Summary for Input Data

Plot Reference	A 906	Issued on Date	19/03/2026
Assessment Reference	Be Lean	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	84 B	DER	13.47	TER	15.73
Environmental	91 B	% DER < TER			14.37
CO_2 Emissions (t/year)	0.64	DFEE	31.16	TFEE	33.93
Compliance Check	See BREL	% DFEE < TFEE			8.15
% DPER < TPER	8.95	DPER	77.81	TPER	85.45

Assessor Details	Mr. Robert Tanner	Assessor ID	W344-0001
Client			

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

Orientation	Southwest	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Top-floor flat	
Which Floor	9	
2.0 Number of Storeys	1	
3.0 Date Built	2026	
4.0 Sheltered Sides	3	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	0.00	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:	9.18 m	51.11 m²	2.80 m

8.0 Living Area	25.52	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	0.15	70.00	17.22	8.88	0.00	None	8.34	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	8.48	6.06	0.70	Stairwell Access Corridor 3	2.42	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	55.24	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Plasterboard on timber frame	9.00	117.49

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	51.11	51.11	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete planks floor, screed, carpeted	40.00	51.11

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor				0.00			1.00
Window	Manufacturer	Window	Double Low-E Soft 0.1			0.35		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Door	Door	Corridor wall	South West	2.42	
Window	Window	External Wall 1	North East	8.34	

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

17.0 Thermal Bridging	Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate	Independently assessed	5.08	0.05	0.05	No
E4 Jamb	Independently assessed	12.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	2.79	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	3.03	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	3.36	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	5.60	0.05	0.05	No
E25 Staggered party wall between dwellings	Independently assessed	5.60	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	19.73	0.00	0.00	No
E3 Sill	Independently assessed	1.59	0.04	0.04	No
E14 Flat roof	Independently assessed	9.18	0.05	0.05	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	19.73	0.05	0.05	No

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500625
Configuration	1
Manufacturer SFP	0.63
Duct Type	Rigid
MVHR Efficiency	90.00
Wet Rooms	1
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

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	0
Number of passive vents	0
Number of flueless gas fires	0

21.0 Fixed Cooling System	No

Summary for Input Data

elmhurst energy

22.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	75.00	15.00	1125.00	5

24.0 Main Heating 1	Manufacturer	
Percentage of Heat	100.00	%
Fuel Type	Mains gas	
SAP Code	102	
In Winter	88.80	
In Summer	79.80	
Model Name	x	
Manufacturer	x	
Controls SAP Code	2110	
Delayed Start Stat	Yes	
Burner Control	Modulating	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Enter value	
Flow Temperature Value	55.00	
Boiler Interlock	Yes	
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
Cold Water Source	From header tank
Bath Count	1

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	8.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes

Summary for Input Data

Independent Time Control	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	180.00	L
Loss	1.20	kWh/day
Pipes insulation	Fully insulated primary pipework	

31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Plot Reference	A 906	Issued on Date	19/03/2026
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Plot Address		SAP Version	10.2

SAP Rating	84 B	DER	13.47	TER	15.73
Environmental	91 B	% DER < TER			14.37
CO_2 Emissions (t/year)	0.64	DFEE	31.16	TFEE	33.93
Compliance Check	See BREL	% DFEE < TFEE			8.15
% DPER < TPER	8.95	DPER	77.81	TPER	85.45

Assessor Details	Mr. Robert Tanner	Assessor ID	W344-0001
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	51.1100	(1b)	x 2.8000	(2b) =	143.1080	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1100					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	143.1080	(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	0 * 10 =	0.0000	(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) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.0000	(17)
Infiltration rate		0.1500	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1162	(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	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation	0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	81.0000	(23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.2432	0.2403	0.2374	0.2229	0.2200	0.2054	0.2054	0.2025	0.2112	0.2200	0.2258	0.2316	(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								
Door			2.4200	1.0000	2.4200			(26)
Window			8.3400	1.1450	9.5496			(27)
External Wall 1	17.2200	8.3400	8.8800	0.1500	1.3320	70.0000	621.6000	(29a)
Corridor wall	8.4800	2.4200	6.0600	0.1900	1.1514	70.0000	424.2000	(29a)
External Roof 1	51.1100		51.1100	0.1000	5.1110	9.0000	459.9900	(30)
Total net area of external elements Aum(A, m2)			76.8100					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.5640			(33)
Main dwelling								
Party Wall 1			55.2400	0.0000	0.0000	70.0000	3866.8001	(32)
Party Floor 1			51.1100			40.0000	2044.4000	(32d)
Internal Wall 1			117.4900			9.0000	1057.4100	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 8474.4000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	165.8071	(35)
List of Thermal Bridges		

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E4 Jamb	12.6000	0.0400	0.5040
E7 Party floor between dwellings (in blocks of flats)	2.7900	0.0500	0.1395
E7 Party floor between dwellings (in blocks of flats)	3.0300	0.0390	0.1182
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0500	0.1680
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E25 Staggered party wall between dwellings	5.6000	0.0390	0.2184
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	19.7300	0.0000	0.0000
E3 Sill	1.5900	0.0400	0.0636
E14 Flat roof	9.1800	0.0500	0.4590
P4 Party wall - Roof (insulation at ceiling level)	19.7300	0.0500	0.9865

