

Summary for Input Data

Plot Reference	A 310		Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref		
Plot Address			SAP Version	10.2

SAP Rating	83 B	DER	4.97	TER	12.59
Environmental	96 A	% DER < TER			60.52
CO ₂ Emissions (t/year)	0.31	DFEE	32.19	TFEE	34.29
Compliance Check	See BREL	% DFEE < TFEE			6.11
% DPER < TPER	20.61	DPER	52.57	TPER	66.22

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

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

Orientation	Northeast	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Top-floor flat	
Which Floor	3	
2.0 Number of Storeys	1	
3.0 Date Built	2026	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	147.59	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:	17.75 m	70.02 m ²	2.80 m

8.0 Living Area	33.12	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	49.70	34.18	0.00	None	15.52	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	44.16	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	157.75

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	70.02	70.02	None	0.00	Enter Gross Area	0.00

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 70.02

12.0 Opening Types

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

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Door	Window	External Wall 1	North East	2.42	
NW windows	Window	External Wall 1	North West	4.75	
SE windows	Window	External Wall 1	South 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	8.25	0.05	0.05	No
E3 Sill	Independently assessed	4.76	0.04	0.04	No
E4 Jamb	Independently assessed	18.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	13.39	0.05	0.05	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	4.36	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	5.60	0.05	0.05	No
E25 Staggered party wall between dwellings	Independently assessed	5.60	0.05	0.05	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	15.77	0.00	0.00	No
E14 Flat roof	Independently assessed	17.75	0.05	0.05	No
E24 Eaves (insulation at ceiling level - inverted)	Independently assessed	8.80	0.05	0.05	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	6.97	0.05	0.05	No

Y-value 0.04 W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500625
Configuration	2
Manufacturer SFP	0.61
Duct Type	Rigid
MVHR Efficiency	89.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	0
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	m ² /(h.m ²) @ 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
			6
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
			Efficiency
			Percentage Of Heat
			Heat
			Heat Power Ratio
			Electrical
			Fuel Factor
			Efficiency type
Heat source 1	Heat pump	Electricity	Space and Water
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]
Shower 1	Combi boiler or unvented hot water system	8.00	
Shower 2	Combi boiler or unvented hot water system	8.00	
			Connected
			Connected To
			No
			No
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



0.34		South East	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				6.11	
% DPER < TPER	20.61		DPER	52.57		TPER	66.22	
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	70.0200 (1b)	2.8000 (2b)	196.0560 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0200		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	196.0560 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

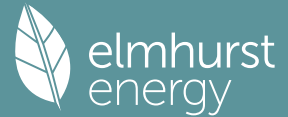
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.2621	0.2589	0.2557	0.2397	0.2366	0.2206	0.2206	0.2174	0.2270	0.2366	0.2429	0.2493 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			15.5200	1.1450	17.7710		(27)
External Wall 1	49.7000	15.5200	34.1800	0.1500	5.1270	70.0000	2392.6001 (29a)
External Roof 1	70.0200		70.0200	0.1000	7.0020	9.0000	630.1800 (30)
Total net area of external elements A _{um} (A, m ²)			119.7200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.9000		(33)
Main dwelling							
Party Wall 1			44.1600	0.0000	0.0000	70.0000	3091.2000 (32)
Party Floor 1			70.0200			40.0000	2800.8000 (32d)
Internal Wall 1			157.7500			9.0000	1419.7500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10334.5300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							147.5940 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate				8.2500	0.0500	0.4125	

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E3 Sill	4.7600	0.0400	0.1904
E4 Jamb	18.6000	0.0400	0.7440
E7 Party floor between dwellings (in blocks of flats)	13.3900	0.0500	0.6695
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180
E16 Corner (normal)	2.8000	0.0500	0.1400
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E25 Staggered party wall between dwellings	5.6000	0.0500	0.2800
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.7700	0.0000	0.0000
E14 Flat roof	17.7500	0.0500	0.8875
E24 Eaves (insulation at ceiling level - inverted)	8.8000	0.0500	0.4400
P4 Party wall - Roof (insulation at ceiling level)	6.9700	0.0500	0.3485
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.6104 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	34.5104 (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	16.9550	16.7488	16.5426	15.5115	15.3052	14.2741	14.2741	14.0679	14.6866	15.3052	15.7177	16.1301 (38)
Average = Sum(39)m / 12 =	51.4654	51.2592	51.0530	50.0219	49.8156	48.7845	48.7845	48.5783	49.1969	49.8156	50.2281	50.6405 (39)
												49.9703
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7350	0.7321	0.7291	0.7144	0.7114	0.6967	0.6967	0.6938	0.7026	0.7114	0.7173	0.7232 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.2466 (42)											
Hot water usage for mixer showers	60.3243	59.4008	58.0397	55.9459	54.0699	51.4454	49.3696	51.7963	53.0169	55.6163	58.3234	60.2699 (42a)
Hot water usage for baths	26.1410	25.7464	25.1850	24.3443	23.5867	22.5436	21.7524	22.7200	23.2278	24.2612	25.3357	26.1203 (42b)
Hot water usage for other uses	37.6375	36.2689	34.9003	33.5316	32.1630	30.7943	30.7943	32.1630	33.5316	34.9003	36.2689	37.6375 (42c)
Average daily hot water use (litres/day)												114.0692 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	124.1029	121.4161	118.1250	113.8218	109.8195	104.7834	101.9163	106.6793	109.7763	114.7778	119.9281	124.0277 (44)
Energy content (annual)	182.7009	160.6580	168.7982	148.6798	141.5136	121.1785	112.6205	125.5635	127.3350	147.9029	162.0868	182.1438 (45)
Distribution loss (46)m = 0.15 x (45)m	27.4051	24.0987	25.3197	22.3020	21.2270	18.1768	16.8931	18.8345	19.1003	22.1854	24.3130	27.3216 (46)
Water storage loss (or HIU loss):	110.0000 (47)											
Store volume	b) If manufacturer declared loss factor is not known :											
Hot water storage loss factor from Table 2 (kWh/litre/day)	0.0152 (51)											
Volume factor from Table 2a	1.0294 (52)											
Temperature factor from Table 2b	0.6000 (53)											
Enter (49) or (54) in (55)	1.0327 (55)											
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	237.9777	210.5854	224.0750	202.1734	196.7904	174.6722	167.8973	180.8403	180.8287	203.1797	215.5804	237.4206 (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	237.9777	210.5854	224.0750	202.1734	196.7904	174.6722	167.8973	180.8403	180.8287	203.1797	215.5804	237.4206 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 2432.0211 (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	104.9695	93.3607	100.3468	92.2310	91.2747	83.0868	81.6678	85.9713	85.1338	93.3991	96.6888	104.7843 (65)

