

Summary for Input Data

Plot Reference	B 1101	Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	81 B	DER	6.20	TER	17.05
Environmental	96 A	% DER < TER			63.64
CO ₂ Emissions (t/year)	0.29	DFEE	39.70	TFEE	40.23
Compliance Check	See BREL	% DFEE < TFEE			1.32
% DPER < TPER	29.39	DPER	65.49	TPER	92.75

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

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

Orientation	Northeast	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Top-floor flat	
Which Floor	11	
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	157.14	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:	23.20 m	52.43 m ²	2.80 m

8.0 Living Area	30.62	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	41.09	29.01	0.00	None	12.08	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	23.87	21.45	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	17.22	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	103.60

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	52.43	52.43	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	52.43

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	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 East	2.42	
NW windows	Window	External Wall 1	North West	3.74	
SW windows	Window	External Wall 1	South West	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	7.58	0.05	0.05	No
E3 Sill	Independently assessed	4.08	0.04	0.04	No
E4 Jamb	Independently assessed	18.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	11.28	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	8.53	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	3.40	0.05	0.05	No
E16 Corner (normal)	Independently assessed	5.60	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	2.80	0.05	0.05	No
E25 Staggered 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	6.15	0.00	0.00	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	6.15	0.05	0.05	No
E14 Flat roof	Independently assessed	23.20	0.05	0.05	No

Y-value

0.04

 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	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

Summary for Input Data

Number of flueless gas fires

0

21.0 Fixed Cooling System

No

22.0 Pressure Testing

Yes

Designed AP₅₀

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

None

25.0 Main Heating 2

None

26.0 Heat Networks

Space Community Heating

Space and Water Combined

Distribution Loss

Calculated

Distribution Loss Value

1.50

SAP Code

2306

	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

None

28.0 Water Heating

Water Heating

Community Heating

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

Internal Store

Insulation Type

Measured Loss

Cylinder Volume

180.00

L

Loss

1.20

kWh/day

32.0 Photovoltaic Unit

Multiple Dwellings – Not Connected

Export Capable Meter?

No

Connected To Dwelling

Yes

Diverter

No

Battery Capacity [kWh]

0.00

Summary for Input Data



PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.25	North West	Horizontal	Modest		No	0.80		

34.0 Small-scale Hydro

None

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

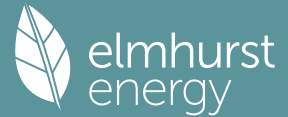
Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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SAP Rating	81 B	DER	6.20
Environmental	96 A	TER	17.05
CO ₂ Emissions (t/year)	0.29	% DER < TER	63.64
Compliance Check	See BREL	DFEE	39.70
% DPER < TPER	29.39	TFEE	40.23
		% DFEE < TFEE	1.32
		TPER	92.75
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	52.4300 (1b)	2.8000 (2b)	146.8040 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.4300		146.8040 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 146.8040 (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) =												81.0000 (23c)
Effective ac	0.2576	0.2544	0.2512	0.2352	0.2321	0.2161	0.2161	0.2129	0.2225	0.2321	0.2384	0.2448 (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							
Window			12.0800	1.1450	13.8321		(27)
Door			2.4200	1.0000	2.4200		(26)
External Wall 1	41.0900	12.0800	29.0100	0.1500	4.3515	70.0000	2030.7000 (29a)
Corridor wall	23.8700	2.4200	21.4500	0.1900	4.0755	70.0000	1501.5001 (29a)
External Roof 1	52.4300		52.4300	0.1000	5.2430	9.0000	471.8700 (30)
Total net area of external elements Aum(A, m ²)			117.3900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.9221		(33)
Main dwelling							
Party Wall 1			17.2200	0.0000	0.0000	70.0000	1205.4000 (32)
Party Floor 1			52.4300			40.0000	2097.2000 (32d)
Internal Wall 1			103.6000			9.0000	932.4000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8239.0700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							157.1442 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	7.5800	0.0500	0.3790
E3 Sill	4.0800	0.0400	0.1632
E4 Jamb	18.6000	0.0400	0.7440
E7 Party floor between dwellings (in blocks of flats)	11.2800	0.0500	0.5640
E7 Party floor between dwellings (in blocks of flats)	8.5300	0.0390	0.3327
E9 Balcony between dwellings, wall insulation continuous	3.4000	0.0500	0.1700
E16 Corner (normal)	5.6000	0.0500	0.2800
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E25 Staggered party wall between dwellings	2.8000	0.0390	0.1092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	6.1500	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	6.1500	0.0500	0.3075
E14 Flat roof	23.2000	0.0500	1.1600
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.3496 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	34.2716 (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	12.4777	12.3233	12.1689	11.3968	11.2423	10.4702	10.4702	10.3158	10.7791	11.2423	11.5512	11.8600	(38)
Heat transfer coeff	46.7493	46.5949	46.4405	45.6684	45.5140	44.7419	44.7419	44.5875	45.0507	45.5140	45.8228	46.1317	(39)
Average = Sum(39)m / 12 =												45.6298	
HLP	0.8917	0.8887	0.8858	0.8710	0.8681	0.8534	0.8534	0.8504	0.8593	0.8681	0.8740	0.8799	(40)
HLP (average)												0.8703	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7618 (42)
Hot water usage for mixer showers	52.4002	51.5979	50.4156	48.5969	46.9673	44.6875	42.8844	44.9924	46.0526	48.3106	50.6621	52.3529	(42a)
Hot water usage for baths	22.7230	22.3800	21.8920	21.1612	20.5026	19.5960	18.9081	19.7492	20.1907	21.0890	22.0230	22.7050	(42b)
Hot water usage for other uses	32.6721	31.4841	30.2960	29.1079	27.9198	26.7317	26.7317	27.9198	29.1079	30.2960	31.4841	32.6721	(42c)
Average daily hot water use (litres/day)												99.0804	(43)
Daily hot water use	107.7953	105.4619	102.6036	98.8660	95.3897	91.0153	88.5243	92.6615	95.3512	99.6956	104.1691	107.7300	(44)
Energy conte	158.6933	139.5475	146.6184	129.1437	122.9193	105.2561	97.8220	109.0642	110.6026	128.4678	140.7881	158.2094	(45)
Energy content (annual)										Total = Sum(45)m =		1547.1323	
Distribution loss (46)m = 0.15 x (45)m	23.8040	20.9321	21.9928	19.3715	18.4379	15.7884	14.6733	16.3596	16.5904	19.2702	21.1182	23.7314	(46)
Water storage loss (or HIU loss):													
Store volume												110.0000	(47)
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	213.9701	189.4749	201.8952	182.6373	178.1961	158.7498	153.0988	164.3410	164.0963	183.7446	194.2817	213.4862	(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	213.9701	189.4749	201.8952	182.6373	178.1961	158.7498	153.0988	164.3410	164.0963	183.7446	194.2817	213.4862	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2197.9721	(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	96.9869	86.3415	92.9721	85.7352	85.0921	77.7926	76.7472	80.4853	79.5703	86.9370	89.6070	96.8261	(65)

