

Summary for Input Data

Plot Reference	A 617		Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref		
Plot Address			SAP Version	10.2

SAP Rating	81 B	DER	6.07	TER	16.88
Environmental	96 A	% DER < TER			64.04
CO ₂ Emissions (t/year)	0.28	DFEE	38.45	TFEE	40.66
Compliance Check	See BREL	% DFEE < TFEE			5.46
% DPER < TPER	29.23	DPER	64.32	TPER	90.89

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

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

Orientation	Southwest	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Top-floor flat	
Which Floor	6	
2.0 Number of Storeys	1	
3.0 Date Built	2026	
4.0 Sheltered Sides	3	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	162.58	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:	20.72 m	50.71 m ²	2.80 m

8.0 Living Area	25.44	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	17.92	9.58	0.00	None	8.34	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	40.10	37.68	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	22.19	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	99.82

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	50.71	50.71	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	50.71

12.0 Opening Types

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

13.0 Openings

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

14.0 Conservatory

None

15.0 Draught Proofing

100

 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate	Independently assessed	5.08	0.05	0.05	No
E4 Jamb	Independently assessed	12.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	3.04	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	14.32	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	3.36	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.04	0.04	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	7.93	0.00	0.00	No
E3 Sill	Independently assessed	1.59	0.04	0.04	No
E14 Flat roof	Independently assessed	20.72	0.05	0.05	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	7.93	0.05	0.05	No

Y-value

0.03

 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
0.24	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
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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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Compliance Check	See BREL	% DFEE < TFEE				5.46	
% DPER < TPER	29.23	DPER	64.32	TPER	90.89		
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	50.7100 (1b)	2.8000 (2b)	141.9880 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7100		141.9880 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	141.9880 (5)

2. Ventilation rate

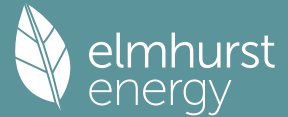
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1162 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.0000 (23c)
Effective ac	0.2432	0.2403	0.2374	0.2229	0.2200	0.2054	0.2054	0.2025	0.2112	0.2200	0.2258	0.2316 (25)

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							
Door			2.4200	1.0000	2.4200		(26)
Window			8.3400	1.1450	9.5496		(27)
External Wall 1	17.9200	8.3400	9.5800	0.1500	1.4370	70.0000	670.6000 (29a)
Corridor wall	40.1000	2.4200	37.6800	0.1900	7.1592	70.0000	2637.5999 (29a)
External Roof 1	50.7100		50.7100	0.1000	5.0710	9.0000	456.3900 (30)
Total net area of external elements Aum(A, m ²)			108.7300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	25.6368		(33)
Main dwelling							
Party Wall 1			22.1900	0.0000	0.0000	70.0000	1553.3000 (32)
Party Floor 1			50.7100			40.0000	2028.4000 (32d)
Internal Wall 1			99.8200			9.0000	898.3800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8244.6699 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							162.5847 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E4 Jamb	12.6000	0.0400	0.5040
E7 Party floor between dwellings (in blocks of flats)	3.0400	0.0500	0.1520
E7 Party floor between dwellings (in blocks of flats)	14.3200	0.0390	0.5585
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0500	0.1680
E16 Corner (normal)	2.8000	0.0500	0.1400
E16 Corner (normal)	2.8000	0.0390	0.1092
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)	7.9300	0.0000	0.0000
E3 Sill	1.5900	0.0400	0.0636
E14 Flat roof	20.7200	0.0500	1.0360
P4 Party wall - Roof (insulation at ceiling level)	7.9300	0.0500	0.3965
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.6310 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	29.2678 (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	11.3963	11.2601	11.1239	10.4430	10.3069	9.6260	9.6260	9.4898	9.8983	10.3069	10.5792	10.8516 (38)
Average = Sum(39)m / 12 =	40.6641	40.5279	40.3917	39.7108	39.5747	38.8938	38.8938	38.7576	39.1661	39.5747	39.8470	40.1194 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8019	0.7992	0.7965	0.7831	0.7804	0.7670	0.7670	0.7643	0.7724	0.7804	0.7858	0.7912 (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	1.7110 (42)											
Hot water usage for mixer showers	51.5710	50.7814	49.6178	47.8279	46.2241	43.9804	42.2058	44.2804	45.3239	47.5461	49.8604	51.5245 (42a)
Hot water usage for baths	22.3653	22.0277	21.5474	20.8281	20.1799	19.2875	18.6105	19.4384	19.8729	20.7570	21.6763	22.3476 (42b)
Hot water usage for other uses	32.1526	30.9834	29.8142	28.6450	27.4758	26.3066	26.3066	27.4758	28.6450	29.8142	30.9834	32.1526 (42c)
Average daily hot water use (litres/day)	23.4272	20.6008	21.6446	19.0649	18.1460	15.5385	14.4410	16.1007	16.3278	18.9651	20.7839	23.3557 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	106.0888	103.7925	100.9794	97.3010	93.8798	89.5746	87.1230	91.1946	93.8417	98.1174	102.5201	106.0246 (44)
Energy content (annual)	156.1811	137.3384	144.2975	127.0994	120.9736	103.5900	96.2734	107.3377	108.8517	126.4341	138.5594	155.7049 (45)
Distribution loss (46)m = 0.15 x (45)m	23.4272	20.6008	21.6446	19.0649	18.1460	15.5385	14.4410	16.1007	16.3278	18.9651	20.7839	23.3557 (46)
Water storage loss (or HIU loss):	110.0000 (47)											
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	211.4579	187.2659	199.5743	180.5931	176.2504	157.0837	151.5502	162.6145	162.3454	181.7109	192.0530	210.9817 (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	211.4579	187.2659	199.5743	180.5931	176.2504	157.0837	151.5502	162.6145	162.3454	181.7109	192.0530	210.9817 (64)
12Total per year (kWh/year)	2173.4811 (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	96.1517	85.6070	92.2004	85.0555	84.4452	77.2386	76.2324	79.9112	78.9881	86.2608	88.8659	95.9933 (65)