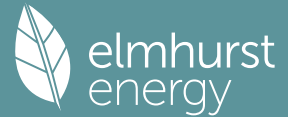
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.5503	110.2164	99.5503	102.8687	99.5503	102.8687	99.5503	99.5503	102.8687	99.5503	102.8687	99.5503 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.3437	199.3915	194.2311	183.2452	169.3775	156.3437	147.6364	145.5886	150.7490	161.7349	175.6027	188.6364 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331 (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)	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644 (71)
Water heating gains (Table 5)	141.0880	138.9297	134.8748	128.0986	122.6811	115.3983	109.7685	115.5528	118.2414	125.5365	134.2900	140.8391 (72)
Total internal gains	494.6812	505.2368	485.3554	470.9116	448.3080	431.3099	413.6544	417.3909	428.5583	443.5209	469.4605	485.7250 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	2.4200	11.2829	0.3500	0.7000	0.7700	4.6359 (75)
Southeast	8.3400	36.7938	0.3500	0.7000	0.7700	52.1003 (77)

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Northwest	4.7600		11.2829		0.3500		0.7000		0.7700		9.1186 (81)	
Solar gains	65.8549	116.7439	171.8694	233.2951	279.8759	286.0185	272.3539	236.3540	192.9447	132.2989	79.7109	55.8197 (83)
Total gains	560.5361	621.9807	657.2248	704.2067	728.1839	717.3284	686.0082	653.7449	621.5030	575.8198	549.1715	541.5446 (84)
7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	55.7792	56.0036	56.2299	57.3890	57.6266	58.8446	58.8446	59.0944	58.3512	57.6266	57.1533	56.6878
alpha	4.7186	4.7336	4.7487	4.8259	4.8418	4.9230	4.9230	4.9396	4.8901	4.8418	4.8102	4.7792
util living area	0.9493	0.9195	0.8713	0.7603	0.6083	0.4311	0.3122	0.3407	0.5329	0.7823	0.9106	0.9547 (86)
MIT	20.1656	20.3536	20.5719	20.8208	20.9478	20.9924	20.9988	20.9981	20.9788	20.8264	20.4923	20.1462 (87)
Th 2	20.3100	20.3126	20.3152	20.3281	20.3307	20.3437	20.3437	20.3463	20.3385	20.3307	20.3255	20.3204 (88)
util rest of house	0.9416	0.9081	0.8539	0.7324	0.5707	0.3883	0.2659	0.2928	0.4858	0.7506	0.8963	0.9478 (89)
MIT 2	19.3413	19.5753	19.8429	20.1440	20.2833	20.3382	20.3431	20.3453	20.3220	20.1577	19.7597	19.3255 (90)
Living area fraction	19.7312	19.9434	20.1878	20.4641	20.5976	20.6476	20.6532	20.6541	20.6327	20.4740	20.1062	19.7137 (92)
MIT	19.7312	19.9434	20.1878	20.4641	20.5976	20.6476	20.6532	20.6541	20.6327	20.4740	20.1062	19.7137 (93)
Temperature adjustment												0.0000
adjusted MIT	19.7312	19.9434	20.1878	20.4641	20.5976	20.6476	20.6532	20.6541	20.6327	20.4740	20.1062	19.7137 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9342	0.9013	0.8504	0.7382	0.5859	0.4082	0.2878	0.3154	0.5070	0.7577	0.8912	0.9406 (94)
Useful gains	523.6453	560.5867	558.8878	519.8503	426.6511	292.8297	197.4256	206.1768	315.0874	436.3038	489.4011	509.3703 (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	794.1740	771.1146	698.8008	578.4594	443.2410	295.0300	197.7340	206.6556	321.3869	491.8792	653.2768	785.6207 (97)
Space heating kWh	201.2733	141.4748	104.0953	42.1985	12.3428	0.0000	0.0000	0.0000	0.0000	41.3481	117.9905	205.5303 (98a)
Space heating requirement - total per year (kWh/year)												866.2537
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	201.2733	141.4748	104.0953	42.1985	12.3428	0.0000	0.0000	0.0000	0.0000	41.3481	117.9905	205.5303 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												866.2537
Space heating per m2										(98c) / (4) =		12.3715 (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												
	201.2733	141.4748	104.0953	42.1985	12.3428	0.0000	0.0000	0.0000	0.0000	41.3481	117.9905	205.5303 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	301.9100	212.2122	156.1430	63.2978	18.5143	0.0000	0.0000	0.0000	0.0000	62.0222	176.9858	308.2954
Space heating requirement												
	301.9100	212.2122	156.1430	63.2978	18.5143	0.0000	0.0000	0.0000	0.0000	62.0222	176.9858	308.2954 (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												
	237.9777	210.5854	224.0750	202.1734	196.7904	174.6722	167.8973	180.8403	180.8287	203.1797	215.5804	237.4206 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	356.9665	315.8782	336.1124	303.2601	295.1856	262.0083	251.8459	271.2604	271.2430	304.7695	323.3707	356.1310
Water heating fuel												
	356.9665	315.8782	336.1124	303.2601	295.1856	262.0083	251.8459	271.2604	271.2430	304.7695	323.3707	356.1310 (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	15.4899	13.9909	15.4899	14.9902	15.4899	14.9902	15.4899	15.4899	14.9902	15.4899	14.9902	15.4899 (331)
Lighting	22.2762	17.8708	16.0906	11.7887	9.1059	7.4396	8.3067	10.7974	14.0248	18.4012	20.7842	22.8953 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-3.7273	-6.6171	-12.2082	-17.1819	-21.4791	-21.1839	-20.7411	-17.8494	-13.4194	-8.6284	-4.4758	-3.0428 (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												1299.3806 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3648.0316 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												12.9938 (313)
Space cooling fuel												0.0000 (321)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7625)												
mechanical ventilation fans (SFP = 0.7625)												182.3811 (330a)
Total electricity for the above, kWh/year												182.3811 (331)
Electricity for lighting (calculated in Appendix L)												179.7814 (332)

