

Summary for Input Data

Plot Reference	B 204	Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	82 B	DER	5.38	TER	15.67
Environmental	96 A	% DER < TER			65.67
CO ₂ Emissions (t/year)	0.25	DFEE	31.39	TFEE	32.30
Compliance Check	See BREL	% DFEE < TFEE			2.84
% DPER < TPER	33.31	DPER	57.26	TPER	85.85

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	Mid-floor flat	
Which Floor	2	
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	182.42	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements	Ground floor:	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
		18.65 m	50.71 m ²	2.80 m

8.0 Living Area	28.50	m ²
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9.0 External Walls	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	29.05	20.00	0.00	None	9.05	Enter Gross Area
	Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	23.17	20.75	0.90	Stairwell Access Corridor 4	2.42	Enter Gross Area

9.1 Party Walls	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	30.86	0.00	None

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Wall 1	Plasterboard on timber frame	9.00	76.44

10.1 Party Ceilings	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	50.71

11.1 Party Floors	Description	Storey Index	Construction	Kappa (kJ/m ² K)	Area (m ²)
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Summary for Input Data



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)
Windows	Manufacturer	Window	Double Low-E Soft 0.1			0.35		0.70	1.20
Door	Manufacturer	Door to Corridor				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Door	Door	Corridor wall	South West	2.42	
SE windows	Windows	External Wall 1	South East	1.03	
NE windows	Windows	External Wall 1	North East	8.02	

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	5.55	0.05	0.05	No
E3 Sill	Independently assessed	2.06	0.04	0.04	No
E4 Jamb	Independently assessed	18.60	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	13.95	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	16.55	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	6.80	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.05	0.05	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	2.80	0.00	0.00	No
E18 Party wall between dwellings	Independently assessed	5.60	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	2.80	0.04	0.04	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	22.04	0.00	0.00	No

Y-value 0.07 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
Number of flueless gas fires	0

Summary for Input Data



21.0 Fixed Cooling System		No	
22.0 Pressure Testing		Yes	
Designed AP ₅₀	3.00	m³/(h.m²) @ 50 Pa	
Test Method	Blower Door		
22.0 Lighting		No	
No Fixed Lighting	No		
	Name	Efficacy	Power
	Lighting 1	75.00	15.00
			Capacity
			1125.00
			Count
			5
24.0 Main Heating 1		None	
25.0 Main Heating 2		None	
26.0 Heat Networks		Space and Water Combined	
Space Community Heating			
Distribution Loss	Calculated		
Distribution Loss Value	1.50		
SAP Code	2306		
	Heat Source	Fuel Type	Heating Use
	Heat source 1	Heat pump	Electricity
	Heat source 2	None	Space and Water
	Heat source 3	None	
	Heat source 4	None	
	Heat source 5	None	
			Efficiency
			232.00
			Percentage Of Heat
			100.00
			Heat
			Heat Power Ratio
			Electrical
			Fuel Factor
			Efficiency type
27.0 Secondary Heating		None	
28.0 Water Heating		Community 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]
Shower	Combi boiler or unvented hot water system	8.00	
			Connected
			No
			Connected To
28.3 Waste Water Heat Recovery System			
29.0 Hot Water Cylinder		Internal Store	
Insulation Type	Measured Loss		
Cylinder Volume	180.00		
Loss	1.20		
			L
			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		
PV Cells kWp	Orientation	Elevation	Overshading FGHRs
			MCS Certificate
			Overshading Factor
			MCS Certificate
			Panel Manufacturer

Summary for Input Data



0.24		North West	Horizontal	Modest	No		0.80		Reference		
34.0 Small-scale Hydro				None							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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Compliance Check	See BREL	% DFEE < TFEE			2.84
% DPER < TPER	33.31	DPER	57.26	TPER	85.85
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		(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)