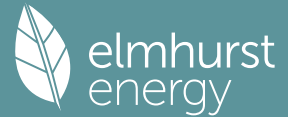
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.0293	86.3896	78.0293	80.6303	78.0293	80.6303	78.0293	78.0293	80.6303	78.0293	80.6303	78.0293 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.0778	150.6248	146.7265	138.4275	127.9515	118.1055	111.5278	109.9808	113.8791	122.1781	132.6541	142.5001 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408 (71)
Water heating gains (Table 5)	129.2361	127.3913	123.9252	118.1326	113.5016	107.2759	102.4629	107.4076	109.7057	115.9419	123.4249	129.0233 (72)
Total internal gains	405.0085	413.0710	397.3463	385.8557	368.1477	354.6770	340.6853	344.0831	352.8805	364.8147	385.3747	398.2180 (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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Northeast	8.3400		11.2829		0.3500		0.7000		0.7700		15.9767 (75)	
Solar gains	15.9767	32.5211	58.5926	96.2260	129.3466	137.8971	128.9999	102.8402	71.3961	39.7433	20.1029	13.0474 (83)
Total gains	420.9853	445.5921	455.9390	482.0817	497.4942	492.5741	469.6852	446.9233	424.2766	404.5580	405.4775	411.2654 (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	56.3197	56.5089	56.6994	57.6716	57.8700	58.8831	58.8831	59.0900	58.4736	57.8700	57.4745	57.0843
alpha	4.7546	4.7673	4.7800	4.8448	4.8580	4.9255	4.9255	4.9393	4.8982	4.8580	4.8316	4.8056
util living area	0.9582	0.9421	0.9125	0.8275	0.6861	0.4965	0.3627	0.3963	0.6097	0.8363	0.9291	0.9615 (86)
MIT	20.1172	20.2543	20.4560	20.7375	20.9139	20.9859	20.9976	20.9963	20.9626	20.7641	20.4303	20.1054 (87)
Th 2	20.2517	20.2540	20.2563	20.2680	20.2703	20.2820	20.2820	20.2844	20.2774	20.2703	20.2657	20.2610 (88)
util rest of house	0.9510	0.9324	0.8976	0.8006	0.6440	0.4438	0.3043	0.3358	0.5540	0.8055	0.9158	0.9549 (89)
MIT 2	19.2314	19.4036	19.6540	19.9975	20.1927	20.2722	20.2808	20.2825	20.2488	20.0354	19.6332	19.2239 (90)
Living area fraction									fLA = Living area / (4) =			0.5017 (91)
MIT	19.6758	19.8304	20.0564	20.3688	20.5545	20.6303	20.6404	20.6406	20.6069	20.4010	20.0331	19.6661 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6758	19.8304	20.0564	20.3688	20.5545	20.6303	20.6404	20.6406	20.6069	20.4010	20.0331	19.6661 (93)
8. Space heating requirement												
Utilisation	0.9445	0.9260	0.8932	0.8045	0.6608	0.4696	0.3336	0.3661	0.5799	0.8114	0.9111	0.9486 (94)
Useful gains	397.6138	412.6352	407.2501	387.8414	328.7588	231.3225	156.6702	163.6096	246.0329	328.2451	369.4331	390.1065 (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	625.2423	605.0979	547.5648	455.4338	350.4154	234.5400	157.1466	164.3542	254.8506	387.8707	515.3435	620.4907 (97)
Space heating kWh	169.3556	129.3349	104.3941	48.6665	16.1125	0.0000	0.0000	0.0000	0.0000	44.3614	105.0555	171.4059 (98a)
Space heating requirement - total per year (kWh/year)												788.6865
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	169.3556	129.3349	104.3941	48.6665	16.1125	0.0000	0.0000	0.0000	0.0000	44.3614	105.0555	171.4059 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												788.6865
Space heating per m2										(98c) / (4) =		15.5529 (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	169.3556	129.3349	104.3941	48.6665	16.1125	0.0000	0.0000	0.0000	0.0000	44.3614	105.0555	171.4059 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	254.0334	194.0024	156.5912	72.9997	24.1687	0.0000	0.0000	0.0000	0.0000	66.5421	157.5833	257.1088
Space heating requirement	254.0334	194.0024	156.5912	72.9997	24.1687	0.0000	0.0000	0.0000	0.0000	66.5421	157.5833	257.1088 (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	211.4579	187.2659	199.5743	180.5931	176.2504	157.0837	151.5502	162.6145	162.3454	181.7109	192.0530	210.9817 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	317.1868	280.8988	299.3615	270.8896	264.3756	235.6255	227.3254	243.9218	243.5181	272.5664	288.0795	316.4725
Water heating fuel	317.1868	280.8988	299.3615	270.8896	264.3756	235.6255	227.3254	243.9218	243.5181	272.5664	288.0795	316.4725 (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	11.5859	10.4647	11.5859	11.2122	11.5859	11.2122	11.5859	11.5859	11.2122	11.5859	11.2122	11.5859 (331)
Lighting	16.5885	13.3079	11.9823	8.7788	6.7810	5.5401	6.1858	8.0406	10.4439	13.7030	15.4775	17.0496 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-2.6439	-4.7041	-8.7021	-12.2851	-15.3967	-15.2025	-14.8850	-12.7901	-9.5904	-6.1447	-3.1780	-2.1575 (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												1183.0297 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3260.2216 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												11.8303 (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)												136.4150 (330a)
Total electricity for the above, kWh/year												136.4150 (331)
Electricity for lighting (calculated in Appendix L)												133.8789 (332)