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

PV generation	-150.5544	(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	5159.0202	(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	2132.5052	0.1570	87.9149 (367)
Electrical energy for heat distribution (space & water)	12.9938	0.0000	7.1764 (372)
Overall CO2 factor for heat network			0.0640 (386)
Total CO2 associated with community systems			316.5041 (373)
Space and water heating			316.5041 (376)
Pumps, fans and electric keep-hot	182.3811	0.1387	25.2985 (378)
Energy for lighting	179.7814	0.1443	25.9480 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-150.5544	0.1305	-19.6523
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-19.6523 (380)
Total CO2, kg/year			348.0983 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.9700 (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	2132.5052	1.5811	885.5402 (467)
Electrical energy for heat distribution (space & water)	12.9938	0.0000	76.0186 (472)
Overall CO2 factor for heat network			0.6777 (486)
Total CO2 associated with community systems			3352.6818 (473)
Space and water heating			3352.6818 (476)
Pumps, fans and electric keep-hot	182.3811	1.5128	275.9061 (478)
Energy for lighting	179.7814	1.5338	275.7548 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-150.5544	1.4822	-223.1503
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-223.1503 (480)
Total Primary energy kWh/year			3681.1923 (483)
Dwelling Primary energy Rate (DPER)			52.5700 (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			
Ground floor	70.0200 (1b)	x 2.8000 (2b)	= 196.0560 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.0560 (5)

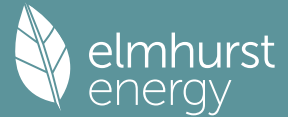
2. Ventilation rate

	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) =	0.1020 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0000 (17)
Infiltration rate			0.3520 (18)
Number of sides sheltered			2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.2992 (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)

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Adj infilt rate	0.3815	0.3740	0.3665	0.3291	0.3217	0.2842	0.2842	0.2768	0.2992	0.3217	0.3366	0.3516 (22b)
Effective ac	0.5728	0.5699	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618 (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 Opening Type			15.5200	1.1450	17.7710		(27)
External Wall 1	49.7000	15.5200	34.1800	0.1800	6.1524		(29a)
External Roof 1	70.0200		70.0200	0.1100	7.7022		(30)
Total net area of external elements Aum(A, m2)			119.7200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	31.6256		(33)
Main dwelling							
Party Wall 1			44.1600	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							147.5940 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate				8.2500	0.0500	0.4125	
E3 Sill				4.7600	0.0500	0.2380	
E4 Jamb				18.6000	0.0500	0.9300	
E7 Party floor between dwellings (in blocks of flats)				13.3900	0.0700	0.9373	
E9 Balcony between dwellings, wall insulation continuous				4.3600	0.0200	0.0872	
E16 Corner (normal)				2.8000	0.0900	0.2520	
E18 Party wall between dwellings				5.6000	0.0600	0.3360	
E25 Staggered party wall between dwellings				5.6000	0.0600	0.3360	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				15.7700	0.0000	0.0000	
E14 Flat roof				17.7500	0.0800	1.4200	
E24 Eaves (insulation at ceiling level - inverted)				8.8000	0.2400	2.1120	
P4 Party wall - Roof (insulation at ceiling level)				6.9700	0.1200	0.8364	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.8974 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	39.5230 (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	37.0572	36.8744	36.6952	35.8535	35.6961	34.9630	34.9630	34.8272	35.2454	35.6961	36.0146	36.3477 (38)
Heat transfer coeff	76.5802	76.3974	76.2182	75.3765	75.2191	74.4860	74.4860	74.3502	74.7683	75.2191	75.5376	75.8707 (39)
Average = Sum(39)m / 12 =												75.3758
HLP	1.0937	1.0911	1.0885	1.0765	1.0743	1.0638	1.0638	1.0618	1.0678	1.0743	1.0788	1.0836 (40)
HLP (average)												1.0765
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