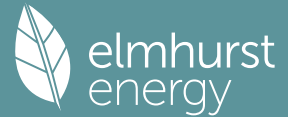
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	77.4438	85.7413	77.4438	80.0252	77.4438	80.0252	77.4438	77.4438	80.0252	77.4438	80.0252	77.4438	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	153.5409	155.1342	151.1192	142.5717	131.7821	121.6414	114.8667	113.2735	117.2885	125.8359	136.6256	146.7663	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	(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)	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	(71)
Water heating gains (Table 5)	130.3588	128.4843	124.9625	119.0767	114.3711	108.0453	103.1549	108.1792	110.5143	116.8508	124.4541	130.1426	(72)
Total internal gains	410.7698	418.7862	402.9517	391.1000	373.0233	359.1382	344.8917	348.3227	357.2543	369.5568	390.5312	403.7789	(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
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Southwest	8.3400		36.7938		0.3500		0.7000		0.7700		52.1003 (79)	
Northwest	3.7400		11.2829		0.3500		0.7000		0.7700		7.1646 (81)	

Solar gains	59.2649	103.3299	147.7017	193.6048	226.5243	229.1401	219.1452	193.9354	163.4960	115.9059	71.4191	50.4380 (83)
Total gains	470.0348	522.1161	550.6534	584.7048	599.5477	588.2783	564.0370	542.2582	520.7503	485.4627	461.9504	454.2170 (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	48.9554	49.1176	49.2809	50.1141	50.2841	51.1519	51.1519	51.3290	50.8012	50.2841	49.9452	49.6109
alpha	4.2637	4.2745	4.2854	4.3409	4.3523	4.4101	4.4101	4.4219	4.3867	4.3523	4.3297	4.3074
util living area	0.9509	0.9242	0.8825	0.7891	0.6520	0.4761	0.3468	0.3750	0.5702	0.8027	0.9166	0.9560 (86)
MIT	19.9650	20.1694	20.4178	20.7156	20.8990	20.9804	20.9961	20.9945	20.9565	20.7389	20.3346	19.9397 (87)
Th 2	20.1746	20.1771	20.1796	20.1922	20.1947	20.2073	20.2073	20.2098	20.2023	20.1947	20.1897	20.1846 (88)
util rest of house	0.9425	0.9120	0.8639	0.7585	0.6073	0.4207	0.2853	0.3120	0.5123	0.7678	0.9013	0.9484 (89)
MIT 2	18.9843	19.2386	19.5435	19.9032	20.1046	20.1937	20.2055	20.2071	20.1696	19.9385	19.4560	18.9606 (90)
Living area fraction	fLA = Living area / (4) =											0.5840 (91)
MIT	19.5570	19.7822	20.0541	20.3777	20.5685	20.6531	20.6672	20.6670	20.6292	20.4060	19.9691	19.5324 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5570	19.7822	20.0541	20.3777	20.5685	20.6531	20.6672	20.6670	20.6292	20.4060	19.9691	19.5324 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9352	0.9054	0.8608	0.7659	0.6286	0.4521	0.3211	0.3486	0.5438	0.7775	0.8966	0.9413 (94)
Useful gains	439.5606	472.7028	473.9788	447.8019	376.8469	265.9788	181.1333	189.0461	283.1927	377.4285	414.1752	427.5532 (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	713.2562	693.4341	629.4586	524.1666	403.6418	270.8277	181.9749	190.2532	294.1444	446.3078	589.6993	707.3108 (97)
Space heating kWh	203.6295	148.3314	115.6770	54.9826	19.9355	0.0000	0.0000	0.0000	0.0000	51.2462	126.3774	208.1397 (98a)
Space heating requirement - total per year (kWh/year)												928.3191
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	203.6295	148.3314	115.6770	54.9826	19.9355	0.0000	0.0000	0.0000	0.0000	51.2462	126.3774	208.1397 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												928.3191
Space heating per m2	(98c) / (4) =											17.7059 (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												
203.6295 148.3314 115.6770 54.9826 19.9355 0.0000 0.0000 0.0000 0.0000 51.2462 126.3774 208.1397 (98)												
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a 305.4442 222.4971 173.5155 82.4738 29.9032 0.0000 0.0000 0.0000 0.0000 76.8693 189.5660 312.2095												
Space heating requirement												
305.4442 222.4971 173.5155 82.4738 29.9032 0.0000 0.0000 0.0000 0.0000 76.8693 189.5660 312.2095 (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												
213.9701 189.4749 201.8952 182.6373 178.1961 158.7498 153.0988 164.3410 164.0963 183.7446 194.2817 213.4862 (64)												
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a 320.9551 284.2123 302.8428 273.9560 267.2942 238.1247 229.6482 246.5115 246.1444 275.6169 291.4226 320.2293												
Water heating fuel												
320.9551 284.2123 302.8428 273.9560 267.2942 238.1247 229.6482 246.5115 246.1444 275.6169 291.4226 320.2293 (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 11.9789 10.8197 11.9789 11.5925 11.9789 11.5925 11.9789 11.9789 11.5925 11.9789 11.5925 11.9789 (331)												
Lighting 16.6368 13.3466 12.0172 8.8043 6.8007 5.5562 6.2038 8.0639 10.4743 13.7428 15.5225 17.0991 (332)												
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m -2.7516 -4.8939 -9.0493 -12.7691 -15.9975 -15.7932 -15.4631 -13.2894 -9.9685 -6.3906 -3.3068 -2.2456 (333a)												
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334a)m 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)												
(335a)m 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)												
(333b)m 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)												
(334b)m 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)												
(335b)m 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												1392.4787 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3296.9581 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												13.9248 (313)
Space cooling fuel												0.0000 (321)

Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7875)												
mechanical ventilation fans (SFP = 0.7875)												141.0419 (330a)
Total electricity for the above, kWh/year												141.0419 (331)
Electricity for lighting (calculated in Appendix L)												134.2681 (332)

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	-111.9187 (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	4852.8282 (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	2021.3090	0.1563	93.8123 (367)
Electrical energy for heat distribution (space & water)	13.9248	0.0000	6.8162 (372)
Overall CO2 factor for heat network			0.0641 (386)
Total CO2 associated with community systems			300.6174 (373)
Space and water heating			300.6174 (376)
Pumps, fans and electric keep-hot	141.0419	0.1387	19.5643 (378)
Energy for lighting	134.2681	0.1443	19.3790 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-111.9187	0.1305	-14.6044
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-14.6044 (380)
Total CO2, kg/year			324.9563 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.2000 (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	2021.3090	1.5786	947.5095 (467)
Electrical energy for heat distribution (space & water)	13.9248	0.0000	72.1076 (472)
Overall CO2 factor for heat network			0.6782 (486)
Total CO2 associated with community systems			3180.1925 (473)
Space and water heating			3180.1925 (476)
Pumps, fans and electric keep-hot	141.0419	1.5128	213.3682 (478)
Energy for lighting	134.2681	1.5338	205.9449 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-111.9187	1.4820	-165.8671
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-165.8671 (480)
Total Primary energy kWh/year			3433.6385 (483)
Dwelling Primary energy Rate (DPER)			65.4900 (484)

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

1. Overall dwelling characteristics

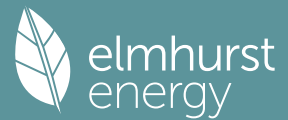
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	52.4300 (1b)	x 2.8000 (2b)	= 146.8040 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.4300		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 146.8040 (5)

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)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1362 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3862 (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) = 0.3283 (21)

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

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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 infiltr rate	0.4186	0.4104	0.4022	0.3611	0.3529	0.3119	0.3119	0.3037	0.3283	0.3529	0.3693	0.3858 (22b)
Effective ac	0.5876	0.5842	0.5809	0.5652	0.5623	0.5486	0.5486	0.5461	0.5539	0.5623	0.5682	0.5744 (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			10.7000	1.1450	12.2519		(27)
External Wall 1	41.0900	10.7000	30.3900	0.1800	5.4702		(29a)
Corridor wall	23.8700	2.4200	21.4500	0.1800	3.8610		(29a)
External Roof 1	52.4300		52.4300	0.1100	5.7673		(30)
Total net area of external elements Aum(A, m2)			117.3900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.7704		(33)
Main dwelling							
Party Wall 1			17.2200	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							157.1442 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	7.5800	0.0500	0.3790
E3 Sill	4.0800	0.0500	0.2040
E4 Jamb	18.6000	0.0500	0.9300
E7 Party floor between dwellings (in blocks of flats)	11.2800	0.0700	0.7896
E7 Party floor between dwellings (in blocks of flats)	8.5300	0.0700	0.5971
E9 Balcony between dwellings, wall insulation continuous	3.4000	0.0200	0.0680
E16 Corner (normal)	5.6000	0.0900	0.5040
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	6.1500	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	6.1500	0.1200	0.7380
E14 Flat roof	23.2000	0.0800	1.8560
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.4017 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	36.1721 (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	28.4668	28.3020	28.1404	27.3817	27.2397	26.5789	26.5789	26.4565	26.8334	27.2397	27.5269	27.8271 (38)
Average = Sum(39)m / 12 =	64.6389	64.4741	64.3125	63.5538	63.4118	62.7510	62.7510	62.6286	63.0055	63.4118	63.6990	63.9992 (39)
												63.5531
HLP	1.2329	1.2297	1.2266	1.2122	1.2095	1.1969	1.1969	1.1945	1.2017	1.2095	1.2149	1.2207 (40)
HLP (average)												1.2122
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