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

PV generation	-107.6802 (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	4605.8650 (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	1915.1945	0.1562	79.6505 (367)
Electrical energy for heat distribution (space & water)	11.8303	0.0000	6.4356 (372)
Overall CO2 factor for heat network			0.0639 (386)
Total CO2 associated with community systems			283.8331 (373)
Space and water heating			283.8331 (376)
Pumps, fans and electric keep-hot	136.4150	0.1387	18.9224 (378)
Energy for lighting	133.8789	0.1443	19.3229 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-107.6802	0.1305	-14.0505
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-14.0505 (380)
Total CO2, kg/year			308.0279 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.0700 (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	1915.1945	1.5783	804.8136 (467)
Electrical energy for heat distribution (space & water)	11.8303	0.0000	68.2373 (472)
Overall CO2 factor for heat network			0.6773 (486)
Total CO2 associated with community systems			3009.5016 (473)
Space and water heating			3009.5016 (476)
Pumps, fans and electric keep-hot	136.4150	1.5128	206.3686 (478)
Energy for lighting	133.8789	1.5338	205.3479 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-107.6802	1.4820	-159.5824
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-159.5824 (480)
Total Primary energy kWh/year			3261.6357 (483)
Dwelling Primary energy Rate (DPER)			64.3200 (484)

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

1. Overall dwelling characteristics

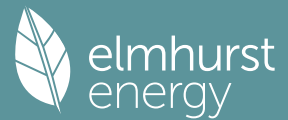
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.7100 (1b)	x 2.8000 (2b)	= 141.9880 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7100		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 141.9880 (5)

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) = 0.1409 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3909 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3029 (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 infilt rate	0.3862	0.3786	0.3711	0.3332	0.3256	0.2878	0.2878	0.2802	0.3029	0.3256	0.3408	0.3559 (22b)
Effective ac	0.5746	0.5717	0.5688	0.5555	0.5530	0.5414	0.5414	0.5393	0.5459	0.5530	0.5581	0.5633 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.4200	1.0000	2.4200		(26)
TER Opening Type			8.3400	1.1450	9.5496		(27)
External Wall 1	17.9200	8.3400	9.5800	0.1800	1.7244		(29a)
Corridor wall	40.1000	2.4200	37.6800	0.1800	6.7824		(29a)
External Roof 1	50.7100		50.7100	0.1100	5.5781		(30)
Total net area of external elements Aum(A, m2)			108.7300				(31)
Fabric heat loss, W/K = Sum (A x U)					26.0545		(33)
Main dwelling							
Party Wall 1			22.1900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							162.5847 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E4 Jamb	12.6000	0.0500	0.6300
E7 Party floor between dwellings (in blocks of flats)	3.0400	0.0700	0.2128
E7 Party floor between dwellings (in blocks of flats)	14.3200	0.0700	1.0024
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0200	0.0672
E16 Corner (normal)	2.8000	0.0900	0.2520
E16 Corner (normal)	2.8000	0.0900	0.2520
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)	7.9300	0.0000	0.0000
E3 Sill	1.5900	0.0500	0.0795
E14 Flat roof	20.7200	0.0800	1.6576
P4 Party wall - Roof (insulation at ceiling level)	7.9300	0.1200	0.9516
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.6951 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 31.7496 (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	26.9226	26.7869	26.6539	26.0291	25.9122	25.3681	25.3681	25.2673	25.5777	25.9122	26.1487	26.3959 (38)
Heat transfer coeff	58.6722	58.5365	58.4035	57.7788	57.6619	57.1177	57.1177	57.0170	57.3273	57.6619	57.8983	58.1455 (39)
Average = Sum(39)m / 12 =												57.7782
HLP	1.1570	1.1543	1.1517	1.1394	1.1371	1.1264	1.1264	1.1244	1.1305	1.1371	1.1418	1.1466 (40)
HLP (average)												1.1394
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7110 (42)
Hot water usage for mixer showers												
52.9077	52.1126	50.9540	48.7372	47.1012	45.2768	44.2398	45.3897	46.6501	48.6090	50.8734	52.7050	(42a)
Hot water usage for baths												
22.8753	22.5355	22.0571	21.1750	20.5145	19.7821	19.3865	19.8616	20.3788	21.1625	22.0628	22.7979	(42b)
Hot water usage for other uses												
32.1526	30.9834	29.8142	28.6450	27.4758	26.3066	26.3066	27.4758	28.6450	29.8142	30.9834	32.1526	(42c)
Average daily hot water use (litres/day)												99.2177 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
107.9355	105.6315	102.8253	98.5572	95.0915	91.3656	89.9330	92.7271	95.6740	99.5857	103.9195	107.6554	(44)
Energy content (annual)	170.9434	150.4178	158.0386	134.9198	128.0115	112.3446	108.7661	114.8155	117.9755	135.1368	148.0524	168.5624 (45)
Distribution loss (46)m = 0.15 x (45)m												
25.6415	22.5627	23.7058	20.2380	19.2017	16.8517	16.3149	17.2223	17.6963	20.2705	22.2079	25.2844	(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	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												
220.1861	194.8951	207.2813	182.5740	177.2541	159.9988	158.0088	164.0581	165.6297	184.3795	195.7066	217.8051	(62)
WWHRS	-24.1872	-21.3913	-22.3998	-18.5479	-17.2860	-14.7917	-13.8649	-14.7439	-15.3041	-18.0418	-20.4392	-23.7393 (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	(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	(63c)
FGHRS	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												
195.9989	173.5037	184.8815	164.0261	159.9682	145.2071	144.1439	149.3142	150.3257	166.3376	175.2674	194.0658	(64)
12Total per year (kWh/year)												2003.0401 (64)
Electric shower(s)												2003 (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)
Heat gains from water heating, kWh/month												
96.2328	85.5957	91.9420	82.9842	81.9580	75.4779	75.5589	77.5703	77.3502	84.3271	87.3508	95.4411	(65)