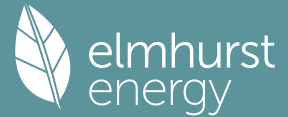
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2466 (42)
Hot water usage for mixer showers	61.8879	60.9579	59.6026	57.0095	55.0959	52.9618	51.7489	53.0939	54.5683	56.8596	59.5083	61.6508 (42a)
Hot water usage for baths	26.7371	26.3400	25.7808	24.7498	23.9778	23.1217	22.6593	23.2146	23.8192	24.7352	25.7874	26.6467 (42b)
Hot water usage for other uses	37.6375	36.2689	34.9003	33.5316	32.1630	30.7943	30.7943	32.1630	33.5316	34.9003	36.2689	37.6375 (42c)
Average daily hot water use (litres/day)												116.0640 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	126.2625	123.5667	120.2836	115.2909	111.2366	106.8779	105.2025	108.4714	111.9190	116.4950	121.5647	125.9350 (44)
Distribution loss (46)m = 0.15 x (45)m	199.9689	175.9574	184.8715	157.8275	149.7459	131.4189	127.2333	134.3103	138.0074	158.0826	173.1911	197.1838 (45)
Water storage loss (or HIU loss):										Total = Sum(45)m =		1927.7986
Store volume	29.9953	26.3936	27.7307	23.6741	22.4619	19.7128	19.0850	20.1465	20.7011	23.7124	25.9787	29.5776 (46)
a) If manufacturer declared loss factor is known (kWh/day):												180.0000 (47)
Temperature factor from Table 2b												1.5520 (48)
Enter (49) or (54) in (55)												0.5400 (49)
Total storage loss												0.8381 (55)
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 (56)
Primary 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 (57)
Combi 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)
Total heat required for water heating calculated for each 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 (61)
WWHRS	249.2116	220.4346	234.1141	205.4817	198.9886	179.0731	176.4760	183.5530	185.6616	207.3253	220.8453	246.4264 (62)
PV diverter	-28.2926	-25.0222	-26.2018	-21.6961	-20.2200	-17.3024	-16.2182	-17.2465	-17.9017	-21.1042	-23.9085	-27.7686 (63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	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)
12Total per year (kWh/year)	220.9190	195.4124	207.9124	183.7856	178.7686	161.7707	160.2578	166.3065	167.7598	186.2211	196.9369	218.6578 (64)
Electric shower(s)								Total per year (kWh/year) = Sum(64)m =				2244.7086 (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								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				0.0000 (64a)
	105.8838	94.0876	100.8639	90.6010	89.1846	81.8201	81.6992	84.0523	84.0108	91.9566	95.7094	104.9577 (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	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	99.5503	110.2164	99.5503	102.8687	99.5503	102.8687	99.5503	99.5503	102.8687	99.5503	102.8687	99.5503 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	197.3437	199.3915	194.2311	183.2452	169.3775	156.3437	147.6364	145.5886	150.7490	161.7349	175.6027	188.6364 (68)