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.1912 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 22.7552 (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	11.4862	11.3489	11.2117	10.5254	10.3882	9.7019	9.7019	9.5647	9.9764	10.3882	10.6627	10.9372	(38)
Heat transfer coeff	34.2413	34.1041	33.9669	33.2806	33.1434	32.4571	32.4571	32.3199	32.7316	33.1434	33.4179	33.6924	(39)

Average = Sum(39)m / 12 = 33.2463

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6700	0.6673	0.6646	0.6512	0.6485	0.6350	0.6350	0.6324	0.6404	0.6485	0.6538	0.6592	(40)
HLP (average)												0.6505	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7228 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	51.7637	50.9712	49.8033	48.0066	46.3969	44.1448	42.3636	44.4459	45.4933	47.7239	50.0468	51.7171	(42a)
Hot water usage for baths	22.4485	22.1096	21.6275	20.9056	20.2549	19.3592	18.6797	19.5107	19.9467	20.8342	21.7569	22.4307	(42b)
Hot water usage for other uses	32.2734	31.0998	29.9262	28.7526	27.5790	26.4055	26.4055	27.5790	28.7526	29.9262	31.0998	32.2734	(42c)

Average daily hot water use (litres/day) 97.8766 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	106.4856	104.1806	101.3570	97.6648	94.2308	89.9095	87.4488	91.5356	94.1927	98.4843	102.9035	106.4211	(44)
Energy conte	156.7651	137.8520	144.8371	127.5747	121.4260	103.9774	96.6335	107.7391	109.2588	126.9069	139.0775	156.2872	(45)

Energy content (annual) Total = Sum(45)m = 1528.3352

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Distribution loss (46)m = 0.15 x (45)m	23.5148	20.6778	21.7256	19.1362	18.2139	15.5966	14.4950	16.1609	16.3888	19.0360	20.8616	23.4431	(46)

Water storage loss (or HIU loss):
Store volume 180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.2000 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 0.6480 (55)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total storage loss	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(56)
If cylinder contains dedicated solar storage	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(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	200.1155	177.0072	188.1875	169.5267	164.7764	145.9294	139.9839	151.0895	151.2108	170.2573	181.0295	199.6376	(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	200.1155	177.0072	188.1875	169.5267	164.7764	145.9294	139.9839	151.0895	151.2108	170.2573	181.0295	199.6376	(64)

Total per year (kWh/year) = Sum(64)m = 2038.7512 (64)

12Total per year (kWh/year) 2039 (64)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat gains from water heating, kWh/month	86.8047	77.1600	82.8387	75.9802	75.0545	68.1341	66.8109	70.5036	69.8901	76.8769	79.8049	86.6458	(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	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.6912	87.1224	78.6912	81.3143	78.6912	81.3143	78.6912	78.6912	81.3143	78.6912	81.3143	78.6912	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	150.1164	151.6741	147.7487	139.3918	128.8429	118.9283	112.3048	110.7470	114.6725	123.0293	133.5783	143.4928	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	(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)	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	(71)
Water heating gains (Table 5)	116.6730	114.8214	111.3423	105.5280	100.8796	94.6307	89.7997	94.7629	97.0696	103.3291	110.8401	116.4594	(72)
Total internal gains	397.3229	405.4601	389.6244	378.0764	360.2560	343.7155	329.6379	333.0434	341.8986	356.8919	377.5749	390.4857	(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	
Northeast	8.3400	11.2829	0.3500	0.7000	0.7700	15.9767	(75)