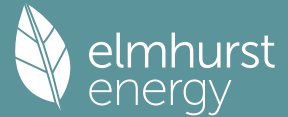
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1482	0.1453	0.1424	0.1279	0.1250	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							
Windows			9.0500	1.1450	10.3626		(27)
Door			2.4200	1.0000	2.4200		(26)
External Wall 1	29.0500	9.0500	20.0000	0.1500	3.0000	70.0000	1399.9999 (29a)
Corridor wall	23.1700	2.4200	20.7500	0.1800	3.7350	70.0000	1452.5000 (29a)
Total net area of external elements Aum(A, m ²)			52.2200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	19.5176	(33)
Main dwelling							
Party Wall 1			30.8600	0.0000	0.0000	70.0000	2160.2000 (32)
Party Floor 1			50.7100			40.0000	2028.4000 (32d)
Party Ceiling 1			50.7100			30.0000	1521.3000 (32b)
Internal Wall 1			76.4400			9.0000	687.9600 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9250.3600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		182.4169 (35)
List of Thermal Bridges		

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.5500	0.0500	0.2775
E3 Sill	2.0600	0.0400	0.0824
E4 Jamb	18.6000	0.0500	0.9300
E7 Party floor between dwellings (in blocks of flats)	13.9500	0.0500	0.6975
E7 Party floor between dwellings (in blocks of flats)	16.5500	0.0360	0.5958
E9 Balcony between dwellings, wall insulation continuous	6.8000	0.0500	0.3400
E16 Corner (normal)	2.8000	0.0500	0.1400
E17 Corner (inverted - internal area greater than external area)	2.8000	0.0000	0.0000
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E18 Party wall between dwellings	2.8000	0.0360	0.1008
E25 Staggered party wall between dwellings	2.8000	0.0360	0.1008
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.0400	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5448 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	23.0624 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	11.3963	11.2601	11.1239	10.4430	10.3069	9.6260	9.6260	9.4898	9.8983	10.3069	10.5792	10.8516 (38)
Heat transfer coeff	34.4587	34.3225	34.1863	33.5054	33.3693	32.6884	32.6884	32.5522	32.9607	33.3693	33.6416	33.9140 (39)
Average = Sum(39)m / 12 =												33.4714
HLP	0.6795	0.6768	0.6742	0.6607	0.6580	0.6446	0.6446	0.6419	0.6500	0.6580	0.6634	0.6688 (40)
HLP (average)												0.6601
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)												97.5120 (43)
Daily hot water use	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 conte	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)
Energy content (annual)										Total = Sum(45)m =		1522.6413
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):												
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)										Total per year (kWh/year) = Sum(64)m =		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)
												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)

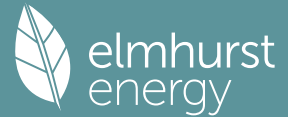
5. Internal gains (see Table 5 and 5a)