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Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644 (71)
Water heating gains (Table 5)	142.3169	140.0113	135.5698	125.8347	119.8718	113.6391	109.8108	112.9735	116.6817	123.5976	132.9297 (72)
Total internal gains	498.9102	509.3185	489.0504	471.6478	448.4988	429.5506	413.6967	414.8116	426.9985	444.5820	471.1003 488.9581 (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			2.4200		11.2829	0.6300	0.7000		0.7700		8.3447 (75)	
Southeast			8.3400		36.7938	0.6300	0.7000		0.7700		93.7806 (77)	
Northwest			4.7600		11.2829	0.6300	0.7000		0.7700		16.4135 (81)	
Solar gains	118.5388	210.1390	309.3649	419.9312	503.7766	514.8334	490.2369	425.4371	347.3004	238.1379	143.4797	100.4754 (83)
Total gains	617.4489	719.4575	798.4153	891.5790	952.2754	944.3840	903.9336	840.2488	774.2990	682.7200	614.5800	589.4335 (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	37.4862	37.5759	37.6643	38.0848	38.1646	38.5402	38.5402	38.6105	38.3946	38.1646	38.0036	37.8368
alpha	3.4991	3.5051	3.5110	3.5390	3.5443	3.5693	3.5693	3.5740	3.5596	3.5443	3.5336	3.5225
util living area	0.9579	0.9304	0.8848	0.7885	0.6479	0.4820	0.3563	0.3972	0.6041	0.8297	0.9315	0.9634 (86)
MIT	19.4196	19.7103	20.0820	20.5170	20.8092	20.9501	20.9869	20.9808	20.8886	20.5012	19.8977	19.3706 (87)
Th 2	20.0060	20.0081	20.0102	20.0201	20.0219	20.0305	20.0305	20.0321	20.0272	20.0219	20.0182	20.0143 (88)
util rest of house	0.9503	0.9185	0.8653	0.7550	0.5975	0.4162	0.2804	0.3176	0.5359	0.7943	0.9176	0.9567 (89)
MIT 2	18.1888	18.5514	19.0092	19.5309	19.8530	19.9965	20.0245	20.0226	19.9434	19.5283	18.7982	18.1330 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.7710	19.0996	19.5166	19.9974	20.3053	20.4475	20.4797	20.4758	20.3905	19.9885	19.3183	18.7184 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.7710	19.0996	19.5166	19.9974	20.3053	20.4475	20.4797	20.4758	20.3905	19.9885	19.3183	18.7184 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9384	0.9053	0.8542	0.7542	0.6127	0.4450	0.3160	0.3546	0.5623	0.7929	0.9057	0.9454 (94)
Useful gains	579.3893	651.2974	682.0056	672.4091	583.4787	420.2971	285.6114	297.9293	435.4260	541.3512	556.6000	557.2439 (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	1108.1921	1084.8109	992.1039	836.4799	647.2832	435.5602	288.9858	303.0387	470.3266	706.1920	922.9393	1101.5178 (97)
Space heating kWh	393.4293	291.3210	230.7131	118.1310	47.4706	0.0000	0.0000	0.0000	0.0000	122.6415	263.7643	404.9397 (98a)
Space heating requirement - total per year (kWh/year)												1872.4106
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	393.4293	291.3210	230.7131	118.1310	47.4706	0.0000	0.0000	0.0000	0.0000	122.6415	263.7643	404.9397 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1872.4106
Space heating per m2										(98c) / (4) =		26.7411 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	393.4293	291.3210	230.7131	118.1310	47.4706	0.0000	0.0000	0.0000	0.0000	122.6415	263.7643	404.9397 (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)	426.2506	315.6241	249.9600	127.9859	51.4308	0.0000	0.0000	0.0000	0.0000	132.8727	285.7685	438.7213 (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	220.9190	195.4124	207.9124	183.7856	178.7686	161.7707	160.2578	166.3065	167.7598	186.2211	196.9369	218.6578 (64)
Water heating requirement	85.3390	84.9534	84.2937	83.0952	81.5339	79.8000	79.8000	79.8000	79.8000	83.1461	84.7158	79.8000 (216)
Efficiency of water heater (217)m	258.8724	230.0232	246.6523	221.1747	219.2567	202.7201	200.8243	208.4041	210.2254	223.9685	232.4678	255.9739 (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	20.6846	16.5939	14.9410	10.9464	8.4553	6.9081	7.7132	10.0260	13.0227	17.0865	19.2992	21.2595 (232)
Lighting	-23.8136	-34.6543	-51.4036	-59.7106	-66.0511	-62.2638	-61.5041	-57.2415	-49.9991	-40.4787	-26.5630	-20.4641 (233a)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m												

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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	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	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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-10.3607	-22.0863	-44.4395	-67.5398	-90.0782	-90.7843	-89.7131	-75.6047	-54.9512	-31.8444	-13.9169	-8.1712		(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	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	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	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													2028.6138	(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													2710.5635	(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)													166.9365	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-1153.6379	(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													3838.4759	(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	2028.6138	0.2100	426.0089 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2710.5635	0.2100	569.2183 (264)
Space and water heating			995.2272 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	166.9365	0.1443	24.0941 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-554.1476	0.1339	-74.2097
PV Unit electricity exported	-599.4903	0.1256	-75.2665
Total			-149.4763 (269)
Total CO2, kg/year			881.7743 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.5900 (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	2028.6138	1.1300	2292.3336 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2710.5635	1.1300	3062.9367 (278)
Space and water heating			5355.2703 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	166.9365	1.5338	256.0528 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-554.1476	1.4949	-828.3932
PV Unit electricity exported	-599.4903	0.4608	-276.2702
Total			-1104.6634 (283)
Total Primary energy kWh/year			4636.7605 (286)
Target Primary Energy Rate (TPER)			66.2200 (287)

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Plot Reference	A 310			Issued on Date	19/03/2026		
Assessment Reference	Be Green		Plot Type Ref				
Plot Address				SAP Version	10.2		
SAP Rating	83 B		DER	4.97		TER	12.59
Environmental	96 A		% DER < TER				60.52
CO ₂ Emissions (t/year)	0.31		DFEE	32.19		TFEE	34.29
Compliance Check	See BREL		% DFEE < TFEE				6.11
% DPER < TPER	20.61		DPER	52.57		TPER	66.22
Assessor Details	Mr. Robert Tanner				Assessor ID	W344-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0200		
Dwelling volume			

