

Summary for Input Data

Plot Reference	A 902		Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref		
Plot Address			SAP Version	10.2

SAP Rating	82 B	DER	5.05	TER	13.88
Environmental	96 A	% DER < TER			63.62
CO ₂ Emissions (t/year)	0.33	DFEE	34.16	TFEE	33.78
Compliance Check	See BREL	% DFEE < TFEE			-1.11
% DPER < TPER	28.91	DPER	53.39	TPER	75.10

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

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

Orientation	Northwest	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Top-floor flat	
Which Floor	9	
2.0 Number of Storeys	1	
3.0 Date Built	2026	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	153.63	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:	31.07 m	73.37 m ²	2.80 m

8.0 Living Area	33.80	m ²
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Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	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	47.07	36.00	0.00	None	11.07	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	39.93	37.51	0.70	Stairwell Access Corridor 3	2.42	Enter Gross Area

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	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	16.20	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	155.20

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	73.37	73.37	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	73.37

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 0.1			0.35		0.70	1.20
Door	Manufacturer	Door to Corridor				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Door	Door	Corridor wall	North West	2.42	
S windows	Windows	External Wall 1	South	8.34	
SE windows	Windows	External Wall 1	South East	2.73	

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	6.90	0.05	0.05	No
E4 Jamb	Independently assessed	18.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	8.27	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	14.26	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	8.54	0.05	0.05	No
E16 Corner (normal)	Independently assessed	8.40	0.05	0.05	No
E16 Corner (normal)	Independently assessed	5.60	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	5.60	0.00	0.00	No
E18 Party wall between dwellings	Independently assessed	2.80	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	5.79	0.00	0.00	No
E3 Sill	Independently assessed	3.41	0.04	0.04	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	5.79	0.05	0.05	No

Y-value

0.02 W/m²K

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

2

Manufacturer SFP

0.61

Duct Type

Rigid

MVHR Efficiency

89.00

Wet Rooms

2

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

Summary for Input Data

Number of passive vents

Number of flueless gas fires

21.0 Fixed Cooling System

22.0 Pressure Testing

Designed AP₅₀ m²/(h.m²) @ 50 Pa

Test Method

22.0 Lighting
No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	75.00	15.00	1125.00	6

24.0 Main Heating 1

25.0 Main Heating 2

26.0 Heat Networks

Space Community Heating

Distribution Loss

Distribution Loss Value

SAP Code

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	Heat pump	Electricity	Space and Water	232.00	100.00					
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating

28.0 Water Heating

Water Heating

SAP Code

Flue Gas Heat Recovery System

Waste Water Heat Recovery Instantaneous System 1

Waste Water Heat Recovery Instantaneous System 2

Waste Water Heat Recovery Storage System

Solar Panel

Water use <= 125 litres/person/day

Cold Water Source

Bath Count

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower 1	Combi boiler or unvented hot water system	8.00		No	
Shower 2	Combi boiler or unvented hot water system	8.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Insulation Type

Cylinder Volume L

Loss kWh/day

32.0 Photovoltaic Unit

Export Capable Meter?

Connected To Dwelling

Diverter

Summary for Input Data



Battery Capacity [kWh]

0.00

PV Cells kWp

Orientation

Elevation

Overshading

FGHRS

MCS Certificate

**Overshading
Factor**

**MCS
Certificate
Reference**

**Panel
Manufacturer**

0.35

South West

Horizontal

Modest

No

0.80

34.0 Small-scale Hydro

None

Jan

Feb

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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Compliance Check	See BREL	% DFEE < TFEE				-1.11	
% DPER < TPER	28.91	DPER	53.39	TPER	75.10		
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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	73.3700 (1b)	2.8000 (2b)	205.4360 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.3700		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	205.4360 (5)

2. Ventilation rate

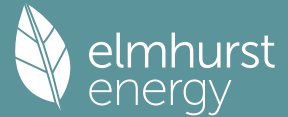
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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)
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	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (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) =												80.1000 (23c)
Effective ac	0.2621	0.2589	0.2557	0.2397	0.2366	0.2206	0.2206	0.2174	0.2270	0.2366	0.2429	0.2493 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			11.0700	1.1450	12.6756		(27)
Door			2.4200	1.0000	2.4200		(26)
External Wall 1	47.0700	11.0700	36.0000	0.1500	5.4000	70.0000	2520.0000 (29a)
Corridor wall	39.9300	2.4200	37.5100	0.1900	7.1269	70.0000	2625.7000 (29a)
External Roof 1	73.3700		73.3700	0.1000	7.3370	9.0000	660.3300 (30)
Total net area of external elements Aum(A, m ²)			160.3700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.9595		(33)
Main dwelling							
Party Wall 1			16.2000	0.0000	0.0000	70.0000	1134.0001 (32)
Party Floor 1			73.3700			40.0000	2934.8000 (32d)
Internal Wall 1			155.2000			9.0000	1396.8000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11271.6300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							153.6272 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	6.9000	0.0500	0.3450
E4 Jamb	18.6000	0.0400	0.7440
E7 Party floor between dwellings (in blocks of flats)	8.2700	0.0500	0.4135
E7 Party floor between dwellings (in blocks of flats)	14.2600	0.0390	0.5561
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.0500	0.4270
E16 Corner (normal)	8.4000	0.0500	0.4200
E16 Corner (normal)	5.6000	0.0390	0.2184
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E18 Party wall between dwellings	2.8000	0.0390	0.1092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.7900	0.0000	0.0000
E3 Sill	3.4100	0.0400	0.1364
P4 Party wall - Roof (insulation at ceiling level)	5.7900	0.0500	0.2895
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.7991 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	38.7586 (37)