Solar gains	15.9767	32.5211	58.5926	96.2260	129.3466	137.8971	128.9999	102.8402	71.3961	39.7433	20.1029	13.0474	(83)
Total gains	413.2996	437.9812	448.2171	474.3023	489.6025	481.6126	458.6378	435.8836	413.2947	396.6352	397.6777	403.5331	(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	68.7473	69.0240	69.3029	70.7319	71.0248	72.5265	72.5265	72.8345	71.9183	71.0248	70.4414	69.8675	
alpha	5.5832	5.6016	5.6202	5.7155	5.7350	5.8351	5.8351	5.8556	5.7946	5.7350	5.6961	5.6578	
util living area	0.9487	0.9264	0.8859	0.7736	0.6124	0.4295	0.3111	0.3407	0.5389	0.7858	0.9082	0.9527	(86)
MIT	20.4168	20.5346	20.6898	20.8833	20.9725	20.9971	20.9996	20.9994	20.9897	20.8922	20.6631	20.4090	(87)
Th 2	20.3674	20.3698	20.3722	20.3842	20.3866	20.3986	20.3986	20.4010	20.3938	20.3866	20.3818	20.3770	(88)
util rest of house	0.9406	0.9154	0.8693	0.7463	0.5762	0.3898	0.2687	0.2965	0.4940	0.7544	0.8931	0.9452	(89)
MIT 2	19.6953	19.8420	20.0321	20.2660	20.3622	20.3966	20.3984	20.4007	20.3860	20.2813	20.0109	19.6936	(90)
Living area fraction									fLA = Living area / (4) =			0.4993	(91)
MIT	20.0555	20.1878	20.3605	20.5742	20.6670	20.6964	20.6986	20.6996	20.6875	20.5864	20.3365	20.0508	(92)
Temperature adjustment												-0.1500	
adjusted MIT	19.9055	20.0378	20.2105	20.4242	20.5170	20.5464	20.5486	20.5496	20.5375	20.4364	20.1865	19.9008	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9338	0.9089	0.8647	0.7481	0.5840	0.3996	0.2793	0.3075	0.5047	0.7571	0.8879	0.9386	(94)
Useful gains	385.9460	398.0638	387.5747	354.8454	285.9226	192.4458	128.1059	134.0217	208.6038	300.2893	353.1095	378.7594	(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	534.3541	516.2608	465.7038	383.5329	292.2242	193.0039	128.1602	134.1152	210.7083	326.0096	437.3241	528.9970	(97)
Space heating kWh	110.4156	79.4284	58.1280	20.6550	4.6884	0.0000	0.0000	0.0000	0.0000	19.1359	60.6345	111.7767	(98a)
Space heating requirement - total per year (kWh/year)												464.8625	
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	110.4156	79.4284	58.1280	20.6550	4.6884	0.0000	0.0000	0.0000	0.0000	19.1359	60.6345	111.7767	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												464.8625	
Space heating per m2										(98c) / (4) =		9.0953	(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 %)	88.8000 (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	110.4156	79.4284	58.1280	20.6550	4.6884	0.0000	0.0000	0.0000	0.0000	19.1359	60.6345	111.7767	(98)
Space heating efficiency (main heating system 1)	88.8000	88.8000	88.8000	88.8000	88.8000	0.0000	0.0000	0.0000	0.0000	88.8000	88.8000	88.8000	(210)
Space heating fuel (main heating system)	124.3419	89.4464	65.4594	23.2601	5.2797	0.0000	0.0000	0.0000	0.0000	21.5494	68.2821	125.8747	(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	200.1155	177.0072	188.1875	169.5267	164.7764	145.9294	139.9839	151.0895	151.2108	170.2573	181.0295	199.6376	(64)
Efficiency of water heater												79.8000	(216)
(217)m	82.7833	82.3863	81.7554	80.6882	80.0244	79.8000	79.8000	79.8000	79.8000	80.6256	81.8822	82.8126	(217)
Fuel for water heating, kWh/month	241.7342	214.8503	230.1835	210.1010	205.9077	182.8689	175.4184	189.3353	189.4872	211.1702	221.0852	241.0715	(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	18.9814	17.1445	18.9814	18.3691	18.9814	18.3691	18.9814	18.9814	18.3691	18.9814	18.3691	18.9814	(231)
Lighting	16.7292	13.4208	12.0840	8.8532	6.8385	5.5871	6.2383	8.1088	10.5325	13.8192	15.6088	17.1942	(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	523.4938 (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	2513.2133 (219)
Space cooling fuel	0.0000 (221)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7875)
mechanical ventilation fans (SFP = 0.7875) 137.4910 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	223.4910	(231)
Electricity for lighting (calculated in Appendix L)	135.0145	(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	3395.2127	(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	523.4938	0.2100	109.9337	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2513.2133	0.2100	527.7748	(264)
Space and water heating			637.7085	(265)
Pumps, fans and electric keep-hot	223.4910	0.1387	31.0010	(267)
Energy for lighting	135.0145	0.1443	19.4868	(268)
Total CO2, kg/year			688.1962	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.4700	(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	523.4938	1.1300	591.5480	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2513.2133	1.1300	2839.9311	(278)
Space and water heating			3431.4790	(279)
Pumps, fans and electric keep-hot	223.4910	1.5128	338.0972	(281)
Energy for lighting	135.0145	1.5338	207.0898	(282)
Total Primary energy kWh/year			3976.6660	(286)
Dwelling Primary energy Rate (DPER)			77.8100	(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	51.1100	(1b) x	2.8000	(2b) =	143.1080	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1100					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	143.1080	(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) =	0.1398	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3898	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3021	(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	0.3851	0.3776	0.3700	0.3323	0.3247	0.2870	0.2870	0.2794	0.3021	0.3247	0.3398	0.3549	(22b)
Effective ac	0.5742	0.5713	0.5685	0.5552	0.5527	0.5412	0.5412	0.5390	0.5456	0.5527	0.5577	0.5630	(25)

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			2.4200	1.0000	2.4200			(26)
TER Opening Type			8.3400	1.1450	9.5496			(27)
External Wall 1	17.2200	8.3400	8.8800	0.1800	1.5984			(29a)
Corridor wall	8.4800	2.4200	6.0600	0.1800	1.0908			(29a)
External Roof 1	51.1100		51.1100	0.1100	5.6221			(30)
Total net area of external elements Aum(A, m2)			76.8100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.2809			(33)
Main dwelling								
Party Wall 1			55.2400	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 165.8071 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E4 Jamb	12.6000	0.0500	0.6300
E7 Party floor between dwellings (in blocks of flats)	2.7900	0.0700	0.1953
E7 Party floor between dwellings (in blocks of flats)	3.0300	0.0700	0.2121
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0200	0.0672
E18 Party wall between dwellings	5.6000	0.0600	0.3360
E25 Staggered party wall between dwellings	5.6000	0.0600	0.3360
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	19.7300	0.0000	0.0000
E3 Sill	1.5900	0.0500	0.0795
E14 Flat roof	9.1800	0.0800	0.7344
P4 Party wall - Roof (insulation at ceiling level)	19.7300	0.1200	2.3676