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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) =	0.1020 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.0000 (17)
Infiltration rate		0.2520 (18)
Number of sides sheltered		2 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2142 (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	0.2731	0.2678	0.2624	0.2356	0.2303	0.2035	0.2035	0.1981	0.2142	0.2303	0.2410	0.2517 (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	0.5373	0.5358	0.5344	0.5278	0.5265	0.5207	0.5207	0.5196	0.5229	0.5265	0.5290	0.5317 (25)

3. Heat losses and heat loss parameter

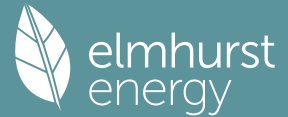
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window			15.5200	1.1450	17.7710		(27)
External Wall 1	49.7000	15.5200	34.1800	0.1500	5.1270	70.0000	2392.6001 (29a)
External Roof 1	70.0200		70.0200	0.1000	7.0020	9.0000	630.1800 (30)
Total net area of external elements Aum(A, m ²)			119.7200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	29.9000	(33)
Main dwelling							
Party Wall 1			44.1600	0.0000	0.0000	70.0000	3091.2000 (32)
Party Floor 1			70.0200			40.0000	2800.8000 (32d)
Internal Wall 1			157.7500			9.0000	1419.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	10334.5300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		147.5940 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125
E3 Sill	4.7600	0.0400	0.1904
E4 Jamb	18.6000	0.0400	0.7440
E7 Party floor between dwellings (in blocks of flats)	13.3900	0.0500	0.6695

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E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180
E16 Corner (normal)	2.8000	0.0500	0.1400
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E25 Staggered party wall between dwellings	5.6000	0.0500	0.2800
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.7700	0.0000	0.0000
E14 Flat roof	17.7500	0.0500	0.8875
E24 Eaves (insulation at ceiling level - inverted)	8.8000	0.0500	0.4400
P4 Party wall - Roof (insulation at ceiling level)	6.9700	0.0500	0.3485
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.6104 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	34.5104 (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	34.7623	34.6686	34.5767	34.1453	34.0646	33.6889	33.6889	33.6193	33.8336	34.0646	34.2279	34.3986 (38)
Average = Sum(39)m / 12 =	69.2727	69.1790	69.0871	68.6557	68.5750	68.1993	68.1993	68.1297	68.3440	68.5750	68.7383	68.9090 (39)
												68.6553
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9893	0.9880	0.9867	0.9805	0.9794	0.9740	0.9740	0.9730	0.9761	0.9794	0.9817	0.9841 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.2466 (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												
	26.1410	25.7464	25.1850	24.3443	23.5867	22.5436	21.7524	22.7200	23.2278	24.2612	25.3357	26.1203 (42b)
Hot water usage for other uses												
	37.6375	36.2689	34.9003	33.5316	32.1630	30.7943	30.7943	32.1630	33.5316	34.9003	36.2689	37.6375 (42c)
Average daily hot water use (litres/day)												58.4549 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	63.7786	62.0153	60.0853	57.8759	55.7496	53.3380	52.5467	54.8830	56.7594	59.1615	61.6046	63.7578 (44)
Energy conte	93.8930	82.0588	85.8606	75.6004	71.8390	61.6836	58.0657	64.5982	65.8381	76.2356	83.2607	93.6330 (45)
Energy content (annual)										Total = Sum(45)m =		912.5669
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												
	79.8091	69.7500	72.9815	64.2604	61.0632	52.4311	49.3558	54.9085	55.9624	64.8002	70.7716	79.5881 (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	79.8091	69.7500	72.9815	64.2604	61.0632	52.4311	49.3558	54.9085	55.9624	64.8002	70.7716	79.5881 (64)
												775.6819 (64)
12Total per year (kWh/year)												776 (64)
Electric shower(s)												
	49.5619	44.1601	48.2211	46.0168	46.8803	44.7192	46.2099	46.8803	46.0168	48.2211	47.3144	49.5619 (64a)
												563.7638 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month												