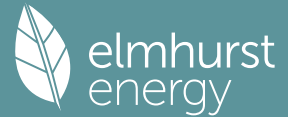
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	17.7662	17.5501	17.3340	16.2536	16.0375	14.9570	14.9570	14.7409	15.3892	16.0375	16.4697	16.9019 (38)
Average = Sum(39)m / 12 =	56.5248	56.3088	56.0927	55.0122	54.7961	53.7156	53.7156	53.4995	54.1478	54.7961	55.2283	55.6605 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.7704	0.7675	0.7645	0.7498	0.7468	0.7321	0.7321	0.7292	0.7380	0.7468	0.7527	0.7586 (40)
HLP (average)												0.7491
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.3251 (42)
Hot water usage for mixer showers	61.6069	60.6637	59.2736	57.1353	55.2195	52.5391	50.4192	52.8975	54.1440	56.7988	59.5634	61.5513 (42a)
Hot water usage for baths	26.6942	26.2913	25.7180	24.8595	24.0858	23.0207	22.2127	23.2008	23.7194	24.7747	25.8719	26.6731 (42b)
Hot water usage for other uses	38.4412	37.0433	35.6455	34.2476	32.8497	31.4519	31.4519	32.8497	34.2476	35.6455	37.0433	38.4412 (42c)
Average daily hot water use (litres/day)												116.4952 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	126.7423	123.9983	120.6371	116.2424	112.1550	107.0118	104.0838	108.9481	112.1110	117.2189	122.4786	126.6655 (44)
Energy content (annual)	186.5865	164.0748	172.3880	151.8417	144.5231	123.7555	115.0156	128.2339	130.0432	151.0484	165.5340	186.0176 (45)
Distribution loss (46)m = 0.15 x (45)m	27.9880	24.6112	25.8582	22.7763	21.6785	18.5633	17.2523	19.2351	19.5065	22.6573	24.8301	27.9026 (46)
Water storage loss (or HIU loss):												110.0000 (47)
Store volume												
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152 (51)
Volume factor from Table 2a												1.0294 (52)
Temperature factor from Table 2b												0.6000 (53)
Enter (49) or (54) in (55)												1.0327 (55)
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (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	241.8633	214.0022	227.6648	205.3354	199.7999	177.2492	170.2924	183.5107	183.5368	206.3252	219.0277	241.2944 (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	241.8633	214.0022	227.6648	205.3354	199.7999	177.2492	170.2924	183.5107	183.5368	206.3252	219.0277	241.2944 (64)
12Total per year (kWh/year)												2469.9020 (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)
Heat gains from water heating, kWh/month	106.2615	94.4968	101.5404	93.2823	92.2754	83.9437	82.4641	86.8592	86.0343	94.4450	97.8350	106.0723 (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	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.1858	120.8843	109.1858	112.8254	109.1858	112.8254	109.1858	109.1858	112.8254	109.1858	112.8254	109.1858 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.0313	207.1589	201.7974	190.3835	175.9756	162.4341	153.3876	151.2600	156.6215	168.0353	182.4433	195.9848 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254 (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)	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034 (71)
Water heating gains (Table 5)	142.8245	140.6202	136.4791	129.5588	124.0260	116.5884	110.8389	116.7462	119.4921	126.9423	135.8819	142.5703 (72)
Total internal gains	514.9179	526.5397	505.3386	490.6439	467.0637	449.7242	431.2886	435.0684	446.8152	462.0397	489.0269	505.6172 (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							

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Southeast		2.7300		36.7938		0.3500		0.7000		0.7700		17.0544 (77)	
South		8.3400		46.7521		0.3500		0.7000		0.7700		66.2012 (78)	

Solar gains	83.2557	137.4706	177.8561	205.3417	217.8213	211.3005	205.7441	196.9177	187.3088	149.0482	98.8983	71.7990 (83)	
Total gains	598.1736	664.0103	683.1947	695.9857	684.8850	661.0247	637.0327	631.9861	634.1240	611.0879	587.9252	577.4162 (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	55.3917	55.6043	55.8185	56.9148	57.1393	58.2886	58.2886	58.5240	57.8233	57.1393	56.6921	56.2519	
alpha	4.6928	4.7070	4.7212	4.7943	4.8093	4.8859	4.8859	4.9016	4.8549	4.8093	4.7795	4.7501	
util living area	0.9535	0.9256	0.8887	0.8085	0.6881	0.5096	0.3692	0.3871	0.5698	0.7977	0.9168	0.9587 (86)	
MIT	20.1281	20.3182	20.5181	20.7583	20.9099	20.9837	20.9972	20.9965	20.9710	20.8064	20.4636	20.1066 (87)	
Th 2	20.2791	20.2816	20.2842	20.2971	20.2996	20.3125	20.3125	20.3151	20.3074	20.2996	20.2945	20.2893 (88)	
util rest of house	0.9460	0.9144	0.8721	0.7816	0.6479	0.4583	0.3123	0.3304	0.5183	0.7655	0.9026	0.9520 (89)	
MIT 2	19.2689	19.5056	19.7521	20.0470	20.2168	20.3007	20.3111	20.3132	20.2849	20.1076	19.6984	19.2502 (90)	
Living area fraction	fLA = Living area / (4) = 0.4607 (91)												
MIT	19.6648	19.8799	20.1050	20.3747	20.5361	20.6153	20.6272	20.6280	20.6010	20.4295	20.0509	19.6447 (92)	
Temperature adjustment	0.0000												
adjusted MIT	19.6648	19.8799	20.1050	20.3747	20.5361	20.6153	20.6272	20.6280	20.6010	20.4295	20.0509	19.6447 (93)	