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	76.9046	85.1444	76.9046	79.4681	76.9046	79.4681	76.9046	76.9046	79.4681	76.9046	79.4681	76.9046 (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	403.8838	411.8258	396.2216	384.6935	367.0230	353.5148	339.5606	342.9584	351.7183	363.6900	384.2125	397.0933 (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		8.0200			11.2829		0.3500		0.7000		0.7700		15.3637 (75)	
Southeast		1.0300			36.7938		0.3500		0.7000		0.7700		6.4345 (77)	
Solar gains	21.7982	42.2335	71.3408	111.1150	145.1960	153.2680	143.9706	117.1500	84.8945	50.3318	27.0385	18.0533	(83)	
Total gains	425.6820	454.0593	467.5624	495.8085	512.2190	506.7828	483.5312	460.1083	436.6128	414.0218	411.2510	415.1466	(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	74.5689	74.8648	75.1630	76.6904	77.0033	78.6073	78.6073	78.9361	77.9577	77.0033	76.3799	75.7666		
alpha	5.9713	5.9910	6.0109	6.1127	6.1336	6.2405	6.2405	6.2624	6.1972	6.1336	6.0920	6.0511		
util living area	0.9510	0.9264	0.8812	0.7605	0.5945	0.4118	0.2973	0.3253	0.5165	0.7741	0.9078	0.9552	(86)	
MIT	20.4851	20.6015	20.7471	20.9140	20.9823	20.9985	20.9998	20.9997	20.9941	20.9194	20.7143	20.4760	(87)	
Th 2	20.3590	20.3613	20.3637	20.3757	20.3780	20.3900	20.3900	20.3924	20.3852	20.3780	20.3733	20.3685	(88)	
util rest of house	0.9426	0.9145	0.8631	0.7315	0.5578	0.3730	0.2562	0.2824	0.4720	0.7407	0.8918	0.9475	(89)	
MIT 2	19.7700	19.9142	20.0908	20.2907	20.3630	20.3890	20.3899	20.3923	20.3810	20.3016	20.0630	19.7668	(90)	
Living area fraction	fLA = Living area / (4) =													
MIT	20.1719	20.3005	20.4596	20.6410	20.7111	20.7316	20.7327	20.7337	20.7256	20.6488	20.4291	20.1654	(92)	
Temperature adjustment	0.0000													
adjusted MIT	20.1719	20.3005	20.4596	20.6410	20.7111	20.7316	20.7327	20.7337	20.7256	20.6488	20.4291	20.1654	(93)	
8. Space heating requirement														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9399	0.9133	0.8660	0.7441	0.5776	0.3948	0.2793	0.3065	0.4967	0.7556	0.8933	0.9448	(94)	
Useful gains	400.0931	414.6996	404.9019	368.9162	295.8511	200.0594	135.0577	141.0111	216.8833	312.8321	367.3730	392.2121	(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	546.9248	528.5827	477.2288	393.3875	300.6925	200.4308	135.0918	141.0707	218.3845	335.3212	448.4115	541.4485	(97)	
Space heating kWh	109.2428	76.5294	53.8112	17.6193	3.6019	0.0000	0.0000	0.0000	0.0000	16.7319	58.3477	111.0319	(98a)	
Space heating requirement - total per year (kWh/year)													446.9162	
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	109.2428	76.5294	53.8112	17.6193	3.6019	0.0000	0.0000	0.0000	0.0000	16.7319	58.3477	111.0319	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													446.9162	
Space heating per m2	(98c) / (4) =												8.8132 (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														
109.2428 76.5294 53.8112 17.6193 3.6019 0.0000 0.0000 0.0000 0.0000 16.7319 58.3477 111.0319 (98)														
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50														
307a 163.8642 114.7941 80.7168 26.4290 5.4029 0.0000 0.0000 0.0000 0.0000 25.0979 87.5216 166.5478														
Space heating requirement														
163.8642 114.7941 80.7168 26.4290 5.4029 0.0000 0.0000 0.0000 0.0000 25.0979 87.5216 166.5478 (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														
16.3494 13.1161 11.8096 8.6522 6.6832 5.4603 6.0967 7.9247 10.2934 13.5055 15.2544 16.8038 (332)														
Electricity generated by PVs (Appendix M) (negative quantity)														
(333a)m -2.6437 -4.7037 -8.7013 -12.2838 -15.3952 -15.2011 -14.8834 -12.7885 -9.5891 -6.1439 -3.1777 -2.1574 (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														
670.3743 (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														
6.7037 (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)														
131.9492 (332)														

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Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-107.6687 (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	4091.2913 (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	1694.2224	0.1577	45.5584 (367)
Electrical energy for heat distribution (space & water)	6.7037	0.0000	5.6447 (372)
Overall CO2 factor for heat network			0.0633 (386)
Total CO2 associated with community systems			248.9501 (373)
Space and water heating			248.9501 (376)
Pumps, fans and electric keep-hot	136.4150	0.1387	18.9224 (378)
Energy for lighting	131.9492	0.1443	19.0443 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-107.6687	0.1305	-14.0490
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-14.0490 (380)
Total CO2, kg/year			272.8679 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.3800 (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	1694.2224	1.5837	457.6122 (467)
Electrical energy for heat distribution (space & water)	6.7037	0.0000	60.1823 (472)
Overall CO2 factor for heat network			0.6753 (486)
Total CO2 associated with community systems			2654.2452 (473)
Space and water heating			2654.2452 (476)
Pumps, fans and electric keep-hot	136.4150	1.5128	206.3686 (478)
Energy for lighting	131.9492	1.5338	202.3881 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-107.6687	1.4820	-159.5655
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-159.5655 (480)
Total Primary energy kWh/year			2903.4364 (483)
Dwelling Primary energy Rate (DPER)			57.2600 (484)

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

1. Overall dwelling characteristics

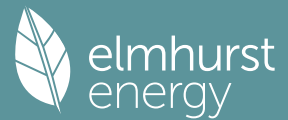
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.7100 (1b)	x 2.8000 (2b)	= 141.9880 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7100		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 141.9880 (5)