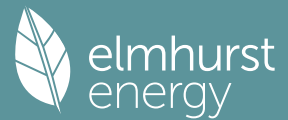
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7618 (42)
Hot water usage for mixer showers													
53.7583	52.9505	51.7732	49.5208	47.8585	46.0048	44.9511	46.1195	47.4002	49.3905	51.6914	53.5524	(42a)	
Hot water usage for baths													
23.2411	22.8959	22.4099	21.5136	20.8426	20.0985	19.6965	20.1792	20.7047	21.5009	22.4156	23.1625	(42b)	
Hot water usage for other uses													
32.6721	31.4841	30.2960	29.1079	27.9198	26.7317	26.7317	27.9198	29.1079	30.2960	31.4841	32.6721	(42c)	
Average daily hot water use (litres/day)												100.8135 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
109.6716	107.3304	104.4791	100.1423	96.6209	92.8350	91.3794	94.2185	97.2128	101.1875	105.5910	109.3870	(44)	
Energy conte	173.6929	152.8371	160.5804	137.0898	130.0703	114.1515	110.5155	116.6622	119.8731	137.3104	150.4338	(45)	
Energy content (annual)										Total = Sum(45)m =	1674.4908		
Distribution loss (46)m = 0.15 x (45)m													
26.0539	22.9256	24.0871	20.5635	19.5106	17.1227	16.5773	17.4993	17.9810	20.5966	22.5651	25.6910	(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	(61)	
Total heat required for water heating calculated for each month													
222.9356	197.3144	209.8231	184.7440	179.3130	161.8057	159.7582	165.9049	167.5273	186.5531	198.0880	220.5163	(62)	
WWHRS	-24.5761	-21.7353	-22.7599	-18.8461	-17.5639	-15.0296	-14.0878	-14.9810	-15.5502	-18.3319	-20.7679	-24.1210 (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													
198.3595	175.5791	187.0632	165.8979	161.7491	146.7761	145.6703	150.9239	151.9772	168.2212	177.3201	196.3954	(64)	
12Total per year (kWh/year)												2025.9329 (64)	
Electric shower(s)												2026 (64)	
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													
97.1470	86.4001	92.7871	83.7057	82.6425	76.0787	76.1405	78.1843	77.9812	85.0499	88.1426	96.3426	(65)	

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

Metabolic gains (Table 5), Watts												
(66)m	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	77.8355	86.1750	77.8355	80.4300	77.8355	80.4300	77.8355	77.8355	80.4300	77.8355	80.4300	77.8355 (67)
153.5409	155.1342	151.1192	142.5717	131.7821	121.6414	114.8667	113.2735	117.2885	125.8359	136.6256	146.7663	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	(71)
Water heating gains (Table 5)	130.5740	128.5716	124.7139	116.2580	111.0787	105.6649	102.3394	105.0864	108.3072	114.3143	122.4203	(72)
Total internal gains	414.3768	422.3072	406.0949	391.6861	373.1226	357.1626	344.4680	345.6218	355.4520	370.4121	391.9022	(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	
Southwest				7.3800	36.7938	0.6300	0.7000	0.7700			82.9857 (79)	
Northwest				3.3200	11.2829	0.6300	0.7000	0.7700			11.4481 (81)	
Solar gains	94.4338	164.6582	235.3929	308.5929	361.1025	365.2883	349.3482	309.1346	260.5791	184.7057	113.8024	80.3675 (83)
Total gains	508.8105	586.9654	641.4878	700.2790	734.2251	722.4509	693.8163	654.7564	616.0312	555.1178	505.7046	486.8884 (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	35.4064	35.4969	35.5861	36.0109	36.0915	36.4716	36.4716	36.5429	36.3243	36.0915	35.9288	35.7603
alpha	3.3604	3.3665	3.3724	3.4007	3.4061	3.4314	3.4314	3.4362	3.4216	3.4061	3.3953	3.3840
util living area	0.9561	0.9305	0.8902	0.8075	0.6822	0.5203	0.3876	0.4249	0.6255	0.8345	0.9300	0.9613 (86)
MIT	19.3196	19.6050	19.9741	20.4202	20.7467	20.9265	20.9795	20.9718	20.8589	20.4406	19.8183	19.2741 (87)
Th 2	19.8938	19.8963	19.8988	19.9103	19.9124	19.9225	19.9225	19.9244	19.9186	19.9124	19.9081	19.9035 (88)
util rest of house	0.9476	0.9174	0.8697	0.7725	0.6272	0.4441	0.2971	0.3317	0.5497	0.7963	0.9146	0.9537 (89)
MIT 2	17.9816	18.3373	18.7922	19.3298	19.6920	19.8743	19.9138	19.9115	19.8162	19.3693	18.6174	17.9313 (90)
Living area fraction	18.7630	19.0777	19.4824	19.9666	20.3080	20.4888	20.5362	20.5307	20.4251	19.9950	19.3187	18.7155 (92)
MIT	18.7630	19.0777	19.4824	19.9666	20.3080	20.4888	20.5362	20.5307	20.4251	19.9950	19.3187	18.7155 (93)
Temperature adjustment												0.0000
adjusted MIT	18.7630	19.0777	19.4824	19.9666	20.3080	20.4888	20.5362	20.5307	20.4251	19.9950	19.3187	18.7155 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9365	0.9058	0.8608	0.7744	0.6481	0.4851	0.3493	0.3851	0.5867	0.7995	0.9046	0.9432 (94)
Useful gains	476.5107	531.6929	552.1684	542.3230	475.8844	350.4621	242.3569	252.1564	361.4051	443.8381	457.4853	459.2313 (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	934.8715	914.0913	834.9323	703.3242	545.8486	369.5285	247.0012	258.7003	398.5191	595.7540	778.3197	928.9834 (97)
Space heating kWh	341.0205	256.9717	210.3764	115.9208	52.0534	0.0000	0.0000	0.0000	0.0000	113.0255	231.0008	349.4956 (98a)
Space heating requirement - total per year (kWh/year)												1669.8646
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	341.0205	256.9717	210.3764	115.9208	52.0534	0.0000	0.0000	0.0000	0.0000	113.0255	231.0008	349.4956 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1669.8646
Space heating per m2										(98c) / (4) =		31.8494 (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	341.0205	256.9717	210.3764	115.9208	52.0534	0.0000	0.0000	0.0000	0.0000	113.0255	231.0008	349.4956 (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)	369.4696	278.4092	227.9268	125.5913	56.3959	0.0000	0.0000	0.0000	0.0000	122.4545	250.2717	378.6518 (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	198.3595	175.5791	187.0632	165.8979	161.7491	146.7761	145.6703	150.9239	151.9772	168.2212	177.3201	196.3954 (64)
Efficiency of water heater (217)m	85.2636	84.9127	84.3238	83.2715	81.8189	79.8000	79.8000	79.8000	79.8000	83.1883	84.6539	79.8000 (216)
Fuel for water heating, kWh/month	232.6427	206.7760	221.8390	199.2253	197.6916	183.9300	182.5443	189.1277	190.4476	202.2174	209.4649	230.1399 (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	16.1727	12.9743	11.6819	8.5587	6.6110	5.4012	6.0308	7.8390	10.1821	13.3595	15.0895	16.6222 (232)