8. Space heating requirement													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9385	0.9073	0.8675	0.7847	0.6619	0.4811	0.3384	0.3564	0.5405	0.7718	0.8971	0.9448 (94)	
Useful gains	561.4140	602.4892	592.7054	546.1427	453.2947	318.0410	215.5925	225.2502	342.7262	471.6408	527.4353	545.5572 (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	868.4903	843.5011	763.1396	631.2470	484.1832	323.1179	216.3235	226.1962	352.0135	538.6187	715.2555	859.6603 (97)	
Space heating kWh	228.4647	161.9600	126.8030	61.2751	22.9810	0.0000	0.0000	0.0000	0.0000	49.8316	135.2306	233.6927 (98a)	
Space heating requirement - total per year (kWh/year)	1020.2388												
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	228.4647	161.9600	126.8030	61.2751	22.9810	0.0000	0.0000	0.0000	0.0000	49.8316	135.2306	233.6927 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	1020.2388												
Space heating per m2	(98c) / (4) = 13.9054 (99)												

9b. Energy requirements													

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (301)	
Fraction of space heat from community system												1.0000 (302)	
Fraction of heat from community Heat pump-Space and Water												1.0000 (303a)	
Factor for control and charging method (Table 4c(3)) for space heating												1.0000 (305)	
Factor for charging method (Table 4c(3)) for water heating												1.0000 (305a)	
Distribution loss factor (Table 12c) for community heating system												1.5000 (306)	
Efficiency of secondary/supplementary heating system, %												0.0000 (208)	
Space heating:													
Space heating requirement	228.4647	161.9600	126.8030	61.2751	22.9810	0.0000	0.0000	0.0000	0.0000	49.8316	135.2306	233.6927 (98)	
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50													
307a	342.6971	242.9401	190.2046	91.9127	34.4715	0.0000	0.0000	0.0000	0.0000	74.7473	202.8459	350.5391	
Space heating requirement	342.6971	242.9401	190.2046	91.9127	34.4715	0.0000	0.0000	0.0000	0.0000	74.7473	202.8459	350.5391 (307)	
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)												
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)	

Water heating													
Annual water heating requirement													
	241.8633	214.0022	227.6648	205.3354	199.7999	177.2492	170.2924	183.5107	183.5368	206.3252	219.0277	241.2944 (64)	
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50													
310a	362.7950	321.0033	341.4972	308.0030	299.6998	265.8738	255.4387	275.2660	275.3052	309.4878	328.5415	361.9417	
Water heating fuel	362.7950	321.0033	341.4972	308.0030	299.6998	265.8738	255.4387	275.2660	275.3052	309.4878	328.5415	361.9417 (310)	
Cooling System Energy Efficiency Ratio	0.0000 (314)												
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (315)	
Pumps and Fa	16.2310	14.6603	16.2310	15.7074	16.2310	15.7074	16.2310	16.2310	15.7074	16.2310	15.7074	16.2310 (331)	
Lighting	24.8272	19.9173	17.9333	13.1387	10.1487	8.2916	9.2580	12.0339	15.6309	20.5085	23.1643	25.5172 (332)	
Electricity generated by PVs (Appendix M) (negative quantity)	-3.8402	-6.8198	-12.5864	-17.7197	-22.1554	-21.8519	-21.3960	-18.4124	-13.8402	-8.8953	-4.6122	-3.1349 (333a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335a)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (333b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335b)	
Annual totals kWh/year													
Space heating fuel - community heating	1530.3582 (307)												
Space heating fuel - secondary	0.0000 (309)												
Water heating fuel - community heating	3704.8530 (310)												
Efficiency of water heater	0.0000 (311)												
Electricity used for heat distribution	15.3036 (313)												
Space cooling fuel	0.0000 (321)												

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7625)													
mechanical ventilation fans (SFP = 0.7625)												191.1068 (330a)	
Total electricity for the above, kWh/year												191.1068 (331)	

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Electricity for lighting (calculated in Appendix L)	200.3696 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-155.2644 (333)
Wind generation	0.0000 (334)
Hydro-electric generation (Appendix N)	0.0000 (335a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (335)
Appendix Q - special features	
Energy saved or generated	-0.0000 (336)
Energy used	0.0000 (337)
Total delivered energy for all uses	5471.4233 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			232.0000 (367)
Space and Water heating from Heat pump	2256.5565	0.1565	103.2148 (367)
Electrical energy for heat distribution (space & water)	15.3036	0.0000	7.6118 (372)
Overall CO2 factor for heat network			0.0641 (386)
Total CO2 associated with community systems			335.7068 (373)
Space and water heating			335.7068 (376)
Pumps, fans and electric keep-hot	191.1068	0.1387	26.5089 (378)
Energy for lighting	200.3696	0.1443	28.9195 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-155.2644	0.1305	-20.2663
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-20.2663 (380)
Total CO2, kg/year			370.8689 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.0500 (384)

13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Efficiency of heat source Heat pump			232.0000 (467a)
Space and Water heating from Heat pump	2256.5565	1.5793	1041.7453 (467)
Electrical energy for heat distribution (space & water)	15.3036	0.0000	80.5082 (472)
Overall CO2 factor for heat network			0.6782 (486)
Total CO2 associated with community systems			3550.6907 (473)
Space and water heating			3550.6907 (476)
Pumps, fans and electric keep-hot	191.1068	1.5128	289.1064 (478)
Energy for lighting	200.3696	1.5338	307.3337 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-155.2644	1.4822	-230.1285
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-230.1285 (480)
Total Primary energy kWh/year			3917.0023 (483)
Dwelling Primary energy Rate (DPER)			53.3900 (484)

