpha	2.3387	2.3416	2.3444	2.3578	2.3603	2.3722	2.3722	2.3745	2.3676	2.3603	2.3552	2.3499	
util living area													
	0.9305	0.9032	0.8685	0.8068	0.7147	0.5839	0.4583	0.4896	0.6570	0.8190	0.9030	0.9367	(86)
MIT	18.2110	18.5685	19.0563	19.6873	20.2540	20.6817	20.8719	20.8456	20.5489	19.8291	18.9239	18.1505	(87)
Th 2	19.6713	19.6737	19.6761	19.6873	19.6894	19.6992	19.6992	19.7010	19.6954	19.6894	19.6851	19.6807	(88)

util rest of house													
	0.9191	0.8877	0.8468	0.7729	0.6605	0.4982	0.3422	0.3747	0.5783	0.7803	0.8848	0.9262	(89)
MIT 2	16.5128	16.9585	17.5654	18.3408	19.0056	19.4703	19.6379	19.6218	19.3440	18.5299	17.4190	16.4424	(90)
Living area fraction										fLA = Living area / (4) =		0.6494	(91)
MIT	17.6155	18.0039	18.5335	19.2151	19.8163	20.2569	20.4392	20.4165	20.1264	19.3735	18.3962	17.5516	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.6155	18.0039	18.5335	19.2151	19.8163	20.2569	20.4392	20.4165	20.1264	19.3735	18.3962	17.5516	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8958	0.8630	0.8239	0.7588	0.6663	0.5371	0.4107	0.4407	0.6064	0.7695	0.8622	0.9037	(94)
Useful gains	474.7990	529.6108	545.0226	534.7215	482.7591	380.0239	279.8328	287.5967	381.6605	445.3898	455.7127	457.5942	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1092.0878	1072.4419	982.7753	834.1339	655.0987	452.6263	307.1872	320.8490	483.8189	708.1484	915.2075	1085.9825	(97)
Space heating kWh	459.2628	364.7825	325.6880	215.5769	128.2207	0.0000	0.0000	0.0000	0.0000	195.4924	330.8362	467.5209	(98a)
Space heating requirement - total per year (kWh/year)												2487.3804	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	459.2628	364.7825	325.6880	215.5769	128.2207	0.0000	0.0000	0.0000	0.0000	195.4924	330.8362	467.5209	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2487.3804	
Space heating per m2											(98c) / (4) =	46.1481	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.3000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	459.2628	364.7825	325.6880	215.5769	128.2207	0.0000	0.0000	0.0000	0.0000	195.4924	330.8362	467.5209	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	497.5762	395.2140	352.8580	233.5611	138.9173	0.0000	0.0000	0.0000	0.0000	211.8011	358.4358	506.5232	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	197.7268	174.9591	186.2776	164.9333	160.6215	145.5531	144.3255	149.6501	150.8245	167.1811	176.5099	195.7361	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.8848	85.6681	85.2997	84.6613	83.5594	79.8000	79.8000	79.8000	79.8000	84.4115	85.4472	85.9396	(217)
Fuel for water heating, kWh/month	230.2232	204.2290	218.3802	194.8155	192.2243	182.3973	180.8591	187.5314	189.0031	198.0549	206.5718	227.7599	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.5067	13.2423	11.9232	8.7354	6.7475	5.5128	6.1553	8.0009	10.3924	13.6353	15.4011	16.9654	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-12.0405	-18.1101	-27.7562	-33.3524	-37.8875	-36.0892	-35.6643	-32.7117	-27.8479	-21.6386	-13.6384	-10.2826	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.7436	-8.0966	-16.5107	-25.4205	-34.2237	-34.5988	-34.1781	-28.6457	-20.6253	-11.7651	-5.0580	-2.9432	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2694.8867	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2412.0497	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	133.2182	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-532.8285	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4793.3261	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	

Space heating - main system 1	2694.8867	0.2100	565.9262	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2412.0497	0.2100	506.5304	(264)
Space and water heating			1072.4566	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.2182	0.1443	19.2275	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	0.1332	-40.9064	
PV Unit electricity exported	-225.8092	0.1252	-28.2685	
Total			-69.1749	(269)
Total CO2, kg/year			1034.4385	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			19.1900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2694.8867	1.1300	3045.2219	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2412.0497	1.1300	2725.6161	(278)
Space and water heating			5770.8381	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.2182	1.5338	204.3346	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0193	1.4923	-458.1785	
PV Unit electricity exported	-225.8092	0.4595	-103.7575	
Total			-561.9360	(283)
Total Primary energy kWh/year			5543.3375	(286)
Target Primary Energy Rate (TPER)			102.8400	(287)