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.2121 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 25.4930 (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	27.1151	26.9791	26.8458	26.2197	26.1025	25.5572	25.5572	25.4562	25.7673	26.1025	26.3395	26.5873	(38)
Heat transfer coeff													
	52.6081	52.4721	52.3388	51.7127	51.5956	51.0502	51.0502	50.9492	51.2603	51.5956	51.8325	52.0803	(39)
Average = Sum(39)m / 12 =												51.7121	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0293	1.0267	1.0240	1.0118	1.0095	0.9988	0.9988	0.9969	1.0029	1.0095	1.0141	1.0190	(40)
HLP (average)												1.0118	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7228 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers													
	53.1054	52.3074	51.1444	48.9193	47.2773	45.4461	44.4052	45.5594	46.8245	48.7907	51.0636	52.9020	(42a)
Hot water usage for baths													
	22.9603	22.6193	22.1391	21.2537	20.5908	19.8557	19.4586	19.9354	20.4546	21.2412	22.1448	22.8827	(42b)
Hot water usage for other uses													
	32.2734	31.0998	29.9262	28.7526	27.5790	26.4055	26.4055	27.5790	28.7526	29.9262	31.0998	32.2734	(42c)
Average daily hot water use (litres/day)												99.5887	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	108.3391	106.0265	103.2097	98.9257	95.4471	91.7072	90.2693	93.0738	96.0317	99.9581	104.3081	108.0580	(44)
Energy conte	171.5827	150.9803	158.6295	135.4243	128.4901	112.7647	109.1728	115.2448	118.4167	135.6422	148.6061	169.1927	(45)
Energy content (annual)										Total = Sum(45)m =		1654.1470	
Distribution loss (46)m = 0.15 x (45)m													
	25.7374	22.6470	23.7944	20.3137	19.2735	16.9147	16.3759	17.2867	17.7625	20.3463	22.2909	25.3789	(46)
Water storage loss (or HIU loss):													
Store volume												180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5520	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8381	(55)
Total storage loss													
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage													
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(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													
	220.8253	195.4575	207.8722	183.0785	177.7328	160.4189	158.4155	164.4875	166.0709	184.8848	196.2603	218.4354	(62)
WWHRS	-24.2776	-21.4713	-22.4835	-18.6172	-17.3506	-14.8470	-13.9167	-14.7990	-15.3613	-18.1093	-20.5156	-23.8280	(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													
	196.5477	173.9862	185.3887	164.4613	160.3822	145.5719	144.4988	149.6884	150.7096	166.7755	175.7446	194.6074	(64)
								Total per year (kWh/year) = Sum(64)m =				2008.3625	(64)
12Total per year (kWh/year)												2008	(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													
	96.4454	85.7827	92.1385	83.1520	82.1171	75.6176	75.6941	77.7130	77.4969	84.4952	87.5349	95.6507	(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	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	78.6912	87.1224	78.6912	81.3143	78.6912	81.3143	78.6912	78.6912	81.3143	78.6912	81.3143	78.6912	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	150.1164	151.6741	147.7487	139.3918	128.8429	118.9283	112.3048	110.7470	114.6725	123.0293	133.5783	143.4928	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	(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)													
	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	(71)
Water heating gains (Table 5)													
	129.6309	127.6529	123.8420	115.4888	110.3725	105.0245	101.7394	104.4530	107.6346	113.5688	121.5762	128.5628	(72)
Total internal gains													

	410.2807	418.2917	402.1241	388.0372	369.7488	354.1093	341.5776	342.7335	352.4636	367.1315	388.3110	402.5891	(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	
Northeast	8.3400	11.2829	0.6300	0.7000	0.7700	28.7581	(75)