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	73.3700 (1b)	2.8000 (2b)	205.4360 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.3700		205.4360 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	205.4360 (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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1460 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3960 (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) = 0.3366 (21)

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

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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												
	0.4292	0.4208	0.4124	0.3703	0.3619	0.3198	0.3198	0.3114	0.3366	0.3619	0.3787	0.3955 (22b)
Effective ac	0.5921	0.5885	0.5850	0.5686	0.5655	0.5511	0.5511	0.5485	0.5567	0.5655	0.5717	0.5782 (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			11.0700	1.1450	12.6756		(27)
External Wall 1	47.0700	11.0700	36.0000	0.1800	6.4800		(29a)
Corridor wall	39.9300	2.4200	37.5100	0.1800	6.7518		(29a)
External Roof 1	73.3700		73.3700	0.1100	8.0707		(30)
Total net area of external elements Aum(A, m2)			160.3700				(31)
Fabric heat loss, W/K = Sum (A x U)					36.3981		(33)
Main dwelling							
Party Wall 1			16.2000	0.0000	0.0000		(32)

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

153.6272 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	6.9000	0.0500	0.3450
E4 Jamb	18.6000	0.0500	0.9300
E7 Party floor between dwellings (in blocks of flats)	8.2700	0.0700	0.5789
E7 Party floor between dwellings (in blocks of flats)	14.2600	0.0700	0.9982
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.0200	0.1708
E16 Corner (normal)	8.4000	0.0900	0.7560
E16 Corner (normal)	5.6000	0.0900	0.5040
E17 Corner (inverted - internal area greater than external area)	5.6000	-0.0900	-0.5040
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E18 Party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.7900	0.0000	0.0000
E3 Sill	3.4100	0.0500	0.1705
P4 Party wall - Roof (insulation at ceiling level)	5.7900	0.1200	0.6948

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

4.9802 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 41.3783 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	40.1411	39.8987	39.6610	38.5447	38.3358	37.3635	37.3635	37.1835	37.7380	38.3358	38.7583	39.2001 (38)
Heat transfer coeff	81.5194	81.2769	81.0393	79.9230	79.7141	78.7418	78.7418	78.5618	79.1163	79.7141	80.1366	80.5783 (39)
Average = Sum(39)m / 12 =												79.9220

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1111	1.1078	1.1045	1.0893	1.0865	1.0732	1.0732	1.0708	1.0783	1.0865	1.0922	1.0982 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3251 (42)
Hot water usage for mixer showers	63.2037	62.2539	60.8698	58.2216	56.2673	54.0878	52.8491	54.2227	55.7284	58.0684	60.7735	62.9615 (42a)
Hot water usage for baths	27.3029	26.8974	26.3264	25.2735	24.4852	23.6110	23.1389	23.7059	24.3232	25.2586	26.3331	27.2106 (42b)
Hot water usage for other uses	38.4412	37.0433	35.6455	34.2476	32.8497	31.4519	31.4519	32.8497	34.2476	35.6455	37.0433	38.4412 (42c)
Average daily hot water use (litres/day)												118.5323 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	128.9478	126.1946	122.8416	117.7427	113.6022	109.1508	107.4398	110.7783	114.2993	118.9725	124.1500	128.6133 (44)
Energy conte	204.2217	179.6994	188.8030	161.1839	152.9304	134.2136	129.9391	137.1667	140.9424	161.4446	176.8744	201.3773 (45)
Energy content (annual)										Total = Sum(45)m =		1968.7966

Distribution loss (46)m = 0.15 x (45)m

30.6333	26.9549	28.3204	24.1776	22.9396	20.1320	19.4909	20.5750	21.1414	24.2167	26.5312	30.2066 (46)
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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	25.9803	25.1422	25.9803	25.1422	25.9803 (56)
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If cylinder contains dedicated solar storage

25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (57)
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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)
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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)
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Total heat required for water heating calculated for each month

253.4644	224.1766	238.0457	208.8381	202.1731	181.8678	179.1818	186.4093	188.5966	210.6873	224.5286	250.6200 (62)
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WWHRS	-28.8941	-25.5542	-26.7589	-22.1574	-20.6499	-17.6703	-16.5630	-17.6131	-18.2823	-21.5528	-24.4168	-28.3590 (63a)
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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)
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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)
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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)
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Output from w/h	224.5703	198.6225	211.2868	186.6807	181.5232	164.1975	162.6187	168.7962	170.3143	189.1344	200.1119	222.2610 (64)
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Total per year (kWh/year) = Sum(64)m = 2280.1176 (64)

12Total per year (kWh/year)