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 infiltr 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			9.0500	1.1450	10.3626		(27)
External Wall 1	29.0500	9.0500	20.0000	0.1800	3.6000		(29a)
Corridor wall	23.1700	2.4200	20.7500	0.1800	3.7350		(29a)
Total net area of external elements Aum(A, m2)			52.2200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.1176		(33)
Main dwelling							
Party Wall 1			30.8600	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							182.4169 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.5500	0.0500	0.2775
E3 Sill	2.0600	0.0500	0.1030
E4 Jamb	18.6000	0.0500	0.9300
E7 Party floor between dwellings (in blocks of flats)	13.9500	0.0700	0.9765
E7 Party floor between dwellings (in blocks of flats)	16.5500	0.0700	1.1585
E9 Balcony between dwellings, wall insulation continuous	6.8000	0.0200	0.1360
E16 Corner (normal)	2.8000	0.0900	0.2520
E17 Corner (inverted - internal area greater than external area)	2.8000	-0.0900	-0.2520
E18 Party wall between dwellings	5.6000	0.0600	0.3360
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)	22.0400	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.2535 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	24.3711 (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	51.2937	51.1580	51.0250	50.4002	50.2833	49.7392	49.7392	49.6384	49.9488	50.2833	50.5198	50.7670 (39)
Average = Sum(39)m / 12 =												50.3997
HLP	1.0115	1.0088	1.0062	0.9939	0.9916	0.9809	0.9809	0.9789	0.9850	0.9916	0.9962	1.0011 (40)
HLP (average)												0.9939
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

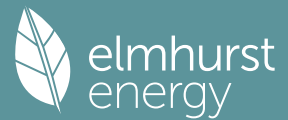
4. Water heating energy requirements (kWh/year)

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)
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 conte	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)
Energy content (annual)										Total = Sum(45)m =		1647.9845
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)										Total per year (kWh/year) = Sum(64)m =		2003.0401 (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												
96.2328	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	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
76.9046	85.1444	76.9046	79.4681	76.9046	79.4681	76.9046	76.9046	79.4681	76.9046	79.4681	76.9046	(67)