Solar gains	28.7581	58.5379	105.4668	173.2067	232.8238	248.2148	232.1999	185.1124	128.5129	71.5380	36.1851	23.4853	(83)
Total gains	439.0388	476.8296	507.5909	561.2439	602.5726	602.3241	573.7775	527.8459	480.9765	438.6695	424.4961	426.0744	(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	44.7459	44.8619	44.9762	45.5207	45.6241	46.1115	46.1115	46.2029	45.9225	45.6241	45.4155	45.1994	
alpha	3.9831	3.9908	3.9984	4.0347	4.0416	4.0741	4.0741	4.0802	4.0615	4.0416	4.0277	4.0133	
util living area	0.9674	0.9528	0.9234	0.8424	0.7017	0.5209	0.3862	0.4349	0.6646	0.8733	0.9475	0.9706	(86)
MIT	19.6627	19.8487	20.1438	20.5473	20.8311	20.9615	20.9910	20.9857	20.8990	20.5454	20.0586	19.6368	(87)
Th 2	20.0590	20.0612	20.0633	20.0735	20.0754	20.0843	20.0843	20.0860	20.0809	20.0754	20.0716	20.0675	(88)
util rest of house	0.9610	0.9437	0.9083	0.8129	0.6521	0.4536	0.3082	0.3524	0.5961	0.8426	0.9358	0.9648	(89)
MIT 2	18.5195	18.7537	19.1212	19.6117	19.9264	20.0586	20.0803	20.0791	20.0052	19.6221	19.0273	18.4931	(90)
Living area fraction									fLA = Living area / (4) =			0.4993	(91)
MIT	19.0903	19.3004	19.6318	20.0789	20.3781	20.5094	20.5351	20.5318	20.4515	20.0831	19.5423	19.0642	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0903	19.3004	19.6318	20.0789	20.3781	20.5094	20.5351	20.5318	20.4515	20.0831	19.5423	19.0642	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9527	0.9347	0.9003	0.8130	0.6690	0.4854	0.3469	0.3931	0.6249	0.8428	0.9278	0.9569	(94)
Useful gains	418.2575	445.6829	456.9605	456.3182	403.1249	292.3980	199.0619	207.5085	300.5435	369.7286	393.8309	407.7139	(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	778.0919	755.6211	687.3029	578.0894	447.7530	301.6787	200.8856	210.5106	325.5789	489.2856	644.9137	774.1305	(97)
Space heating kWh	267.7168	208.2784	171.3748	87.6753	33.2034	0.0000	0.0000	0.0000	0.0000	88.9504	180.7797	272.6139	(98a)
Space heating requirement - total per year (kWh/year)												1310.5925	
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	267.7168	208.2784	171.3748	87.6753	33.2034	0.0000	0.0000	0.0000	0.0000	88.9504	180.7797	272.6139	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1310.5925	
Space heating per m2											(98c) / (4) =	25.6426	(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	267.7168	208.2784	171.3748	87.6753	33.2034	0.0000	0.0000	0.0000	0.0000	88.9504	180.7797	272.6139	(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)	290.0507	225.6538	185.6715	94.9894	35.9733	0.0000	0.0000	0.0000	0.0000	96.3709	195.8609	295.3563	(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	196.5477	173.9862	185.3887	164.4613	160.3822	145.5719	144.4988	149.6884	150.7096	166.7755	175.7446	194.6074	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.7533	84.4643	83.8839	82.7151	81.2117	79.8000	79.8000	79.8000	79.8000	82.7160	84.1232	84.8157	(217)
Fuel for water heating, kWh/month	231.9056	205.9880	221.0063	198.8286	197.4865	182.4209	181.0762	187.5795	188.8592	201.6242	208.9134	229.4474	(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	16.3505	13.1170	11.8104	8.6528	6.6837	5.4606	6.0971	7.9252	10.2940	13.5063	15.2554	16.8049	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-6.8137	-10.5194	-16.5414	-20.4069	-23.6586	-22.7086	-22.4424	-20.3532	-16.9887	-12.7878	-7.8103	-5.7899	(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	-1.5013	-3.2863	-6.7783	-10.5546	-14.3295	-14.5298	-14.3505	-11.9698	-8.5469	-4.8092	-2.0389	-1.1774	(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	1419.9269	(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	2435.1357	(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)	131.9578	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-280.6933	(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	3792.3270	(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	1419.9269	0.2100	298.1846	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2435.1357	0.2100	511.3785	(264)
Space and water heating			809.5631	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	131.9578	0.1443	19.0456	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-186.8209	0.1327	-24.7963	
PV Unit electricity exported	-93.8724	0.1249	-11.7222	
Total			-36.5184	(269)
Total CO2, kg/year			804.0196	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.7300	(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	1419.9269	1.1300	1604.5174	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2435.1357	1.1300	2751.7034	(278)
Space and water heating			4356.2207	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	131.9578	1.5338	202.4012	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-186.8209	1.4904	-278.4437	
PV Unit electricity exported	-93.8724	0.4583	-43.0237	
Total			-321.4674	(283)
Total Primary energy kWh/year			4367.2554	(286)
Target Primary Energy Rate (TPER)			85.4500	(287)

Full SAP Calculation Printout

Plot Reference	A 906	Issued on Date	19/03/2026
Assessment Reference	Be Lean	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	84 B	DER	13.47	TER	15.73
Environmental	91 B	% DER < TER			14.37
CO_2 Emissions (t/year)	0.64	DFEE	31.16	TFEE	33.93
Compliance Check	See BREL	% DFEE < TFEE			8.15
% DPER < TPER	8.95	DPER	77.81	TPER	85.45

Assessor Details	Mr. Robert Tanner	Assessor ID	W344-0001
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	51.1100 (1b)	x	2.8000 (2b)	=	143.1080	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 51.1100						(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	143.1080	(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)	=	0.1398	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			3.0000	(17)
Infiltration rate			0.2898	(18)
Number of sides sheltered			3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)]	=	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20)	=	0.2246	(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	0.2863	0.2807	0.2751	0.2470	0.2414	0.2133	0.2133	0.2077	0.2246	0.2414	0.2526	0.2639	(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	0.5410	0.5394	0.5378	0.5305	0.5291	0.5228	0.5228	0.5216	0.5252	0.5291	0.5319	0.5348	(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								
Door			2.4200	1.0000	2.4200			(26)
Window			8.3400	1.1450	9.5496			(27)
External Wall 1	17.2200	8.3400	8.8800	0.1500	1.3320	70.0000	621.6000	(29a)
Corridor wall	8.4800	2.4200	6.0600	0.1900	1.1514	70.0000	424.2000	(29a)
External Roof 1	51.1100		51.1100	0.1000	5.1110	9.0000	459.9900	(30)
Total net area of external elements Aum(A, m2)			76.8100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.5640			(33)
Main dwelling								
Party Wall 1			55.2400	0.0000	0.0000	70.0000	3866.8001	(32)
Party Floor 1			51.1100			40.0000	2044.4000	(32d)
Internal Wall 1			117.4900			9.0000	1057.4100	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 8474.4000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	165.8071	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E4 Jamb	12.6000	0.0400	0.5040