2280 (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	0.0000 (64a)
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Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month	107.2979	95.3319	102.1711	91.7170	90.2435	82.7494	82.5989	85.0021	84.9867	93.0745	96.9341	106.3521 (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
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(66)m	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.1858	120.8843	109.1858	112.8254	109.1858	112.8254	109.1858	109.1858	112.8254	109.1858	112.8254	109.1858	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.0313	207.1589	201.7974	190.3835	175.9756	162.4341	153.3876	151.2600	156.6215	168.0353	182.4433	195.9848	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	(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)	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	(71)
Water heating gains (Table 5)	144.2176	141.8629	137.3268	127.3847	121.2950	114.9297	111.0200	114.2501	118.0371	125.1001	134.6307	142.9464	(72)
Total internal gains	519.3109	530.7823	509.1863	491.4699	467.3327	448.0655	431.4697	432.5722	445.3602	463.1975	490.7756	508.9932	(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			
Southeast				2.7300	36.7938	0.6300	0.7000	0.7700	30.6980 (77)			
South				8.3400	46.7521	0.6300	0.7000	0.7700	119.1622 (78)			
Solar gains	149.8602	247.4470	320.1409	369.6151	392.0783	380.3410	370.3393	354.4519	337.1559	268.2868	178.0170	129.2382 (83)
Total gains	669.1711	778.2294	829.3272	861.0850	859.4110	828.4064	801.8090	787.0241	782.5161	731.4843	668.7926	638.2314 (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	38.4081	38.5227	38.6357	39.1753	39.2780	39.7630	39.7630	39.8541	39.5747	39.2780	39.0709	38.8567
alpha	3.5605	3.5682	3.5757	3.6117	3.6185	3.6509	3.6509	3.6569	3.6383	3.6185	3.6047	3.5904
util living area	0.9578	0.9300	0.8938	0.8261	0.7223	0.5653	0.4204	0.4444	0.6275	0.8296	0.9298	0.9633 (86)
MIT	19.4704	19.7574	20.0774	20.4540	20.7423	20.9235	20.9799	20.9750	20.8825	20.5252	19.9500	19.4259 (87)
Th 2	19.9918	19.9945	19.9971	20.0096	20.0119	20.0228	20.0228	20.0248	20.0186	20.0119	20.0072	20.0023 (88)
util rest of house	0.9499	0.9176	0.8749	0.7950	0.6724	0.4922	0.3319	0.3562	0.5575	0.7933	0.9152	0.9564 (89)
MIT 2	18.2386	18.5965	18.9922	19.4524	19.7797	19.9697	20.0135	20.0125	19.9307	19.5458	18.8511	18.1901 (90)
Living area fraction	fLA = Living area / (4) = 0.4607 (91)											
MIT	18.8061	19.1313	19.4921	19.9138	20.2231	20.4091	20.4587	20.4559	20.3692	19.9970	19.3573	18.7594 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8061	19.1313	19.4921	19.9138	20.2231	20.4091	20.4587	20.4559	20.3692	19.9970	19.3573	18.7594 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9382	0.9049	0.8639	0.7917	0.6837	0.5220	0.3721	0.3959	0.5836	0.7927	0.9038	0.9454 (94)
Ext temp.	627.8330	704.2021	716.4469	681.7198	587.6120	432.4077	298.3199	311.5861	456.6804	579.8410	604.4352	603.3922 (95)
Heat loss rate W	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)
Space heating kWh	1182.5262	1156.6749	1052.8705	880.2569	679.4134	457.4162	303.8407	318.6390	495.9927	749.0731	982.2621	1173.1719 (97)
Space heating requirement - total per year (kWh/year)	412.6918	304.0617	250.2992	142.9467	68.3002	0.0000	0.0000	0.0000	0.0000	125.9087	272.0354	423.9161 (98a)
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98c)
Space heating kWh	412.6918	304.0617	250.2992	142.9467	68.3002	0.0000	0.0000	0.0000	0.0000	125.9087	272.0354	423.9161 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2000.1598											
Space heating per m2	(98c) / (4) = 27.2613 (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)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
412.6918	304.0617	250.2992	142.9467	68.3002	0.0000	0.0000	0.0000	0.0000	0.0000	125.9087	272.0354	423.9161 (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)	447.1200	329.4277	271.1800	154.8718	73.9980	0.0000	0.0000	0.0000	0.0000	136.4125	294.7296	459.2808 (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	224.5703	198.6225	211.2868	186.6807	181.5232	164.1975	162.6187	168.7962	170.3143	189.1344	200.1119	222.2610 (64)
Efficiency of water heater (217)m	85.4056	85.0116	84.4408	83.4686	82.0742	79.8000	79.8000	79.8000	79.8000	83.1688	84.7489	79.8000 (216)
Fuel for water heating, kWh/month	262.9456	233.6415	250.2190	223.6537	221.1697	205.7613	203.7829	211.5240	213.4264	227.4103	236.1232	260.0035 (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)

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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	22.6867	18.2001	16.3872	12.0059	9.2737	7.5767	8.4598	10.9964	14.2832	18.7403	21.1672	23.3172	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-9.7068	-14.9437	-23.4292	-28.8092	-33.3035	-31.9186	-31.5331	-28.6387	-23.9706	-18.1186	-11.1091	-8.2520	(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	-2.2297	-4.8747	-10.0470	-15.6369	-21.2295	-21.5383	-21.2842	-17.7620	-12.6866	-7.1425	-3.0298	-1.7498	(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												2167.0204	(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												2749.6612	(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)												183.0944	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-402.9440	(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												4782.8319	(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	2167.0204	0.2100	455.0743	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2749.6612	0.2100	577.4288	(264)
Space and water heating			1032.5031	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	183.0944	0.1443	26.4262	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-263.7330	0.1328	-35.0227	
PV Unit electricity exported	-139.2110	0.1249	-17.3835	
Total			-52.4062	(269)
Total CO2, kg/year			1018.4524	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.8800	(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	2167.0204	1.1300	2448.7331	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2749.6612	1.1300	3107.1171	(278)
Space and water heating			5555.8502	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	183.0944	1.5338	280.8362	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-263.7330	1.4907	-393.1437	
PV Unit electricity exported	-139.2110	0.4583	-63.8024	
Total			-456.9460	(283)
Total Primary energy kWh/year			5509.8412	(286)
Target Primary Energy Rate (TPER)			75.1000	(287)

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Plot Reference	A 902				Issued on Date	19/03/2026	
Assessment Reference	Be Green			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	82 B	DER	5.05	TER	13.88		
Environmental	96 A	% DER < TER				63.62	
CO ₂ Emissions (t/year)	0.33	DFEE	34.16	TFEE	33.78		
Compliance Check	See BREL	% DFEE < TFEE				-1.11	
% DPER < TPER	28.91	DPER	53.39	TPER	75.10		
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 (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.3700		
Dwelling volume			