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Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-5.8268	-9.0577	-14.3399	-17.8146	-20.7645	-19.9700	-19.7343	-17.8421	-14.8149	-11.0592	-6.6994	-4.9447 (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	(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	(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	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-1.1521	-2.5295	-5.2326	-8.1717	-11.1194	-11.2846	-11.1464	-9.2869	-6.6175	-3.7103	-1.5671	-0.9031 (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	(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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1809.1707 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2446.0462 (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)												130.5228 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-235.5895 (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												4236.1503 (238)

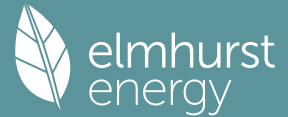
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1809.1707	0.2100	379.9259	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2446.0462	0.2100	513.6697	(264)
Space and water heating			893.5956	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	130.5228	0.1443	18.8385	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-162.8682	0.1326	-21.5957	
PV Unit electricity exported	-72.7213	0.1248	-9.0748	
Total			-30.6705	(269)
Total CO2, kg/year			893.6928	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.0500	(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	1809.1707	1.1300	2044.3629	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2446.0462	1.1300	2764.0322	(278)
Space and water heating			4808.3951	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	130.5228	1.5338	200.2003	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-162.8682	1.4899	-242.6635	
PV Unit electricity exported	-72.7213	0.4580	-33.3069	
Total			-275.9704	(283)
Total Primary energy kWh/year			4862.7258	(286)
Target Primary Energy Rate (TPER)			92.7500	(287)

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Plot Reference	B 1101	Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref	
Plot Address		SAP Version	10.2
SAP Rating	81 B	DER	6.20
Environmental	96 A	TER	17.05
CO ₂ Emissions (t/year)	0.29	% DER < TER	63.64
Compliance Check	See BREL	DFEE	39.70
% DPER < TPER	29.39	TFEE	40.23
		% DFEE < TFEE	1.32
		TPER	92.75
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	52.4300 (1b)	2.8000 (2b)	146.8040 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.4300		146.8040 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 146.8040 (5)

2. Ventilation rate

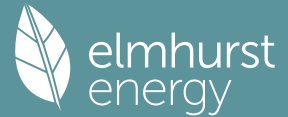
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (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) =	20.0000 / (5) = 0.1362 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2862 (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) = 0.2433 (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 infiltr rate	0.3102	0.3041	0.2980	0.2676	0.2615	0.2311	0.2311	0.2251	0.2433	0.2615	0.2737	0.2859 (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	0.5481	0.5462	0.5444	0.5358	0.5342	0.5267	0.5267	0.5253	0.5296	0.5342	0.5375	0.5409 (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							
Window			12.0800	1.1450	13.8321		(27)
Door			2.4200	1.0000	2.4200		(26)
External Wall 1	41.0900	12.0800	29.0100	0.1500	4.3515	70.0000	2030.7000 (29a)
Corridor wall	23.8700	2.4200	21.4500	0.1900	4.0755	70.0000	1501.5001 (29a)
External Roof 1	52.4300		52.4300	0.1000	5.2430	9.0000	471.8700 (30)
Total net area of external elements A _{um} (A, m ²)			117.3900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 29.9221		(33)
Main dwelling							
Party Wall 1			17.2200	0.0000	0.0000	70.0000	1205.4000 (32)
Party Floor 1			52.4300			40.0000	2097.2000 (32a)
Internal Wall 1			103.6000			9.0000	932.4000 (32c)
Heat capacity C _m = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 8239.0700 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							157.1442 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					7.5800	0.0500	0.3790
E3 Sill					4.0800	0.0400	0.1632