E7 Party floor between dwellings (in blocks of flats)	2.7900	0.0500	0.1395
E7 Party floor between dwellings (in blocks of flats)	3.0300	0.0390	0.1182
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0500	0.1680
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E25 Staggered party wall between dwellings	5.6000	0.0390	0.2184
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	19.7300	0.0000	0.0000
E3 Sill	1.5900	0.0400	0.0636
E14 Flat roof	9.1800	0.0500	0.4590
P4 Party wall - Roof (insulation at ceiling level)	19.7300	0.0500	0.9865

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.1912 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 22.7552 (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	25.5485	25.4733	25.3997	25.0536	24.9889	24.6875	24.6875	24.6316	24.8035	24.9889	25.1198	25.2568	(38)
Heat transfer coeff	48.3037	48.2285	48.1548	47.8088	47.7440	47.4426	47.4426	47.3868	47.5587	47.7440	47.8750	48.0120	(39)
Average = Sum(39)m / 12 =												47.8085	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9451	0.9436	0.9422	0.9354	0.9341	0.9282	0.9282	0.9272	0.9305	0.9341	0.9367	0.9394	(40)
HLP (average)												0.9354	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7228 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	22.4485	22.1096	21.6275	20.9056	20.2549	19.3592	18.6797	19.5107	19.9467	20.8342	21.7569	22.4307	(42b)
Hot water usage for other uses	32.2734	31.0998	29.9262	28.7526	27.5790	26.4055	26.4055	27.5790	28.7526	29.9262	31.0998	32.2734	(42c)
Average daily hot water use (litres/day)												50.1545	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.7218	53.2094	51.5537	49.6582	47.8340	45.7647	45.0852	47.0897	48.6994	50.7604	52.8567	54.7040	(44)
Energy conte	80.5600	70.4068	73.6692	64.8660	61.6389	52.9254	49.8205	55.4254	56.4888	65.4099	71.4376	80.3368	(45)
Energy content (annual)										Total = Sum(45)m =		782.9853	
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 (or HIU 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	68.4760	59.8457	62.6188	55.1361	52.3931	44.9866	42.3474	47.1116	48.0155	55.5984	60.7220	68.2863	(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	68.4760	59.8457	62.6188	55.1361	52.3931	44.9866	42.3474	47.1116	48.0155	55.5984	60.7220	68.2863	(64)
								Total per year (kWh/year) = Sum(64)m =				665.5375	(64)
12Total per year (kWh/year)												666	(64)
Electric shower(s)	42.5286	37.8933	41.3781	39.4866	40.2275	38.3732	39.6523	40.2275	39.4866	41.3781	40.6000	42.5286	(64a)
						Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =						483.7604	(64a)
Heat gains from water heating, kWh/month	27.7511	24.4348	25.9992	23.6557	23.1552	20.8399	20.4999	21.8348	21.8755	24.2441	25.3305	27.7037	(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	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.6912	87.1224	78.6912	81.3143	78.6912	81.3143	78.6912	78.6912	81.3143	78.6912	81.3143	78.6912	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	150.1164	151.6741	147.7487	139.3918	128.8429	118.9283	112.3048	110.7470	114.6725	123.0293	133.5783	143.4928	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	(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)	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	(71)
Water heating gains (Table 5)	37.2999	36.3613	34.9452	32.8551	31.1225	28.9444	27.5537	29.3478	30.3827	32.5862	35.1812	37.2362	(72)
Total internal gains	314.9498	324.0000	310.2273	302.4034	287.4988	278.0292	267.3919	267.6283	275.2117	283.1490	298.9160	308.2625	(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	
Northeast	8.3400	11.2829	0.3500	0.7000	0.7700	15.9767	(75)