2. Ventilation rate

	m ³ 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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1460 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2960 (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) = 0.2516 (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	0.3208	0.3145	0.3082	0.2768	0.2705	0.2390	0.2390	0.2328	0.2516	0.2705	0.2831	0.2957 (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	0.5515	0.5495	0.5475	0.5383	0.5366	0.5286	0.5286	0.5271	0.5317	0.5366	0.5401	0.5437 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			11.0700	1.1450	12.6756		(27)
Door			2.4200	1.0000	2.4200		(26)
External Wall 1	47.0700	11.0700	36.0000	0.1500	5.4000	70.0000	2520.0000 (29a)
Corridor wall	39.9300	2.4200	37.5100	0.1900	7.1269	70.0000	2625.7000 (29a)
External Roof 1	73.3700		73.3700	0.1000	7.3370	9.0000	660.3300 (30)
Total net area of external elements A _{um} (A, m ²)			160.3700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	34.9595	(33)
Main dwelling							
Party Wall 1			16.2000	0.0000	0.0000	70.0000	1134.0001 (32)
Party Floor 1			73.3700			40.0000	2934.8000 (32a)
Internal Wall 1			155.2000			9.0000	1396.8000 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							11271.6300 (34)
List of Thermal Bridges							153.6272 (35)
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					6.9000	0.0500	0.3450
E4 Jamb					18.6000	0.0400	0.7440

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E7 Party floor between dwellings (in blocks of flats)	8.2700	0.0500	0.4135
E7 Party floor between dwellings (in blocks of flats)	14.2600	0.0390	0.5561
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.0500	0.4270
E16 Corner (normal)	8.4000	0.0500	0.4200
E16 Corner (normal)	5.6000	0.0390	0.2184
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E18 Party wall between dwellings	2.8000	0.0390	0.1092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.7900	0.0000	0.0000
E3 Sill	3.4100	0.0400	0.1364
P4 Party wall - Roof (insulation at ceiling level)	5.7900	0.0500	0.2895
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.7991 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	38.7586 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	37.3859	37.2504	37.1176	36.4939	36.3772	35.8339	35.8339	35.7333	36.0432	36.3772	36.6132	36.8601 (38)
Average = Sum(39)m / 12 =	76.1445	76.0090	75.8762	75.2525	75.1358	74.5925	74.5925	74.4919	74.8018	75.1358	75.3719	75.6187 (39)
												75.2519
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0378	1.0360	1.0342	1.0257	1.0241	1.0167	1.0167	1.0153	1.0195	1.0241	1.0273	1.0306 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3251 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses	26.6942	26.2913	25.7180	24.8595	24.0858	23.0207	22.2127	23.2008	23.7194	24.7747	25.8719	26.6731 (42c)
Average daily hot water use (litres/day)	38.4412	37.0433	35.6455	34.2476	32.8497	31.4519	31.4519	32.8497	34.2476	35.6455	37.0433	38.4412 (42c)
												59.6984 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	65.1354	63.3346	61.3635	59.1071	56.9356	54.4726	53.6646	56.0505	57.9670	60.4201	62.9152	65.1142 (44)
Energy content (annual)	95.8906	83.8045	87.6871	77.2087	73.3672	62.9958	59.3009	65.9725	67.2388	77.8575	85.0320	95.6250 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss (or HIU 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 (46)
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												
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 (57)
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 (59)
Total heat required for water heating calculated for each month												
WWHRS	81.5070	71.2338	74.5341	65.6274	62.3621	53.5464	50.4058	56.0766	57.1530	66.1788	72.2772	81.2813 (62)
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 (63a)
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 (63b)
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 (63c)
Output from w/h	81.5070	71.2338	74.5341	65.6274	62.3621	53.5464	50.4058	56.0766	57.1530	66.1788	72.2772	81.2813 (64)
12Total per year (kWh/year)												792.1835 (64)
Electric shower(s)	50.6156	45.0989	49.2463	46.9951	47.8770	45.6700	47.1923	47.8770	46.9951	49.2463	48.3203	50.6156 (64a)
Heat gains from water heating, kWh/month	33.0307	29.0832	30.9451	28.1556	27.5598	24.8041	24.3995	25.9884	26.0370	28.8563	30.1494	32.9742 (65)
												575.7497 (64a)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	109.1858	120.8843	109.1858	112.8254	109.1858	112.8254	109.1858	109.1858	112.8254	109.1858	112.8254	109.1858 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	205.0313	207.1589	201.7974	190.3835	175.9756	162.4341	153.3876	151.2600	156.6215	168.0353	182.4433	195.9848 (68)
Pumps, fans	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034 (71)
Total internal gains	44.3960	43.2786	41.5929	39.1050	37.0427	34.4501	32.7951	34.9307	36.1625	38.7853	41.8741	44.3202 (72)
	416.4894	429.1980	410.4524	400.1902	380.0804	367.5859	353.2448	353.2528	363.4856	373.8828	395.0191	407.3671 (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
Southeast				2.7300	36.7938		0.3500		0.7000		0.7700		17.0544 (77)
South				8.3400	46.7521		0.3500		0.7000		0.7700		66.2012 (78)
Solar gains	83.2557	137.4706	177.8561	205.3417	217.8213	211.3005	205.7441	196.9177	187.3088	149.0482	98.8983	71.7990	(83)
Total gains	499.7451	566.6686	588.3084	605.5319	597.9017	578.8864	558.9888	550.1705	550.7945	522.9310	493.9174	479.1661	(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	41.1193	41.1926	41.2647	41.6067	41.6713	41.9748	41.9748	42.0315	41.8574	41.6713	41.5408	41.4052
alpha	3.7413	3.7462	3.7510	3.7738	3.7781	3.7983	3.7983	3.8021	3.7905	3.7781	3.7694	3.7603
util living area	0.9813	0.9692	0.9531	0.9162	0.8475	0.7095	0.5524	0.5796	0.7648	0.9150	0.9681	0.9839 (86)
MIT	19.3086	19.5388	19.8309	20.2272	20.5826	20.8548	20.9577	20.9481	20.7935	20.3417	19.7634	19.2669 (87)
Th 2	20.0519	20.0535	20.0550	20.0620	20.0633	20.0695	20.0695	20.0706	20.0671	20.0633	20.0607	20.0579 (88)
util rest of house	0.9776	0.9631	0.9434	0.8973	0.8099	0.6370	0.4493	0.4788	0.7013	0.8923	0.9607	0.9807 (89)
MIT 2	18.5128	18.7407	19.0288	19.4177	19.7501	19.9841	20.0528	20.0489	19.9364	19.5322	18.9699	18.4759 (90)
Living area fraction	fLA = Living area / (4) = 0.4607 (91)											
MIT	18.8794	19.1084	19.3983	19.7906	20.1336	20.3852	20.4697	20.4631	20.3312	19.9051	19.3354	18.8403 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8794	19.1084	19.3983	19.7906	20.1336	20.3852	20.4697	20.4631	20.3312	19.9051	19.3354	18.8403 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9716	0.9555	0.9351	0.8909	0.8130	0.6632	0.4952	0.5231	0.7207	0.8879	0.9535	0.9752 (94)
Useful gains	485.5506	541.4398	550.1246	539.4942	486.1177	383.9101	276.8110	287.7889	396.9747	464.2954	470.9512	467.2884 (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	1110.1446	1079.9640	978.6719	819.5443	633.6672	431.5327	288.6479	302.6709	466.1078	699.1470	922.2072	1107.0810 (97)
Space heating kWh	464.6980	361.8883	318.8392	201.6361	109.7768	0.0000	0.0000	0.0000	0.0000	174.7296	324.9043	476.0057 (98a)
Space heating requirement - total per year (kWh/year)												2432.4779
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	464.6980	361.8883	318.8392	201.6361	109.7768	0.0000	0.0000	0.0000	0.0000	174.7296	324.9043	476.0057 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2432.4779
Space heating per m2										(98c) / (4) =		33.1536 (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	701.1696	551.9846	566.1385	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7481	0.8294	0.8154	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	524.5440	457.8013	461.6172	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	631.1944	610.3119	602.0506	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	76.7883	113.4678	104.4825	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	19.1971	28.3670	26.1206	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												73.6846 (107)
Energy for space heating												33.1536 (99)
Energy for space cooling												1.0043 (108)
Total												34.1579 (109)
Fabric Energy Efficiency (DFEE)												34.2 (109)