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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	406.9929	414.8091	398.8743	384.8167	366.6799	351.0694	338.6554	339.8119	349.4434	364.0910	385.1081	399.3511 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
Northeast				8.0200	11.2829	0.6300		0.7000		0.7700	27.6547 (75)	
Southeast				1.0300	36.7938	0.6300		0.7000		0.7700	11.5820 (77)	
Solar gains	39.2367	76.0203	128.4134	200.0069	261.3529	275.8824	259.1471	210.8700	152.8100	90.5973	48.6693	32.4960 (83)
Total gains	446.2296	490.8294	527.2877	584.8237	628.0328	626.9519	597.8024	550.6819	502.2534	454.6883	433.7774	431.8471 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	50.0947	50.2276	50.3586	50.9828	51.1013	51.6603	51.6603	51.7652	51.4436	51.1013	50.8621	50.6144
alpha	4.3396	4.3485	4.3572	4.3989	4.4068	4.4440	4.4440	4.4510	4.4296	4.4068	4.3908	4.3743
util living area	0.9708	0.9546	0.9215	0.8314	0.6795	0.4951	0.3634	0.4098	0.6396	0.8672	0.9502	0.9742 (86)
MIT	19.8240	20.0131	20.2938	20.6552	20.8860	20.9779	20.9955	20.9925	20.9345	20.6409	20.1914	19.7966 (87)
Th 2	20.0738	20.0760	20.0782	20.0884	20.0904	20.0993	20.0993	20.1010	20.0959	20.0904	20.0865	20.0824 (88)
util rest of house	0.9646	0.9452	0.9054	0.7996	0.6285	0.4301	0.2903	0.3319	0.5703	0.8342	0.9383	0.9687 (89)
MIT 2	18.7242	18.9617	19.3093	19.7439	19.9931	20.0853	20.0975	20.0977	20.0491	19.7397	19.1955	18.6961 (90)
Living area fraction									FLA = Living area / (4) =			0.5620 (91)
MIT	19.3423	19.5526	19.8626	20.2561	20.4949	20.5869	20.6022	20.6006	20.5467	20.2462	19.7552	19.3146 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3423	19.5526	19.8626	20.2561	20.4949	20.5869	20.6022	20.6006	20.5467	20.2462	19.7552	19.3146 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9586	0.9389	0.9011	0.8059	0.6519	0.4657	0.3313	0.3755	0.6059	0.8404	0.9332	0.9629 (94)
Ext temp.	427.7604	460.8408	475.1290	471.3012	409.4226	291.9672	198.0614	206.7828	304.2907	382.1108	404.8002	415.8435 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	771.5754	749.5966	681.8266	572.3493	442.2382	297.7856	199.0659	208.5100	322.0064	485.0443	639.3385	767.3224 (97)
Space heating requirement - total per year (kWh/year)	255.7984	194.0439	153.7830	72.7546	24.4148	0.0000	0.0000	0.0000	0.0000	76.5825	168.8676	261.5003 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	255.7984	194.0439	153.7830	72.7546	24.4148	0.0000	0.0000	0.0000	0.0000	76.5825	168.8676	261.5003 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1207.7452
Space heating per m2										(98c) / (4) =		23.8167 (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
255.7984	194.0439	153.7830	72.7546	24.4148	0.0000	0.0000	0.0000	0.0000	0.0000	76.5825	168.8676	261.5003 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	277.1380	210.2317	166.6122	78.8241	26.4516	0.0000	0.0000	0.0000	0.0000	82.9713	182.9551	283.3156 (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	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)
Water heating requirement	84.6579	84.3113	83.6498	82.3650	80.8855	79.8000	79.8000	79.8000	79.8000	82.4339	83.9764	84.7293 (217)
Efficiency of water heater (217)m	231.5187	205.7894	221.0186	199.1454	197.7711	181.9638	180.6315	187.1106	188.3780	201.7830	208.7103	229.0422 (219)
Fuel for water heating, kWh/month	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)
Space cooling fuel requirement (221)m	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)
Pumps and Fa	15.9793	12.8192	11.5422	8.4563	6.5319	5.3366	5.9586	7.7453	10.0603	13.1997	14.9090	16.4234 (232)
Lighting												
Electricity generated by PVs (Appendix M) (negative quantity)												

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(233a)m	-4.2462	-6.6661	-10.6565	-13.3712	-15.7059	-15.1488	-14.9703	-13.4772	-11.1073	-8.1924	-4.9041	-3.5966	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-0.7038	-1.5524	-3.2258	-5.0603	-6.9086	-7.0194	-6.9327	-5.7648	-4.0942	-2.2832	-0.9591	-0.5511	(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												1308.4997	(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												2432.8624	(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)												128.9618	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-167.0979	(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												3789.2260	(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	1308.4997	0.2100	274.7849 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2432.8624	0.2100	510.9011 (264)
Space and water heating			785.6860 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	128.9618	0.1443	18.6132 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-122.0426	0.1324	-16.1594
PV Unit electricity exported	-45.0553	0.1247	-5.6169
Total			-21.7764 (269)
Total CO2, kg/year			794.4521 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.6700 (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	1308.4997	1.1300	1478.6046 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2432.8624	1.1300	2749.1345 (278)
Space and water heating			4227.7392 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	128.9618	1.5338	197.8059 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-122.0426	1.4892	-181.7498
PV Unit electricity exported	-45.0553	0.4576	-20.6153
Total			-202.3651 (283)
Total Primary energy kWh/year			4353.2808 (286)
Target Primary Energy Rate (TPER)			85.8500 (287)

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Plot Reference	B 204	Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref	
Plot Address		SAP Version	10.2
SAP Rating	82 B	DER	5.38
Environmental	96 A	TER	15.67
CO ₂ Emissions (t/year)	0.25	% DER < TER	65.67
Compliance Check	See BREL	DFEE	31.39
% DPER < TPER	33.31	TFEE	32.30
		% DFEE < TFEE	2.84
		DPER	57.26
		TPER	85.85
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			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 141.9880 (5)