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

Metabolic gains (Table 5), Watts												
(66)m	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510 (66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.0293	86.3896	78.0293	80.6303	78.0293	80.6303	78.0293	78.0293	80.6303	78.0293	80.6303	78.0293 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.0778	150.6248	146.7265	138.4275	127.9515	118.1055	111.5278	109.9808	113.8791	122.1781	132.6541	142.5001 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408 (71)
Water heating gains (Table 5)	129.3452	127.3746	123.5779	115.2558	110.1585	104.8305	101.5576	104.2611	107.4309	113.3429	121.3205	128.2811 (72)
Total internal gains	408.1176	416.0543	399.9990	385.9789	367.8047	352.2316	339.7801	340.9366	350.6056	365.2157	386.2703	400.4758 (73)

6. Solar gains

[Jan]												Gains	
	Area				Solar flux		g		FF		Access		W
	m2				Table 6a		Specific data		Specific data		factor		
					W/m2		or Table 6b		or Table 6c		Table 6d		
Northeast	8.3400				11.2829		0.6300		0.7000		0.7700		28.7581 (75)
Solar gains	28.7581	58.5379	105.4668	173.2067	232.8238	248.2148	232.1999	185.1124	128.5129	71.5380	36.1851	23.4853 (83)	
Total gains	436.8757	474.5922	505.4658	559.1856	600.6285	600.4464	571.9800	526.0491	479.1185	436.7537	422.4554	423.9611 (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	39.0336	39.1241	39.2132	39.6372	39.7175	40.0959	40.0959	40.1668	39.9493	39.7175	39.5553	39.3871
alpha	3.6022	3.6083	3.6142	3.6425	3.6478	3.6731	3.6731	3.6778	3.6633	3.6478	3.6370	3.6258
util living area	0.9690	0.9564	0.9312	0.8625	0.7383	0.5661	0.4271	0.4785	0.7048	0.8891	0.9520	0.9720 (86)
MIT	19.3771	19.5743	19.9015	20.3649	20.7280	20.9247	20.9794	20.9689	20.8301	20.3805	19.8213	19.3486 (87)
Th 2	19.9545	19.9567	19.9588	19.9688	19.9707	19.9794	19.9794	19.9810	19.9760	19.9707	19.9669	19.9629 (88)
util rest of house	0.9627	0.9475	0.9168	0.8339	0.6868	0.4894	0.3333	0.3807	0.6319	0.8596	0.9407	0.9662 (89)
MIT 2	18.0913	18.3402	18.7498	19.3176	19.7285	19.9289	19.9704	19.9663	19.8475	19.3504	18.6612	18.0610 (90)
Living area fraction									FLA = Living area / (4) =			0.5017 (91)
MIT	18.7364	18.9593	19.3276	19.8430	20.2299	20.4284	20.4766	20.4693	20.3405	19.8672	19.2432	18.7070 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7364	18.9593	19.3276	19.8430	20.2299	20.4284	20.4766	20.4693	20.3405	19.8672	19.2432	18.7070 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9532	0.9369	0.9063	0.8300	0.7006	0.5242	0.3798	0.4286	0.6595	0.8561	0.9309	0.9572 (94)
Useful gains	416.4220	444.6582	458.0990	464.1146	420.8042	314.7570	217.2145	225.4870	315.9671	373.9254	393.2611	405.7996 (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	847.0142	822.9826	749.1773	632.2740	491.8511	332.9074	221.4206	232.0177	357.7484	534.3644	703.0733	843.5167 (97)
Space heating kWh	320.3606	254.2340	216.5623	121.0747	52.8589	0.0000	0.0000	0.0000	0.0000	119.3666	223.0648	325.6615 (98a)
Space heating requirement - total per year (kWh/year)												1633.1833
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	320.3606	254.2340	216.5623	121.0747	52.8589	0.0000	0.0000	0.0000	0.0000	119.3666	223.0648	325.6615 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1633.1833
Space heating per m2										(98c) / (4) =		32.2063 (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
	320.3606	254.2340	216.5623	121.0747	52.8589	0.0000	0.0000	0.0000	0.0000	119.3666	223.0648	325.6615 (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)	347.0862	275.4431	234.6287	131.1752	57.2686	0.0000	0.0000	0.0000	0.0000	129.3246	241.6737	352.8293 (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	195.9989	173.5037	184.8815	164.0261	159.9682	145.2071	144.1439	149.3142	150.3257	166.3376	175.2674	194.0658 (64)
Efficiency of water heater (217)m	85.1546	84.9153	84.4154	83.3892	81.8606	79.8000	79.8000	79.8000	79.8000	83.3285	84.6017	79.8000 (216)
Fuel for water heating, kWh/month	230.1684	204.3256	219.0139	196.6996	195.4153	181.9638	180.6315	187.1106	188.3780	199.6168	207.1677	227.7460 (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	16.2130	13.0066	11.7110	8.5800	6.6274	5.4147	6.0458	7.8585	10.2074	13.3927	15.1271	16.6636 (232)