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E4 Jamb									18.6000	0.0400	0.7440	
E7 Party floor between dwellings (in blocks of flats)									11.2800	0.0500	0.5640	
E7 Party floor between dwellings (in blocks of flats)									8.5300	0.0390	0.3327	
E9 Balcony between dwellings, wall insulation continuous									3.4000	0.0500	0.1700	
E16 Corner (normal)									5.6000	0.0500	0.2800	
E18 Party wall between dwellings									2.8000	0.0500	0.1400	
E25 Staggered party wall between dwellings									2.8000	0.0390	0.1092	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)									6.1500	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)									6.1500	0.0500	0.3075	
E14 Flat roof									23.2000	0.0500	1.1600	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												4.3496 (36)
Point Thermal bridges												0.0000
Total fabric heat loss											(33) + (36) + (36a) =	34.2716 (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	26.5536	26.4631	26.3744	25.9576	25.8797	25.5167	25.5167	25.4495	25.6565	25.8797	26.0374	26.2023 (38)
Average = Sum(39)m / 12 =	60.8252	60.7347	60.6460	60.2293	60.1513	59.7884	59.7884	59.7211	59.9282	60.1513	60.3090	60.4739 (39)
	60.2289											
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1601	1.1584	1.1567	1.1488	1.1473	1.1403	1.1403	1.1391	1.1430	1.1473	1.1503	1.1534 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.1487

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												1.7618 (42)
Hot water usage for mixer showers												
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 (42a)
Hot water usage for other uses	22.7230	22.3800	21.8920	21.1612	20.5026	19.5960	18.9081	19.7492	20.1907	21.0890	22.0230	22.7050 (42b)
Average daily hot water use (litres/day)	32.6721	31.4841	30.2960	29.1079	27.9198	26.7317	26.7317	27.9198	29.1079	30.2960	31.4841	32.6721 (42c)
												50.7715 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	55.3951	53.8640	52.1880	50.2691	48.4224	46.3277	45.6399	47.6691	49.2986	51.3850	53.5070	55.3771 (44)
Energy content (annual)	81.5512	71.2730	74.5755	65.6640	62.3972	53.5765	50.4334	56.1074	57.1839	66.2147	72.3166	81.3253 (45)
Distribution loss (46)m = 0.15 x (45)m												792.6186
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	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	69.3185	60.5820	63.3892	55.8144	53.0376	45.5400	42.8684	47.6913	48.6063	56.2825	61.4691	69.1265 (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	69.3185	60.5820	63.3892	55.8144	53.0376	45.5400	42.8684	47.6913	48.6063	56.2825	61.4691	69.1265 (64)
12Total per year (kWh/year)												673.7258 (64)
Electric shower(s)	43.0515	38.3592	41.8868	39.9721	40.7221	38.8450	40.1398	40.7221	39.9721	41.8868	41.0992	43.0515 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												489.7080 (64a)
Heat gains from water heating, kWh/month	28.0925	24.7353	26.3190	23.9466	23.4399	21.0962	20.7520	22.1033	22.1446	24.5423	25.6421	28.0445 (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	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	77.4438	85.7413	77.4438	80.0252	77.4438	80.0252	77.4438	77.4438	80.0252	77.4438	80.0252	77.4438 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	153.5409	155.1342	151.1192	142.5717	131.7821	121.6414	114.8667	113.2735	117.2885	125.8359	136.6256	146.7663 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088 (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)	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702 (71)
Water heating gains (Table 5)	37.7587	36.8085	35.3750	33.2592	31.5053	29.3003	27.8925	29.7088	30.7564	32.9870	35.6140	37.6942 (72)
Total internal gains	318.1697	327.1103	313.3643	305.2825	290.1575	280.3933	269.6294	269.8524	277.4964	285.6930	301.6911	311.3306 (73)

6. Solar gains												

[Jan]												
			Area	Solar flux								Gains
			m2	Table 6a								W
				W/m2								
Southwest			8.3400	36.7938			0.3500		0.7000		0.7700	52.1003 (79)
Northwest			3.7400	11.2829			0.3500		0.7000		0.7700	7.1646 (81)