2. Ventilation rate

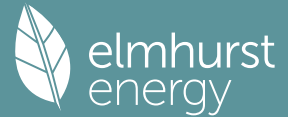
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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)
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							
Windows			9.0500	1.1450	10.3626		(27)
Door			2.4200	1.0000	2.4200		(26)
External Wall 1	29.0500	9.0500	20.0000	0.1500	3.0000	70.0000	1399.9999 (29a)
Corridor wall	23.1700	2.4200	20.7500	0.1800	3.7350	70.0000	1452.5000 (29a)
Total net area of external elements Aum(A, m ²)			52.2200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.5176		(33)
Main dwelling							
Party Wall 1			30.8600	0.0000	0.0000	70.0000	2160.2000 (32)
Party Floor 1			50.7100			40.0000	2028.4000 (32a)
Party Ceiling 1			50.7100			30.0000	1521.3000 (32b)
Internal Wall 1			76.4400			9.0000	687.9600 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	9250.3600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							182.4169 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					5.5500	0.0500	0.2775
E3 Sill					2.0600	0.0400	0.0824

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E4 Jamb													18.6000	0.0500	0.9300	
E7 Party floor between dwellings (in blocks of flats)													13.9500	0.0500	0.6975	
E7 Party floor between dwellings (in blocks of flats)													16.5500	0.0360	0.5958	
E9 Balcony between dwellings, wall insulation continuous													6.8000	0.0500	0.3400	
E16 Corner (normal)													2.8000	0.0500	0.1400	
E17 Corner (inverted - internal area greater than external area)													2.8000	0.0000	0.0000	
E18 Party wall between dwellings													5.6000	0.0500	0.2800	
E18 Party wall between dwellings													2.8000	0.0360	0.1008	
E25 Staggered party wall between dwellings													2.8000	0.0360	0.1008	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)													22.0400	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)																3.5448 (36)
Point Thermal bridges																0.0000
Total fabric heat loss																(33) + (36) + (36a) = 23.0624 (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				
	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)			
Heat transfer coeff	48.4256	48.3504	48.2768	47.9308	47.8661	47.5648	47.5648	47.5090	47.6808	47.8661	47.9970	48.1339	(39)			
Average = Sum(39)m / 12 =												47.9305				
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
HLP (average)	0.9550	0.9535	0.9520	0.9452	0.9439	0.9380	0.9380	0.9369	0.9403	0.9439	0.9465	0.9492	(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				
	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 conte	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)			
Energy content (annual)																
Distribution loss (46)m = 0.15 x (45)m																
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)			
Water storage loss (or HIU loss):																
Total storage loss																
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)			
If cylinder contains dedicated solar storage																
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)			
Primary loss																
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)			
Combi loss																
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)			
Total heat required for water heating calculated for each month																
	68.2208	59.6227	62.3854	54.9306	52.1978	44.8189	42.1896	46.9360	47.8365	55.3912	60.4956	68.0318	(62)			
WWHRS																
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)			
PV diverter																
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)			
Solar input																
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)			
FGHRS																
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)			
Output from w/h																
	68.2208	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)																
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				
	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																
	76.9046	85.1444	76.9046	79.4681	76.9046	79.4681	76.9046	76.9046	79.4681	76.9046	79.4681	76.9046	(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)																
	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)			
Total internal gains																
	311.8087	320.6603	307.1114	299.2936	284.5280	275.0755	264.5487	264.7893	272.2820	280.2129	295.8377	305.1675	(73)			

6. Solar gains																

[Jan]																
			Area	Solar flux	g	FF	Access	Gains								
			m2	Table 6a	W/m2	Specific data	factor	W								
				or Table 6b		or Table 6c	Table 6d									
Northeast			8.0200	11.2829	0.3500	0.7000	0.7700	15.3637	(75)							
Southeast			1.0300	36.7938	0.3500	0.7000	0.7700	6.4345	(77)							