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Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-9.6879	-14.7094	-22.7538	-27.6028	-31.5886	-30.1749	-29.8232	-27.2446	-23.0290	-17.6886	-11.0218	-8.2588 (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	-2.6870	-5.8370	-11.9520	-18.4760	-24.9475	-25.2455	-24.9342	-20.8604	-14.9746	-8.5003	-3.6364	-2.1104 (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												1769.4293 (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												2418.2371 (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)												130.8478 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-417.7448 (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												3986.7695 (238)

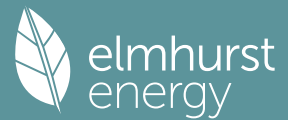
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1769.4293	0.2100	371.5802 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2418.2371	0.2100	507.8298 (264)
Space and water heating			879.4100 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	130.8478	0.1443	18.8854 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-253.5834	0.1331	-33.7393
PV Unit electricity exported	-164.1614	0.1251	-20.5329
Total			-54.2722 (269)
Total CO2, kg/year			855.9524 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.8800 (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	1769.4293	1.1300	1999.4552 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2418.2371	1.1300	2732.6079 (278)
Space and water heating			4732.0631 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	130.8478	1.5338	200.6988 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-253.5834	1.4916	-378.2557
PV Unit electricity exported	-164.1614	0.4591	-75.3635
Total			-453.6191 (283)
Total Primary energy kWh/year			4609.2435 (286)
Target Primary Energy Rate (TPER)			90.8900 (287)

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Plot Reference	A 617				Issued on Date	19/03/2026	
Assessment Reference	Be Green			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	81 B	DER	6.07	TER	16.88		
Environmental	96 A	% DER < TER				64.04	
CO ₂ Emissions (t/year)	0.28	DFEE	38.45	TFEE	40.66		
Compliance Check	See BREL	% DFEE < TFEE				5.46	
% DPER < TPER	29.23	DPER	64.32	TPER	90.89		
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	50.7100 (1b)	2.8000 (2b)	141.9880 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7100		141.9880 (4)
Dwelling volume			141.9880 (5)

2. Ventilation rate

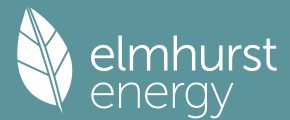
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1409 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2909 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2254 (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	0.2874	0.2818	0.2761	0.2480	0.2423	0.2141	0.2141	0.2085	0.2254	0.2423	0.2536	0.2649 (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	0.5413	0.5397	0.5381	0.5307	0.5294	0.5229	0.5229	0.5217	0.5254	0.5294	0.5322	0.5351 (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							
Door			2.4200	1.0000	2.4200		(26)
Window			8.3400	1.1450	9.5496		(27)
External Wall 1	17.9200	8.3400	9.5800	0.1500	1.4370	70.0000	670.6000 (29a)
Corridor wall	40.1000	2.4200	37.6800	0.1900	7.1592	70.0000	2637.5999 (29a)
External Roof 1	50.7100		50.7100	0.1000	5.0710	9.0000	456.3900 (30)
Total net area of external elements A _{um} (A, m ²)			108.7300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 25.6368		(33)
Main dwelling							
Party Wall 1			22.1900	0.0000	0.0000	70.0000	1553.3000 (32)
Party Floor 1			50.7100			40.0000	2028.4000 (32a)
Internal Wall 1			99.8200			9.0000	898.3800 (32c)
Heat capacity C _m = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	8244.6699 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							162.5847 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					5.0800	0.0500	0.2540
E4 Jamb					12.6000	0.0400	0.5040