	32.3427	28.4775	30.3007	27.5693	26.9859	24.2876	23.8914	25.4472	25.4948	28.2553	29.5215	32.2875 (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
	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	99.5503	110.2164	99.5503	102.8687	99.5503	102.8687	99.5503	99.5503	102.8687	99.5503	102.8687	99.5503 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	197.3437	199.3915	194.2311	183.2452	169.3775	156.3437	147.6364	145.5886	150.7490	161.7349	175.6027	188.6364 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331 (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)												
	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644 (71)
Water heating gains (Table 5)												
	43.4714	42.3772	40.7267	38.2907	36.2713	33.7328	32.1121	34.2032	35.4094	37.9776	41.0021	43.3972 (72)
Total internal gains												
	397.0647	408.6844	391.2073	381.1037	361.8983	349.6443	335.9980	336.0413	345.7263	355.9620	376.1726	388.2831 (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	2.4200											4.6359 (75)
Southeast	8.3400											52.1003 (77)
Northwest	4.7600											9.1186 (81)
Solar gains	65.8549	116.7439	171.8694	233.2951	279.8759	286.0185	272.3539	236.3540	192.9447	132.2989	79.7109	55.8197 (83)
Total gains	462.9195	525.4283	563.0767	614.3988	641.7742	635.6629	608.3519	572.3953	538.6710	488.2609	455.8835	444.1027 (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	41.4406	41.4968	41.5519	41.8130	41.8622	42.0929	42.0929	42.1359	42.0037	41.8622	41.7628	41.6593
alpha	3.7627	3.7665	3.7701	3.7875	3.7908	3.8062	3.8062	3.8091	3.8002	3.7908	3.7842	3.7773
util living area	0.9806	0.9679	0.9467	0.8913	0.7888	0.6251	0.4757	0.5211	0.7361	0.9104	0.9673	0.9833 (86)
MIT	19.3366	19.5672	19.8900	20.3283	20.6878	20.9070	20.9746	20.9640	20.8217	20.3624	19.7798	19.2913 (87)
Th 2	20.0922	20.0934	20.0945	20.0996	20.1006	20.1051	20.1051	20.1059	20.1033	20.1006	20.0986	20.0966 (88)
util rest of house	0.9769	0.9619	0.9363	0.8695	0.7466	0.5552	0.3860	0.4300	0.6732	0.8879	0.9600	0.9801 (89)
MIT 2	18.5736	18.8015	19.1187	19.5428	19.8705	20.0516	20.0951	20.0907	19.9901	19.5833	19.0175	18.5320 (90)
Living area fraction	18.9345	19.1637	19.4835	19.9143	20.2571	20.4562	20.5111	20.5038	fLA = Living area / (4) =			0.4730 (91)
MIT	18.9345	19.1637	19.4835	19.9143	20.2571	20.4562	20.5111	20.5038	20.3835	19.9518	19.3781	18.8911 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9345	19.1637	19.4835	19.9143	20.2571	20.4562	20.5111	20.5038	20.3835	19.9518	19.3781	18.8911 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9708	0.9542	0.9278	0.8644	0.7545	0.5837	0.4276	0.4716	0.6942	0.8836	0.9528	0.9745 (94)
Useful gains	449.4249	501.3541	522.4427	531.1095	484.1930	371.0358	260.1144	269.9487	373.9313	431.4140	434.3699	432.7903 (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	1013.7681	986.7481	896.9915	756.1973	586.8034	399.3885	266.7351	279.5916	429.4371	641.2999	843.9735	1012.3512 (97)
Space heating kWh	419.8713	326.1848	278.6643	162.0632	76.3421	0.0000	0.0000	0.0000	0.0000	156.1551	294.9146	431.1933 (98a)
Space heating requirement - total per year (kWh/year)												2145.3887
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	419.8713	326.1848	278.6643	162.0632	76.3421	0.0000	0.0000	0.0000	0.0000	156.1551	294.9146	431.1933 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2145.3887
Space heating per m2										(98c) / (4) =		30.6397 (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	641.0732	504.6747	517.7857	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8282	0.8895	0.8646	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	530.9275	448.9243	447.6794	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	705.7577	675.8709	635.6497	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	125.8778	168.8482	139.8499	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	31.4694	42.2121	34.9625	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												108.6440 (107)
Energy for space heating												30.6397 (99)
Energy for space cooling												1.5516 (108)
Total												32.1913 (109)
Fabric Energy Efficiency (DFEE)												32.2 (109)