Solar gains	15.9767	32.5211	58.5926	96.2260	129.3466	137.8971	128.9999	102.8402	71.3961	39.7433	20.1029	13.0474	(83)
Total gains	330.9265	356.5211	368.8200	398.6294	416.8454	415.9263	396.3918	370.4686	346.6077	322.8923	319.0189	321.3099	(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	48.7333	48.8093	48.8840	49.2378	49.3046	49.6178	49.6178	49.6763	49.4967	49.3046	49.1697	49.0295	
alpha	4.2489	4.2540	4.2589	4.2825	4.2870	4.3079	4.3079	4.3118	4.2998	4.2870	4.2780	4.2686	
util living area													
	0.9865	0.9799	0.9677	0.9266	0.8355	0.6674	0.5103	0.5622	0.7885	0.9384	0.9771	0.9881	(86)
MIT	19.5538	19.7132	19.9713	20.3687	20.7109	20.9213	20.9805	20.9707	20.8341	20.4155	19.9323	19.5248	(87)
Th 2	20.1293	20.1306	20.1318	20.1375	20.1386	20.1436	20.1436	20.1445	20.1416	20.1386	20.1364	20.1342	(88)
util rest of house													
	0.9836	0.9757	0.9605	0.9094	0.7968	0.5969	0.4180	0.4683	0.7285	0.9205	0.9715	0.9856	(89)
MIT 2	18.8070	18.9656	19.2210	19.6099	19.9249	20.0990	20.1362	20.1325	20.0364	19.6608	19.1881	18.7819	(90)
Living area fraction									fLA = Living area / (4) =			0.4993	(91)
MIT	19.1799	19.3389	19.5957	19.9888	20.3174	20.5096	20.5578	20.5510	20.4347	20.0376	19.5597	19.1528	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1799	19.3389	19.5957	19.9888	20.3174	20.5096	20.5578	20.5510	20.4347	20.0376	19.5597	19.1528	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9797	0.9708	0.9550	0.9060	0.8055	0.6283	0.4635	0.5141	0.7505	0.9180	0.9668	0.9819	(94)
Useful gains	324.1962	346.1276	352.2412	361.1525	335.7747	261.3085	183.7373	190.4686	260.1344	296.4158	308.4274	315.4868	(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													
	718.7529	696.3667	630.6196	530.1414	411.4272	280.3665	187.7668	196.7041	301.2705	450.5899	596.5092	717.9142	(97)
Space heating kWh													
	293.5501	235.3607	207.1135	121.6720	56.2855	0.0000	0.0000	0.0000	0.0000	114.7056	207.4189	299.4060	(98a)
Space heating requirement - total per year (kWh/year)												1535.5123	
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													
	293.5501	235.3607	207.1135	121.6720	56.2855	0.0000	0.0000	0.0000	0.0000	114.7056	207.4189	299.4060	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1535.5123	
Space heating per m2											(98c) / (4) =	30.0433	(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	445.9608	351.0755	360.1399	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8205	0.8872	0.8570	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	365.9315	311.4592	308.6314	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	456.0289	434.9075	406.0312	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	64.8701	91.8456	72.4654	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	16.2175	22.9614	18.1164	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												57.2953	(107)
Energy for space heating												30.0433	(99)
Energy for space cooling												1.1210	(108)
Total												31.1643	(109)
Fabric Energy Efficiency (DFEE)												31.2	(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	51.1100	(1b)	x 2.8000	(2b) =	143.1080	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1100					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	143.1080	(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) =	0.1398	(8)
Pressure test		Yes	

Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3898	(18)
Number of sides sheltered	3	(19)
Shelter factor (20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) =	0.3021	(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													
	0.3851	0.3776	0.3700	0.3323	0.3247	0.2870	0.2870	0.2794	0.3021	0.3247	0.3398	0.3549	(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	0.5742	0.5713	0.5685	0.5552	0.5527	0.5412	0.5412	0.5390	0.5456	0.5527	0.5577	0.5630	(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			2.4200	1.0000	2.4200			(26)
TER Opening Type			8.3400	1.1450	9.5496			(27)
External Wall 1	17.2200	8.3400	8.8800	0.1800	1.5984			(29a)
Corridor wall	8.4800	2.4200	6.0600	0.1800	1.0908			(29a)
External Roof 1	51.1100		51.1100	0.1100	5.6221			(30)
Total net area of external elements Aum(A, m2)			76.8100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.2809			(33)
Main dwelling								
Party Wall 1			55.2400	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 165.8071 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E4 Jamb	12.6000	0.0500	0.6300
E7 Party floor between dwellings (in blocks of flats)	2.7900	0.0700	0.1953
E7 Party floor between dwellings (in blocks of flats)	3.0300	0.0700	0.2121
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0200	0.0672
E18 Party wall between dwellings	5.6000	0.0600	0.3360
E25 Staggered party wall between dwellings	5.6000	0.0600	0.3360
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	19.7300	0.0000	0.0000
E3 Sill	1.5900	0.0500	0.0795
E14 Flat roof	9.1800	0.0800	0.7344
P4 Party wall - Roof (insulation at ceiling level)	19.7300	0.1200	2.3676

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	5.2121	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	25.4930	(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	27.1151	26.9791	26.8458	26.2197	26.1025	25.5572	25.5572	25.4562	25.7673	26.1025	26.3395	26.5873	(38)
Heat transfer coeff													
	52.6081	52.4721	52.3388	51.7127	51.5956	51.0502	51.0502	50.9492	51.2603	51.5956	51.8325	52.0803	(39)