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E7 Party floor between dwellings (in blocks of flats)	3.0400	0.0500	0.1520
E7 Party floor between dwellings (in blocks of flats)	14.3200	0.0390	0.5585
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0500	0.1680
E16 Corner (normal)	2.8000	0.0500	0.1400
E16 Corner (normal)	2.8000	0.0390	0.1092
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)	7.9300	0.0000	0.0000
E3 Sill	1.5900	0.0400	0.0636
E14 Flat roof	20.7200	0.0500	1.0360
P4 Party wall - Roof (insulation at ceiling level)	7.9300	0.0500	0.3965
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.6310 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	29.2678 (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	25.3632	25.2880	25.2144	24.8684	24.8037	24.5024	24.5024	24.4466	24.6184	24.8037	24.9346	25.0715 (38)
Average = Sum(39)m / 12 =	54.6310	54.5558	54.4822	54.1362	54.0715	53.7702	53.7702	53.7144	53.8862	54.0715	54.2024	54.3393 (39)
												54.1359
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0773	1.0758	1.0744	1.0676	1.0663	1.0603	1.0603	1.0592	1.0626	1.0663	1.0689	1.0716 (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												1.7110 (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	22.3653	22.0277	21.5474	20.8281	20.1799	19.2875	18.6105	19.4384	19.8729	20.7570	21.6763	22.3476 (42b)
Hot water usage for other uses	32.1526	30.9834	29.8142	28.6450	27.4758	26.3066	26.3066	27.4758	28.6450	29.8142	30.9834	32.1526 (42c)
Average daily hot water use (litres/day)												49.9675 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	54.5179	53.0111	51.3616	49.4731	47.6557	45.5942	44.9172	46.9142	48.5179	50.5712	52.6597	54.5001 (44)
Energy content (annual)	80.2597	70.1444	73.3946	64.6243	61.4092	52.7281	49.6348	55.2189	56.2783	65.1661	71.1714	80.0374 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):	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)
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 (57)
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 (59)
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 (61)
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 (62)
Total heat required for water heating calculated for each month	68.2208	59.6227	62.3854	54.9306	52.1978	44.8189	42.1896	46.9360	47.8365	55.3912	60.4956	68.0318 (63a)
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 (63b)
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 (63c)
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 (63d)
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 (64)
Output from w/h	68.2208	59.6227	62.3854	54.9306	52.1978	44.8189	42.1896	46.9360	47.8365	55.3912	60.4956	68.0318 (64)
12Total per year (kWh/year)												663.0571 (64)
Electric shower(s)	42.3702	37.7522	41.2240	39.3395	40.0777	38.2303	39.5046	40.0777	39.3395	41.2240	40.4488	42.3702 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												481.9588 (64a)
Heat gains from water heating, kWh/month	27.6477	24.3437	25.9024	23.5675	23.0689	20.7623	20.4235	21.7534	21.7940	24.1538	25.2361	27.6005 (65)