Solar gains	21.7982	42.2335	71.3408	111.1150	145.1960	153.2680	143.9706	117.1500	84.8945	50.3318	27.0385	18.0533	(83)			
Total gains	333.6069	362.8938	378.4522	410.4086	429.7240	428.3435	408.5193	381.9393	357.1765	330.5447	322.8762	323.2208	(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	53.0617	53.1442	53.2253	53.6094	53.6819	54.0220	54.0220	54.0855	53.8905	53.6819	53.5355	53.3832
alpha	4.5374	4.5429	4.5484	4.5740	4.5788	4.6015	4.6015	4.6057	4.5927	4.5788	4.5690	4.5589
util living area	0.9894	0.9831	0.9710	0.9296	0.8349	0.6606	0.5005	0.5526	0.7859	0.9426	0.9809	0.9908 (86)
MIT	19.6523	19.8122	20.0631	20.4400	20.7562	20.9393	20.9864	20.9789	20.8635	20.4742	20.0112	19.6229 (87)
Th 2	20.1210	20.1223	20.1235	20.1293	20.1303	20.1353	20.1353	20.1363	20.1334	20.1303	20.1282	20.1259 (88)
util rest of house	0.9869	0.9792	0.9639	0.9118	0.7940	0.5877	0.4075	0.4574	0.7228	0.9245	0.9758	0.9886 (89)
MIT 2	18.8908	19.0501	19.2982	19.6664	19.9544	20.1026	20.1306	20.1283	20.0500	19.7052	19.2528	18.8654 (90)
Living area fraction									fLA = Living area /	(4) =		0.5620 (91)
MIT	19.3188	19.4784	19.7281	20.1011	20.4050	20.5729	20.6116	20.6063	20.5072	20.1374	19.6791	19.2911 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3188	19.4784	19.7281	20.1011	20.4050	20.5729	20.6116	20.6063	20.5072	20.1374	19.6791	19.2911 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9840	0.9756	0.9601	0.9112	0.8079	0.6257	0.4595	0.5102	0.7517	0.9246	0.9725	0.9860 (94)
Useful gains	328.2771	354.0449	363.3506	373.9567	347.1595	268.0247	187.7039	194.8836	268.4976	305.6370	314.0001	318.6978 (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	727.2927	704.8732	638.6087	536.8802	416.6739	284.0982	190.8092	199.8381	305.5011	456.5175	603.7572	726.3946 (97)
Space heating kWh	296.8676	235.7566	204.7921	117.3049	51.7187	0.0000	0.0000	0.0000	0.0000	112.2551	208.6251	303.3264 (98a)
Space heating requirement - total per year (kWh/year)												1530.6466
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	296.8676	235.7566	204.7921	117.3049	51.7187	0.0000	0.0000	0.0000	0.0000	112.2551	208.6251	303.3264 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1530.6466
Space heating per m2										(98c) / (4) =		30.1843 (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	447.1088	351.9792	361.0681	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8431	0.9063	0.8784	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	376.9709	318.9995	317.1576	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	472.1842	450.6560	420.9659	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	68.5536	97.9525	77.2334	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	17.1384	24.4881	19.3084	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												60.9349 (107)
Energy for space heating												30.1843 (99)
Energy for space cooling												1.2016 (108)
Total												31.3860 (109)
Fabric Energy Efficiency (DFEE)												31.4 (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)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	(22)
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)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (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			9.0500	1.1450	10.3626			(27)
External Wall 1	29.0500	9.0500	20.0000	0.1800	3.6000			(29a)
Corridor wall	23.1700	2.4200	20.7500	0.1800	3.7350			(29a)
Total net area of external elements Aum(A, m2)			52.2200					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.1176			(33)
Main dwelling								
Party Wall 1			30.8600	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							182.4169	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E1 Steel lintel with perforated steel base plate				5.5500	0.0500		0.2775	
E3 Sill				2.0600	0.0500		0.1030	
E4 Jamb				18.6000	0.0500		0.9300	
E7 Party floor between dwellings (in blocks of flats)				13.9500	0.0700		0.9765	
E7 Party floor between dwellings (in blocks of flats)				16.5500	0.0700		1.1585	
E9 Balcony between dwellings, wall insulation continuous				6.8000	0.0200		0.1360	
E16 Corner (normal)				2.8000	0.0900		0.2520	
E17 Corner (inverted - internal area greater than external area)				2.8000	-0.0900		-0.2520	
E18 Party wall between dwellings				5.6000	0.0600		0.3360	
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)				22.0400	0.0000		0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.2535	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	24.3711	(37)