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

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	73.3700 (1b)	x 2.8000 (2b)	= 205.4360 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	205.4360 (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)

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Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											Air changes per hour	
Pressure test												30.0000 / (5) =	0.1460 (8)
Pressure Test Method												Blower Door	Yes
Measured/design AP50													5.0000 (17)
Infiltration rate													0.3960 (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) =	0.3366 (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	0.4292	0.4208	0.4124	0.3703	0.3619	0.3198	0.3198	0.3114	0.3366	0.3619	0.3787	0.3955	(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	0.5921	0.5885	0.5850	0.5686	0.5655	0.5511	0.5511	0.5485	0.5567	0.5655	0.5717	0.5782	(25)

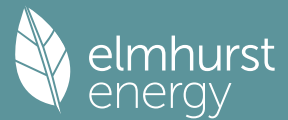
3. Heat losses and heat loss parameter

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			11.0700	1.1450	12.6756			(27)
External Wall 1	47.0700	11.0700	36.0000	0.1800	6.4800			(29a)
Corridor wall	39.9300	2.4200	37.5100	0.1800	6.7518			(29a)
External Roof 1	73.3700		73.3700	0.1100	8.0707			(30)
Total net area of external elements Aum(A, m2)			160.3700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.3981			(33)
Main dwelling								
Party Wall 1			16.2000	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								153.6272 (35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E1 Steel lintel with perforated steel base plate				6.9000	0.0500		0.3450	
E4 Jamb				18.6000	0.0500		0.9300	
E7 Party floor between dwellings (in blocks of flats)				8.2700	0.0700		0.5789	
E7 Party floor between dwellings (in blocks of flats)				14.2600	0.0700		0.9982	
E9 Balcony between dwellings, wall insulation continuous				8.5400	0.0200		0.1708	
E16 Corner (normal)				8.4000	0.0900		0.7560	
E16 Corner (normal)				5.6000	0.0900		0.5040	
E17 Corner (inverted - internal area greater than external area)				5.6000	-0.0900		-0.5040	
E18 Party wall between dwellings				2.8000	0.0600		0.1680	
E18 Party wall between dwellings				2.8000	0.0600		0.1680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				5.7900	0.0000		0.0000	
E3 Sill				3.4100	0.0500		0.1705	
P4 Party wall - Roof (insulation at ceiling level)				5.7900	0.1200		0.6948	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								4.9802 (36)
Point Thermal bridges								(36a) = 0.0000
Total fabric heat loss								(33) + (36) + (36a) = 41.3783 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3251 (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													
27.3029	26.8974	26.3264	25.2735	24.4852	23.6110	23.1389	23.7059	24.3232	25.2586	26.3331	27.2106	(42b)	
Hot water usage for other uses													
38.4412	37.0433	35.6455	34.2476	32.8497	31.4519	31.4519	32.8497	34.2476	35.6455	37.0433	38.4412	(42c)	
Average daily hot water use (litres/day)												60.2606 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	65.7441	63.9407	61.9718	59.5211	57.3349	55.0629	54.5907	56.5556	58.5709	60.9041	63.3765	65.6518	(44)
Energy content (annual)	104.1225	91.0507	95.2484	81.4815	77.1838	67.7063	66.0228	70.0277	72.2237	82.6463	90.2914	102.7948	(45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1000.7999	
0.0000	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	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													
88.5042	77.3931	80.9612	69.2593	65.6063	57.5503	56.1194	59.5235	61.3902	70.2493	76.7477	87.3756	(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	88.5042	77.3931	80.9612	69.2593	65.6063	57.5503	56.1194	59.5235	61.3902	70.2493	76.7477	87.3756	(64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 850.6799 (64)	
Electric shower(s)												851 (64)	
50.6156	45.0989	49.2463	46.9951	47.8770	45.6700	47.1923	47.8770	46.9951	49.2463	48.3203	50.6156	(64a)	