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	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	78.0293	86.3896	78.0293	80.6303	78.0293	80.6303	78.0293	78.0293	80.6303	78.0293	80.6303	78.0293 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	149.0778	150.6248	146.7265	138.4275	127.9515	118.1055	111.5278	109.9808	113.8791	122.1781	132.6541	142.5001 (68)
Pumps, fans	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551 (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)	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408 (71)
Total internal gains	37.1609	36.2258	34.8150	32.7327	31.0066	28.8365	27.4510	29.2385	30.2695	32.4648	35.0502	37.0975 (72)
	312.9334	321.9055	308.2361	300.4558	285.6527	276.2376	265.6734	265.9140	273.4442	281.3376	296.9999	306.2922 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific FF data or Table 6c	Access factor Table 6d	Gains W
Northeast	8.3400	11.2829	0.3500	0.7000	0.7700	15.9767 (75)
Solar gains	15.9767	32.5211	58.5926	96.2260	129.3466	137.8971
Total gains	328.9101	354.4266	366.8288	396.6817	414.9992	414.1348
						128.9999
						102.8402
						71.3961
						39.7433
						20.1029
						13.0474 (83)
						319.3396 (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	41.9210	41.9788	42.0355	42.3041	42.3548	42.5921	42.5921	42.6364	42.5004	42.3548	42.2525	42.1460
alpha	3.7947	3.7986	3.8024	3.8203	3.8237	3.8395	3.8395	3.8424	3.8334	3.8237	3.8168	3.8097
util living area	0.9866	0.9808	0.9703	0.9363	0.8612	0.7144	0.5627	0.6146	0.8219	0.9461	0.9784	0.9880 (86)
MIT	19.2506	19.4200	19.7073	20.1538	20.5659	20.8557	20.9567	20.9389	20.7359	20.2283	19.6783	19.2196 (87)
Th 2	20.0194	20.0206	20.0218	20.0274	20.0285	20.0333	20.0333	20.0343	20.0315	20.0285	20.0263	20.0241 (88)
util rest of house	0.9837	0.9766	0.9633	0.9201	0.8238	0.6387	0.4539	0.5067	0.7620	0.9292	0.9728	0.9854 (89)
MIT 2	18.4266	18.5952	18.8802	19.3191	19.7047	19.9507	20.0171	20.0093	19.8616	19.3974	18.8568	18.3993 (90)
Living area fraction									fLA = Living area /	(4) =		0.5017 (91)
MIT	18.8400	19.0090	19.2951	19.7379	20.1367	20.4047	20.4884	20.4756	20.3002	19.8142	19.2689	18.8108 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8400	19.0090	19.2951	19.7379	20.1367	20.4047	20.4884	20.4756	20.3002	19.8142	19.2689	18.8108 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9791	0.9709	0.9568	0.9144	0.8284	0.6696	0.5070	0.5583	0.7804	0.9247	0.9673	0.9812 (94)
Useful gains	322.0204	344.1277	350.9735	362.7325	343.7957	277.3025	200.0908	205.8797	269.1072	296.8990	306.7396	313.3226 (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	794.3342	769.7261	697.1053	586.7207	456.1873	312.1210	209.0813	218.9196	334.1066	498.2268	659.5854	793.9427 (97)
Space heating kWh	351.4015	286.0021	257.5221	161.2715	83.6194	0.0000	0.0000	0.0000	0.0000	149.7879	254.0490	357.5813 (98a)
Space heating requirement - total per year (kWh/year)												1901.2347
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	351.4015	286.0021	257.5221	161.2715	83.6194	0.0000	0.0000	0.0000	0.0000	149.7879	254.0490	357.5813 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1901.2347
Space heating per m2										(98c) / (4) =		37.4923 (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	505.4396	397.8992	408.2292	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7491	0.8257	0.7897	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	378.6240	328.5493	322.3847	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	454.3167	433.2642	404.3785	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	54.4987	77.9079	61.0034	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	13.6247	19.4770	15.2508	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												48.3525 (107)
Energy for space heating												37.4923 (99)
Energy for space cooling												0.9535 (108)
Total												38.4458 (109)
Fabric Energy Efficiency (DFEE)												38.4 (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	50.7100 (1b)	x 2.8000 (2b)	= 141.9880 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	141.9880 (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) = 0.1409 (8)
 Pressure test Yes
 Pressure Test Method Blower Door
 Measured/design AP50 5.0000 (17)
 Infiltration rate 0.3909 (18)
 Number of sides sheltered 3 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3029 (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	0.3862	0.3786	0.3711	0.3332	0.3256	0.2878	0.2878	0.2802	0.3029	0.3256	0.3408	0.3559	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5746	0.5717	0.5688	0.5555	0.5530	0.5414	0.5414	0.5393	0.5459	0.5530	0.5581	0.5633	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.4200	1.0000	2.4200			(26)
TER Opening Type			8.3400	1.1450	9.5496			(27)
External Wall 1	17.9200	8.3400	9.5800	0.1800	1.7244			(29a)
Corridor wall	40.1000	2.4200	37.6800	0.1800	6.7824			(29a)
External Roof 1	50.7100		50.7100	0.1100	5.5781			(30)
Total net area of external elements Aum (A, m2)			108.7300					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 26.0545			(33)
Main dwelling								
Party Wall 1			22.1900	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							162.5847	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540	
E4 Jamb	12.6000	0.0500	0.6300	
E7 Party floor between dwellings (in blocks of flats)	3.0400	0.0700	0.2128	
E7 Party floor between dwellings (in blocks of flats)	14.3200	0.0700	1.0024	
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0200	0.0672	
E16 Corner (normal)	2.8000	0.0900	0.2520	
E16 Corner (normal)	2.8000	0.0900	0.2520	
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)	7.9300	0.0000	0.0000	
E3 Sill	1.5900	0.0500	0.0795	
E14 Flat roof	20.7200	0.0800	1.6576	
P4 Party wall - Roof (insulation at ceiling level)	7.9300	0.1200	0.9516	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.6951 (36)
Point Thermal bridges			(36a) = 0.0000	
Total fabric heat loss			(33) + (36) + (36a) = 31.7496	(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	26.9226	26.7869	26.6539	26.0291	25.9122	25.3681	25.3681	25.2673	25.5777	25.9122	26.1487	26.3959	(38)
Heat transfer coeff	58.6722	58.5365	58.4035	57.7788	57.6619	57.1177	57.1177	57.0170	57.3273	57.6619	57.8983	58.1455	(39)
Average = Sum(39)m / 12 =													57.7782

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1570	1.1543	1.1517	1.1394	1.1371	1.1264	1.1264	1.1244	1.1305	1.1371	1.1418	1.1466	(40)
HLP (average)													1.1394
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7110 (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	0.0000	(42a)
Hot water usage for baths													
22.8753	22.5355	22.0571	21.1750	20.5145	19.7821	19.3865	19.8616	20.3788	21.1625	22.0628	22.7979	22.7979	(42b)
Hot water usage for other uses													
32.1526	30.9834	29.8142	28.6450	27.4758	26.3066	26.3066	27.4758	28.6450	29.8142	30.9834	32.1526	32.1526	(42c)
Average daily hot water use (litres/day)													50.4386 (43)
Daily hot water use													
55.0278	53.5189	51.8713	49.8200	47.9903	46.0887	45.6931	47.3374	49.0238	50.9767	53.0462	54.9505	54.9505	(44)
Energy conte	87.1506	76.2102	79.7243	68.2011	64.6042	56.6715	55.2619	58.6136	60.4513	69.1749	75.5740	86.0392	(45)
Energy content (annual)													837.6766
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	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													
74.0780	64.7787	67.7656	57.9709	54.9136	48.1708	46.9726	49.8215	51.3836	58.7987	64.2379	73.1333	73.1333	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
74.0780	64.7787	67.7656	57.9709	54.9136	48.1708	46.9726	49.8215	51.3836	58.7987	64.2379	73.1333	73.1333	(64)
12Total per year (kWh/year)													712 (64)
Electric shower(s)													
42.3702	37.7522	41.2240	39.3395	40.0777	38.2303	39.5046	40.0777	39.3395	41.2240	40.4488	42.3702	42.3702	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													481.9588 (64a)