Solar gains	59.2649	103.3299	147.7017	193.6048	226.5243	229.1401	219.1452	193.9354	163.4960	115.9059	71.4191	50.4380 (83)
Total gains	377.4347	430.4403	461.0660	498.8873	516.6818	509.5334	488.7746	463.7878	440.9923	401.5989	373.1102	361.7686 (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	37.6263	37.6824	37.7375	37.9986	38.0479	38.2789	38.2789	38.3219	38.1896	38.0479	37.9484	37.8449
alpha	3.5084	3.5122	3.5158	3.5332	3.5365	3.5519	3.5519	3.5548	3.5460	3.5365	3.5299	3.5230
util living area	0.9803	0.9678	0.9480	0.8992	0.8094	0.6581	0.5089	0.5510	0.7543	0.9138	0.9673	0.9829 (86)
MIT	19.1357	19.3790	19.7221	20.1889	20.5911	20.8627	20.9585	20.9444	20.7655	20.2510	19.6183	19.0902 (87)
Th 2	19.9520	19.9534	19.9548	19.9612	19.9624	19.9680	19.9680	19.9691	19.9659	19.9624	19.9600	19.9574 (88)
util rest of house	0.9761	0.9612	0.9367	0.8763	0.7642	0.5785	0.4014	0.4435	0.6846	0.8894	0.9593	0.9793 (89)
MIT 2	18.2672	18.5077	18.8450	19.2980	19.6665	19.8920	19.9530	19.9473	19.8220	19.3657	18.7512	18.2262 (90)
Living area fraction									fLA = Living area /	(4) =		0.5840 (91)
MIT	18.7744	19.0166	19.3573	19.8183	20.2065	20.4589	20.5402	20.5296	20.3730	19.8827	19.2576	18.7308 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7744	19.0166	19.3573	19.8183	20.2065	20.4589	20.5402	20.5296	20.3730	19.8827	19.2576	18.7308 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9701	0.9537	0.9289	0.8726	0.7758	0.6181	0.4626	0.5038	0.7141	0.8872	0.9525	0.9737 (94)
Useful gains	366.1419	410.4921	428.3022	435.3483	400.8191	314.9504	226.1047	233.6634	314.8998	356.2858	355.3995	352.2606 (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	880.4081	857.3676	779.7409	657.5997	511.6752	350.2961	235.5798	246.6252	375.9296	558.3681	733.2146	878.7362 (97)
Space heating kWh	382.6140	300.3004	261.4704	160.0211	82.4770	0.0000	0.0000	0.0000	0.0000	150.3492	272.0269	391.6979 (98a)
Space heating requirement - total per year (kWh/year)												2000.9568
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	382.6140	300.3004	261.4704	160.0211	82.4770	0.0000	0.0000	0.0000	0.0000	150.3492	272.0269	391.6979 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2000.9568
Space heating per m2										(98c) / (4) =		38.1643 (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	562.0105	442.4338	453.8807	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7844	0.8538	0.8286	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	440.8671	377.7447	376.0721	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	568.0241	545.3684	517.5359	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	91.5531	124.7120	105.2491	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	22.8883	31.1780	26.3123	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												80.3785 (107)
Energy for space heating												38.1643 (99)
Energy for space cooling												1.5331 (108)
Total												39.6974 (109)
Fabric Energy Efficiency (DFEE)												39.7 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	52.4300 (1b)	x 2.8000 (2b)	= 146.8040 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.4300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	146.8040 (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	

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1362 (8)
 Pressure test Yes
 Pressure Test Method Blower Door
 Measured/design AP50 5.0000 (17)
 Infiltration rate 0.3862 (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) = 0.3283 (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	0.4186	0.4104	0.4022	0.3611	0.3529	0.3119	0.3119	0.3037	0.3283	0.3529	0.3693	0.3858	(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	0.5876	0.5842	0.5809	0.5652	0.5623	0.5486	0.5486	0.5461	0.5539	0.5623	0.5682	0.5744	(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			10.7000	1.1450	12.2519			(27)
External Wall 1	41.0900	10.7000	30.3900	0.1800	5.4702			(29a)
Corridor wall	23.8700	2.4200	21.4500	0.1800	3.8610			(29a)
External Roof 1	52.4300		52.4300	0.1100	5.7673			(30)
Total net area of external elements Aum (A, m2)			117.3900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 29.7704			(33)
Main dwelling								
Party Wall 1			17.2200	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							157.1442	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate	7.5800	0.0500	0.3790	
E3 Sill	4.0800	0.0500	0.2040	
E4 Jamb	18.6000	0.0500	0.9300	
E7 Party floor between dwellings (in blocks of flats)	11.2800	0.0700	0.7896	
E7 Party floor between dwellings (in blocks of flats)	8.5300	0.0700	0.5971	
E9 Balcony between dwellings, wall insulation continuous	3.4000	0.0200	0.0680	
E16 Corner (normal)	5.6000	0.0900	0.5040	
E18 Party wall between dwellings	2.8000	0.0600	0.1680	
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	6.1500	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	6.1500	0.1200	0.7380	
E14 Flat roof	23.2000	0.0800	1.8560	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				6.4017 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	36.1721 (37)

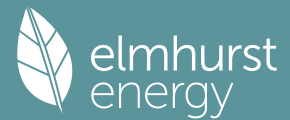
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.4668	28.3020	28.1404	27.3817	27.2397	26.5789	26.5789	26.4565	26.8334	27.2397	27.5269	27.8271	(38)
Heat transfer coeff	64.6389	64.4741	64.3125	63.5538	63.4118	62.7510	62.7510	62.6286	63.0055	63.4118	63.6990	63.9992	(39)
Average = Sum(39)m / 12 =												63.5531	
HLP	1.2329	1.2297	1.2266	1.2122	1.2095	1.1969	1.1969	1.1945	1.2017	1.2095	1.2149	1.2207	(40)
HLP (average)												1.2122	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7618 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													23.2411 (42b)
Hot water usage for other uses													32.6721 (42c)
Average daily hot water use (litres/day)													51.2501 (43)
Daily hot water use													
Energy conte	55.9132	54.3800	52.7058	50.6215	48.7624	46.8302	46.4283	48.0990	49.8126	51.7969	53.8997	55.8346	(44)
Energy content (annual)	88.5529	77.4364	81.0069	69.2984	65.6436	57.5832	56.1510	59.5566	61.4239	70.2879	76.7900	87.4236	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss (or HIU loss):													
Total storage loss													
If cylinder contains dedicated solar storage													
Primary loss													
Combi loss													
Total heat required for water heating calculated for each month													
WWHRS	75.2699	65.8209	68.8559	58.9036	55.7970	48.9457	47.7283	50.6231	52.2104	59.7447	65.2715	74.3100	(62)
PV diverter													
Solar input													
FGHRS													
Output from w/h													
Total per year (kWh/year)													
Electric shower(s)													
Heat gains from water heating, kWh/month													