Average = Sum(39)m / 12 = 51.7121

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0293	1.0267	1.0240	1.0118	1.0095	0.9988	0.9988	0.9969	1.0029	1.0095	1.0141	1.0190	(40)
HLP (average)												1.0118	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7228 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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													
	22.9603	22.6193	22.1391	21.2537	20.5908	19.8557	19.4586	19.9354	20.4546	21.2412	22.1448	22.8827	(42b)
Hot water usage for other uses													
	32.2734	31.0998	29.9262	28.7526	27.5790	26.4055	26.4055	27.5790	28.7526	29.9262	31.0998	32.2734	(42c)
Average daily hot water use (litres/day)												50.6272	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	55.2337	53.7191	52.0653	50.0064	48.1698	46.2611	45.8640	47.5145	49.2072	51.1674	53.2446	55.1560	(44)
Energy conte	87.4766	76.4953	80.0225	68.4562	64.8458	56.8835	55.4686	58.8328	60.6774	69.4337	75.8567	86.3610	(45)
Energy content (annual)										Total = Sum(45)m =		840.8101	
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 (or HIU 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													
	74.3551	65.0210	68.0191	58.1878	55.1190	48.3509	47.1483	50.0079	51.5758	59.0186	64.4782	73.4069	(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													
	74.3551	65.0210	68.0191	58.1878	55.1190	48.3509	47.1483	50.0079	51.5758	59.0186	64.4782	73.4069	(64)
								Total per year (kWh/year) = Sum(64)m =				714.6885	(64)
12Total per year (kWh/year)												715	(64)
Electric shower(s)													
	42.5286	37.8933	41.3781	39.4866	40.2275	38.3732	39.6523	40.2275	39.4866	41.3781	40.6000	42.5286	(64a)
						Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =						483.7604	(64a)
Heat gains from water heating, kWh/month													
	29.2209	25.7286	27.3493	24.4186	23.8366	21.6810	21.7001	22.5589	22.7656	25.0992	26.2695	28.9839	(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	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	78.6912	87.1224	78.6912	81.3143	78.6912	81.3143	78.6912	78.6912	81.3143	78.6912	81.3143	78.6912	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	150.1164	151.6741	147.7487	139.3918	128.8429	118.9283	112.3048	110.7470	114.6725	123.0293	133.5783	143.4928	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	(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)													
	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	(71)
Water heating gains (Table 5)													
	39.2754	38.2866	36.7598	33.9147	32.0385	30.1125	29.1669	30.3210	31.6189	33.7354	36.4855	38.9568	(72)
Total internal gains													
	316.9253	325.9254	312.0419	303.4631	288.4148	279.1973	269.0051	268.6015	276.4479	284.2982	300.2203	309.9831	(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	
Northeast	8.3400	11.2829	0.6300	0.7000	0.7700	28.7581	(75)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	28.7581	58.5379	105.4668	173.2067	232.8238	248.2148	232.1999	185.1124	128.5129	71.5380	36.1851	23.4853	(83)
Total gains	345.6834	384.4633	417.5087	476.6698	521.2386	527.4122	501.2050	453.7140	404.9608	355.8362	336.4054	333.4684	(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	44.7459	44.8619	44.9762	45.5207	45.6241	46.1115	46.1115	46.2029	45.9225	45.6241	45.4155	45.1994	
alpha	3.9831	3.9908	3.9984	4.0347	4.0416	4.0741	4.0741	4.0802	4.0615	4.0416	4.0277	4.0133	
util living area													
	0.9851	0.9760	0.9566	0.8935	0.7672	0.5827	0.4386	0.4991	0.7448	0.9267	0.9746	0.9870	(86)
MIT	19.4146	19.6154	19.9391	20.4085	20.7632	20.9425	20.9858	20.9764	20.8454	20.3874	19.8386	19.3874	(87)
Th 2	20.0590	20.0612	20.0633	20.0735	20.0754	20.0843	20.0843	20.0860	20.0809	20.0754	20.0716	20.0675	(88)
util rest of house													
	0.9819	0.9709	0.9469	0.8702	0.7204	0.5112	0.3515	0.4072	0.6785	0.9056	0.9683	0.9842	(89)
MIT 2	18.6162	18.8160	19.1353	19.5910	19.9077	20.0535	20.0793	20.0769	19.9864	19.5819	19.0463	18.5957	(90)
Living area fraction										fLA = Living area / (4) =		0.4993	(91)
MIT	19.0149	19.2152	19.5367	19.9992	20.3348	20.4974	20.5319	20.5261	20.4154	19.9841	19.4419	18.9910	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0149	19.2152	19.5367	19.9992	20.3348	20.4974	20.5319	20.5261	20.4154	19.9841	19.4419	18.9910	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9773	0.9651	0.9404	0.8681	0.7343	0.5443	0.3947	0.4523	0.7041	0.9032	0.9629	0.9800	(94)
Useful gains	337.8301	371.0280	392.6409	413.8044	382.7555	287.0895	197.8036	205.2313	285.1475	321.3758	323.9302	326.8004	(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													
	774.1222	751.1472	682.3235	573.9693	445.5198	301.0623	200.7243	210.2197	323.7266	484.1780	639.7127	770.3203	(97)
Space heating kWh													
	324.6013	255.4401	215.5239	115.3187	46.6966	0.0000	0.0000	0.0000	0.0000	121.1249	227.3634	329.9788	(98a)
Space heating requirement - total per year (kWh/year)												1636.0477	
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													
	324.6013	255.4401	215.5239	115.3187	46.6966	0.0000	0.0000	0.0000	0.0000	121.1249	227.3634	329.9788	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1636.0477	
Space heating per m2											(98c) / (4) =	32.0103	(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	479.8720	377.7716	387.2141	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8741	0.9232	0.8924	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	419.4724	348.7523	345.5612	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	586.1399	557.1441	503.1667	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	120.0006	155.0434	117.2585	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	30.0002	38.7609	29.3146	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												98.0756	(107)
Energy for space heating												32.0103	(99)
Energy for space cooling												1.9189	(108)
Total												33.9292	(109)
Fabric Energy Efficiency (TFEE)												33.9	(109)