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Heat gains from water heating, kWh/month
29.1121 25.6327 27.2474 24.3276 23.7478 21.6003 21.6193 22.4748 22.6808 25.0057 26.1717 28.8759 (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	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	85.5510	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.0293	86.3896	78.0293	80.6303	78.0293	80.6303	78.0293	78.0293	80.6303	78.0293	80.6303	78.0293	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.0778	150.6248	146.7265	138.4275	127.9515	118.1055	111.5278	109.9808	113.8791	122.1781	132.6541	142.5001	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	31.5551	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	-68.4408	(71)
Water heating gains (Table 5)	39.1291	38.1439	36.6228	33.7884	31.9191	30.0004	29.0582	30.2081	31.5011	33.6098	36.3495	38.8117	(72)
Total internal gains	314.9016	323.8236	310.0440	301.5115	286.5652	277.4015	267.2806	266.8836	274.6758	282.4825	298.2993	308.0064	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W		
-----					Northeast	8.3400	11.2829		0.6300	0.7000	0.7700		28.7581 (75)	

Solar gains	28.7581	58.5379	105.4668	173.2067	232.8238	248.2148	232.1999	185.1124	128.5129	71.5380	36.1851	23.4853	(83)	
Total gains	343.6597	382.3616	415.5107	474.7182	519.3890	525.6163	499.4805	451.9960	403.1887	354.0205	334.4844	331.4917	(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	39.0336	39.1241	39.2132	39.6372	39.7175	40.0959	40.0959	40.1668	39.9493	39.7175	39.5553	39.3871	
alpha	3.6022	3.6083	3.6142	3.6425	3.6478	3.6731	3.6731	3.6778	3.6633	3.6478	3.6370	3.6258	
util living area	0.9850	0.9767	0.9596	0.9061	0.7972	0.6272	0.4823	0.5446	0.7780	0.9344	0.9756	0.9868	(86)
MIT	19.1297	19.3395	19.6914	20.2120	20.6418	20.8945	20.9693	20.9525	20.7596	20.2119	19.5993	19.1002	(87)
Th 2	19.9545	19.9567	19.9588	19.9688	19.9707	19.9794	19.9794	19.9810	19.9760	19.9707	19.9669	19.9629	(88)
util rest of house	0.9817	0.9716	0.9503	0.8838	0.7502	0.5478	0.3791	0.4381	0.7101	0.9142	0.9693	0.9839	(89)
MIT 2	18.2598	18.4687	18.8165	19.3245	19.7149	19.9225	19.9686	19.9628	19.8276	19.3356	18.7351	18.2366	(90)
Living area fraction	18.6962	18.9056	19.2554	19.7697	20.1799	20.4101	20.4707	20.4593	20.2952	19.7752	19.1686	18.6699	(91)
MIT	18.6962	18.9056	19.2554	19.7697	20.1799	20.4101	20.4707	20.4593	20.2952	19.7752	19.1686	18.6699	(92)
Temperature adjustment	18.6962	18.9056	19.2554	19.7697	20.1799	20.4101	20.4707	20.4593	20.2952	19.7752	19.1686	18.6699	(93)
adjusted MIT	18.6962	18.9056	19.2554	19.7697	20.1799	20.4101	20.4707	20.4593	20.2952	19.7752	19.1686	18.6699	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9764	0.9649	0.9425	0.8789	0.7606	0.5827	0.4300	0.4898	0.7332	0.9096	0.9630	0.9790	(94)
Useful gains	335.5425	368.9475	391.6185	417.2275	395.0250	306.2854	214.7691	221.3781	295.6153	322.0237	322.1159	324.5389	(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	844.6560	819.8392	744.9613	628.0393	488.9675	331.8615	221.0833	231.4517	355.1523	529.0610	698.7538	841.3581	(97)
Space heating kWh	378.7804	302.9993	262.8870	151.7845	69.8932	0.0000	0.0000	0.0000	0.0000	154.0357	271.1792	384.5135	(98a)
Space heating requirement - total per year (kWh/year)												1976.0729	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	378.7804	302.9993	262.8870	151.7845	69.8932	0.0000	0.0000	0.0000	0.0000	154.0357	271.1792	384.5135	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1976.0729	
Space heating per m2										(98c) / (4) =		38.9681	(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	536.9066	422.6712	433.3289	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8180	0.8785	0.8396	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	439.1936	371.3047	363.8199	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	584.4233	555.4947	501.5104	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	104.5654	137.0374	102.4417	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	26.1413	34.2593	25.6104	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												86.0111	(107)
Energy for space heating												38.9681	(99)
Energy for space cooling												1.6961	(108)
Total												40.6642	(109)
Fabric Energy Efficiency (TFEE)												40.7	(109)