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	22.8753	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)												50.4386	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	55.0278	53.5189	51.8713	49.8200	47.9903	46.0887	45.6931	47.3374	49.0238	50.9767	53.0462	54.9505	(44)
Energy content (annual)	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)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	74.0780	64.7787	67.7656	57.9709	54.9136	48.1708	46.9726	49.8215	51.3836	58.7987	64.2379	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	(64)
12Total per year (kWh/year)												712.0251	(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	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)

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	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	76.9046	85.1444	76.9046	79.4681	76.9046	79.4681	76.9046	76.9046	79.4681	76.9046	79.4681	76.9046 (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	313.7769	322.5784	308.9193	300.3493	285.4405	276.2393	266.1559	265.7589	273.5136	281.3578	297.1371	306.8817 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Northeast	8.0200		11.2829		0.6300		0.7000		0.7700		27.6547 (75)	
Southeast	1.0300		36.7938		0.6300		0.7000		0.7700		11.5820 (77)	
Solar gains	39.2367	76.0203	128.4134	200.0069	261.3529	275.8824	259.1471	210.8700	152.8100	90.5973	48.6693	32.4960 (83)
Total gains	353.0135	398.5988	437.3327	500.3562	546.7934	552.1217	525.3030	476.6288	426.3237	371.9551	345.8064	339.3777 (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	50.0947	50.2276	50.3586	50.9828	51.1013	51.6603	51.6603	51.7652	51.4436	51.1013	50.8621	50.6144
alpha	4.3396	4.3485	4.3572	4.3989	4.4068	4.4440	4.4440	4.4510	4.4296	4.4068	4.3908	4.3743
util living area	0.9873	0.9776	0.9560	0.8855	0.7463	0.5543	0.4116	0.4695	0.7203	0.9235	0.9769	0.9892 (86)
MIT	19.5888	19.7938	20.1051	20.5348	20.8338	20.9656	20.9926	20.9872	20.8949	20.4992	19.9841	19.5600 (87)
Th 2	20.0738	20.0760	20.0782	20.0884	20.0904	20.0993	20.0993	20.1010	20.0959	20.0904	20.0865	20.0824 (88)
util rest of house	0.9844	0.9724	0.9457	0.8600	0.6970	0.4841	0.3297	0.3820	0.6512	0.9006	0.9707	0.9867 (89)
MIT 2	18.7917	18.9955	19.3016	19.7157	19.9766	20.0819	20.0969	20.0964	20.0348	19.6934	19.1932	18.7697 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.2397	19.4441	19.7532	20.1760	20.4583	20.5786	20.6003	20.5970	20.5182	20.1463	19.6377	19.2138 (92)
Temperature adjustment												
adjusted MIT	19.2397	19.4441	19.7532	20.1760	20.4583	20.5786	20.6003	20.5970	20.5182	20.1463	19.6377	19.2138 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9810	0.9681	0.9414	0.8627	0.7178	0.5221	0.3756	0.4308	0.6849	0.9022	0.9669	0.9837 (94)
Useful gains	346.3171	385.8846	411.7244	431.6336	392.5142	288.2852	197.3113	205.3548	292.0099	335.5819	334.3570	333.8398 (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	766.3114	744.0487	676.2434	568.3151	440.3989	297.3701	198.9731	208.3347	320.5814	480.0202	633.4022	762.2081 (97)
Space heating kWh	312.4758	240.6862	196.8021	98.4107	35.6262	0.0000	0.0000	0.0000	0.0000	107.4621	215.3125	318.7060 (98a)
Space heating requirement - total per year (kWh/year)												1525.4815
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	312.4758	240.6862	196.8021	98.4107	35.6262	0.0000	0.0000	0.0000	0.0000	107.4621	215.3125	318.7060 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1525.4815
Space heating per m ²												(98c) / (4) = 30.0825 (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	467.5485	368.0701	377.2521	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9092	0.9491	0.9254	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	425.1049	349.3342	349.0956	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	616.6636	586.8851	531.4784	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	137.9223	176.7379	135.6928	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)												1.0000 (105)
	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	34.4806	44.1845	33.9232	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												112.5882 (107)
Energy for space heating												30.0825 (99)
Energy for space cooling												2.2202 (108)
Total												32.3027 (109)
Fabric Energy Efficiency (TFEE)												32.3 (109)