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Heat gains from water heating, kWh/month
 34.7799 30.6230 32.5519 29.0636 28.3708 25.8051 25.8279 26.8501 27.0963 29.8739 31.2670 34.4978 (65)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 575.7497 (64a)

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	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542	116.2542 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.1858	120.8843	109.1858	112.8254	109.1858	112.8254	109.1858	109.1858	112.8254	109.1858	112.8254	109.1858 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.0313	207.1589	201.7974	190.3835	175.9756	162.4341	153.3876	151.2600	156.6215	168.0353	182.4433	195.9848 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254	34.6254 (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)	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034	-93.0034 (71)
Water heating gains (Table 5)	46.7472	45.5700	43.7525	40.3661	38.1328	35.8404	34.7150	36.0889	37.6338	40.1531	43.4264	46.3680 (72)
Total internal gains	418.8406	431.4894	412.6120	401.4513	381.1705	368.9762	355.1647	354.4110	364.9569	375.2505	396.5713	409.4149 (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			
Southeast				2.7300	36.7938	0.6300	0.7000	0.7700	30.6980 (77)			
South				8.3400	46.7521	0.6300	0.7000	0.7700	119.1622 (78)			
Solar gains	149.8602	247.4470	320.1409	369.6151	392.0783	380.3410	370.3393	354.4519	337.1559	268.2868	178.0170	129.2382 (83)
Total gains	568.7008	678.9364	732.7529	771.0664	773.2488	749.3171	725.5040	708.8629	702.1128	643.5373	574.5883	538.6531 (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)												
tau	38.4081	38.5227	38.6357	39.1753	39.2780	39.7630	39.7630	39.8541	39.5747	39.2780	39.0709	38.8567
alpha	3.5605	3.5682	3.5757	3.6117	3.6185	3.6509	3.6509	3.6569	3.6383	3.6185	3.6047	3.5904
util living area	0.9735	0.9513	0.9214	0.8620	0.7667	0.6111	0.4602	0.4876	0.6770	0.8702	0.9532	0.9777 (86)
MIT	19.2851	19.5918	19.9368	20.3542	20.6826	20.9012	20.9730	20.9662	20.8488	20.4251	19.7919	19.2380 (87)
Th 2	19.9918	19.9945	19.9971	20.0096	20.0119	20.0228	20.0228	20.0248	20.0186	20.0119	20.0072	20.0023 (88)
util rest of house	0.9682	0.9420	0.9062	0.8347	0.7194	0.5359	0.3651	0.3930	0.6069	0.8392	0.9428	0.9732 (89)
MIT 2	18.4450	18.7466	19.0831	19.4879	19.7847	19.9682	20.0129	20.0116	19.9283	19.5627	18.9560	18.4064 (90)
Living area fraction									fLA = Living area / (4) =			0.4607 (91)
MIT	18.8320	19.1360	19.4764	19.8870	20.1984	20.3980	20.4552	20.4513	20.3524	19.9600	19.3411	18.7895 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8320	19.1360	19.4764	19.8870	20.1984	20.3980	20.4552	20.4513	20.3524	19.9600	19.3411	18.7895 (93)

8. Space heating requirement

Utilisation	0.9605	0.9324	0.8970	0.8310	0.7290	0.5660	0.4081	0.4354	0.6320	0.8373	0.9341	0.9662 (94)
Useful gains	546.2287	633.0496	657.2448	640.7211	563.6737	424.0824	296.0998	308.6684	443.7612	538.8651	536.7498	520.4386 (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	1184.6396	1157.0551	1051.5957	878.1151	677.4386	456.5485	303.5649	318.2803	494.6634	746.1237	980.9616	1175.5988 (97)
Space heating kWh	474.9778	352.1317	293.3970	170.9236	84.6410	0.0000	0.0000	0.0000	0.0000	154.2004	319.8325	487.4392 (98a)
Space heating requirement - total per year (kWh/year)												2337.5433
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	474.9778	352.1317	293.3970	170.9236	84.6410	0.0000	0.0000	0.0000	0.0000	154.2004	319.8325	487.4392 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2337.5433
Space heating per m ²										(98c) / (4) =		31.8597 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	740.1730	582.6894	597.0694	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8276	0.8907	0.8787	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	612.5485	519.0208	524.6233	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	830.1644	804.6158	787.3397	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction												
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	39.1708	53.1207	48.8652	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												141.1567 (107)
Energy for space heating												31.8597 (99)
Energy for space cooling												1.9239 (108)

Total
Fabric Energy Efficiency (TFEE)

33.7836 (109)
33.8 (109)