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29.5804 26.0450 27.6857 24.7189 24.1298 21.9477 21.9670 22.8363 23.0456 25.4079 26.5927 29.3404 (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	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	88.0878	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	77.8355	86.1750	77.8355	80.4300	77.8355	80.4300	77.8355	77.8355	80.4300	77.8355	80.4300	77.8355	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	153.5409	155.1342	151.1192	142.5717	131.7821	121.6414	114.8667	113.2735	117.2885	125.8359	136.6256	146.7663	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	31.8088	(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)	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	-70.4702	(71)
Water heating gains (Table 5)	39.7585	38.7575	37.2119	34.3318	32.4325	30.4829	29.5256	30.6940	32.0078	34.1504	36.9342	39.4360	(72)
Total internal gains	320.5613	329.4931	315.5930	306.7599	291.4765	281.9806	271.6542	271.2293	279.1526	287.2482	303.4162	313.4641	(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	
Southwest				7.3800	36.7938	0.6300	0.7000				0.7700	82.9857 (79)	
Northwest				3.3200	11.2829	0.6300	0.7000				0.7700	11.4481 (81)	
Solar gains	94.4338	164.6582	235.3929	308.5929	361.1025	365.2883	349.3482	309.1346	260.5791	184.7057	113.8024	80.3675 (83)	
Total gains	414.9951	494.1513	550.9859	615.3529	652.5790	647.2689	621.0024	580.3639	539.7318	471.9539	417.2185	393.8317 (84)	

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	35.4064	35.4969	35.5861	36.0109	36.0915	36.4716	36.4716	36.5429	36.3243	36.0915	35.9288	35.7603	
alpha	3.3604	3.3665	3.3724	3.4007	3.4061	3.4314	3.4314	3.4362	3.4216	3.4061	3.3953	3.3840	
util living area	0.9748	0.9552	0.9229	0.8502	0.7324	0.5684	0.4289	0.4728	0.6841	0.8820	0.9573	0.9786	(86)
MIT	19.0873	19.3947	19.7965	20.2997	20.6814	20.9036	20.9721	20.9608	20.8129	20.3066	19.6165	19.0391	(87)
Th 2	19.8938	19.8963	19.8988	19.9103	19.9124	19.9225	19.9225	19.9244	19.9186	19.9124	19.9081	19.9035	(88)
util rest of house	0.9695	0.9461	0.9070	0.8197	0.6794	0.4888	0.3304	0.3717	0.6084	0.8509	0.9471	0.9740	(89)
MIT 2	18.1776	18.4800	18.8714	19.3537	19.6917	19.8721	19.9131	19.9101	19.8095	19.3738	18.7104	18.1371	(90)
Living area fraction	18.7089	19.0142	19.4117	19.9062	20.2697	20.4745	20.5315	20.5237	20.3955	19.9186	19.2396	18.6639	(91)
MIT	18.7089	19.0142	19.4117	19.9062	20.2697	20.4745	20.5315	20.5237	20.3955	19.9186	19.2396	18.6639	(92)
Temperature adjustment	18.7089	19.0142	19.4117	19.9062	20.2697	20.4745	20.5315	20.5237	20.3955	19.9186	19.2396	18.6639	(93)
adjusted MIT	18.7089	19.0142	19.4117	19.9062	20.2697	20.4745	20.5315	20.5237	20.3955	19.9186	19.2396	18.6639	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9622	0.9371	0.8988	0.8195	0.6978	0.5308	0.3870	0.4293	0.6436	0.8511	0.9393	0.9674	(94)
Useful gains	399.3244	463.0825	495.2204	504.3013	455.3985	343.5716	240.3413	249.1394	347.3750	401.6631	391.8930	380.9778	(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	931.3741	909.9989	830.3814	699.4847	543.4208	368.6321	246.7082	258.2635	396.6496	590.9089	773.2775	925.6775	(97)
Space heating kWh	395.8450	300.3278	249.3598	140.5321	65.4886	0.0000	0.0000	0.0000	0.0000	140.7988	274.5968	405.2565	(98a)
Space heating requirement - total per year (kWh/year)												1972.2055	
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	395.8450	300.3278	249.3598	140.5321	65.4886	0.0000	0.0000	0.0000	0.0000	140.7988	274.5968	405.2565	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1972.2055	
Space heating per m ²												37.6160	(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	589.8591	464.3572	475.9773	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8482	0.9015	0.8788	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	500.2940	418.6108	418.2895	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	728.3752	699.2238	653.2176	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	164.2185	208.7760	174.7866	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	41.0546	52.1940	43.6966	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												136.9453	(107)
Energy for space heating												37.6160	(99)
Energy for space cooling												2.6120	(108)
Total												40.2279	(109)
Fabric Energy Efficiency (TFEE)												40.2	(109)