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

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

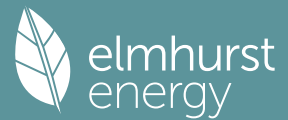
1. Overall dwelling characteristics

		Area (m2)	Storey height (m)	Volume (m3)
Main dwelling		70.0200 (1b)	x 2.8000 (2b)	= 196.0560 (1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0200			
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	196.0560 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1020 (8)

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Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												5.0000 (17)
Infiltration rate												0.3520 (18)
Number of sides sheltered												2 (19)
Shelter factor												(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) = 0.2992 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	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)
Adj infilt rate	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)
	0.3815	0.3740	0.3665	0.3291	0.3217	0.2842	0.2842	0.2768	0.2992	0.3217	0.3366	0.3516 (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	0.5728	0.5699	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618 (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 Opening Type			15.5200	1.1450	17.7710		(27)
External Wall 1	49.7000	15.5200	34.1800	0.1800	6.1524		(29a)
External Roof 1	70.0200		70.0200	0.1100	7.7022		(30)
Total net area of external elements Aum(A, m2)			119.7200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.6256		(33)
Main dwelling							
Party Wall 1			44.1600	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							147.5940 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate				8.2500	0.0500	0.4125	
E3 Sill				4.7600	0.0500	0.2380	
E4 Jamb				18.6000	0.0500	0.9300	
E7 Party floor between dwellings (in blocks of flats)				13.3900	0.0700	0.9373	
E9 Balcony between dwellings, wall insulation continuous				4.3600	0.0200	0.0872	
E16 Corner (normal)				2.8000	0.0900	0.2520	
E18 Party wall between dwellings				5.6000	0.0600	0.3360	
E25 Staggered party wall between dwellings				5.6000	0.0600	0.3360	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				15.7700	0.0000	0.0000	
E14 Flat roof				17.7500	0.0800	1.4200	
E24 Eaves (insulation at ceiling level - inverted)				8.8000	0.2400	2.1120	
P4 Party wall - Roof (insulation at ceiling level)				6.9700	0.1200	0.8364	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.8974 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	39.5230 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2466 (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	26.7371	26.3400	25.7808	24.7498	23.9778	23.1217	22.6593	23.2146	23.8192	24.7352	25.7874	26.6467	(42b)
Hot water usage for other uses	37.6375	36.2689	34.9003	33.5316	32.1630	30.7943	30.7943	32.1630	33.5316	34.9003	36.2689	37.6375	(42c)
Average daily hot water use (litres/day)													59.0054 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	64.3746	62.6089	60.6811	58.2814	56.1407	53.9161	53.4537	55.3776	57.3508	59.6354	62.0563	64.2842	(44)
Energy content (annual)	101.9536	89.1542	93.2645	79.7843	75.5762	66.2961	64.6476	68.5690	70.7193	80.9247	88.4106	100.6535	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		979.9537	
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	86.6606	75.7811	79.2748	67.8167	64.2398	56.3517	54.9504	58.2837	60.1114	68.7860	75.1490	85.5555	(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	86.6606	75.7811	79.2748	67.8167	64.2398	56.3517	54.9504	58.2837	60.1114	68.7860	75.1490	85.5555	(64)
12Total per year (kWh/year)									Total per year (kWh/year) = Sum(64)m =			832.9606	(64)
Electric shower(s)	49.5619	44.1601	48.2211	46.0168	46.8803	44.7192	46.2099	46.8803	46.0168	48.2211	47.3144	49.5619	(64a)
												563.7638	(64a)
Heat gains from water heating, kWh/month	34.0556	29.9853	31.8740	28.4584	27.7800	25.2677	25.2901	26.2910	26.5320	29.2518	30.6158	33.7793	(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	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.5503	110.2164	99.5503	102.8687	99.5503	102.8687	99.5503	99.5503	102.8687	99.5503	102.8687	99.5503 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.3437	199.3915	194.2311	183.2452	169.3775	156.3437	147.6364	145.5886	150.7490	161.7349	175.6027	188.6364 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331 (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)	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644 (71)
Water heating gains (Table 5)	45.7737	44.6210	42.8414	39.5255	37.3387	35.0941	33.9920	35.3373	36.8501	39.3169	42.5220	45.4024 (72)
Total internal gains	399.3669	410.9281	393.3220	382.3386	362.9657	351.0057	337.8780	337.1754	347.1669	357.3013	377.6925	390.2882 (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	2.4200		11.2829		0.6300		0.7000		0.7700		8.3447 (75)	
Southeast	8.3400		36.7938		0.6300		0.7000		0.7700		93.7806 (77)	
Northwest	4.7600		11.2829		0.6300		0.7000		0.7700		16.4135 (81)	
Solar gains	118.5388	210.1390	309.3649	419.9312	503.7766	514.8334	490.2369	425.4371	347.3004	238.1379	143.4797	100.4754 (83)
Total gains	517.9057	621.0671	702.6869	802.2697	866.7423	865.8390	828.1149	762.6126	694.4674	595.4393	521.1722	490.7637 (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	37.4862	37.5759	37.6643	38.0848	38.1646	38.5402	38.5402	38.6105	38.3946	38.1646	38.0036	37.8368
alpha	3.4991	3.5051	3.5110	3.5390	3.5443	3.5693	3.5693	3.5740	3.5596	3.5443	3.5336	3.5225
util living area	0.9744	0.9527	0.9147	0.8268	0.6901	0.5191	0.3869	0.4340	0.6535	0.8723	0.9558	0.9784 (86)
MIT	19.2200	19.5315	19.9353	20.4254	20.7656	20.9369	20.9830	20.9744	20.8563	20.3924	19.7261	19.1684 (87)
Th 2	20.0060	20.0081	20.0102	20.0201	20.0219	20.0305	20.0305	20.0321	20.0272	20.0219	20.0182	20.0143 (88)
util rest of house	0.9695	0.9439	0.8990	0.7964	0.6402	0.4502	0.3053	0.3485	0.5846	0.8423	0.9461	0.9742 (89)
MIT 2	18.3951	18.7014	19.0938	19.5599	19.8577	19.9964	20.0243	20.0221	19.9411	19.5431	18.9038	18.3504 (90)
Living area fraction	18.7853	19.0940	19.4919	19.9693	20.2871	20.4413	20.4778	20.4726	20.3740	19.9448	19.2928	18.7373 (92)
Temperature adjustment	18.7853	19.0940	19.4919	19.9693	20.2871	20.4413	20.4778	20.4726	20.3740	19.9448	19.2928	18.7373 (93)
adjusted MIT	18.7853	19.0940	19.4919	19.9693	20.2871	20.4413	20.4778	20.4726	20.3740	19.9448	19.2928	18.7373 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9617	0.9341	0.8894	0.7947	0.6544	0.4801	0.3435	0.3881	0.6103	0.8396	0.9372	0.9671 (94)
Useful gains	498.0472	580.1195	624.9514	637.5771	567.1928	415.6936	284.4222	295.9725	423.8675	499.9564	488.4398	474.6312 (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	1109.2877	1084.3882	990.2166	834.3619	645.9139	435.0926	288.8398	302.7975	469.0955	702.9078	921.0123	1102.9577 (97)
Space heating kWh	454.7629	338.8686	271.7573	141.6850	58.5685	0.0000	0.0000	0.0000	0.0000	150.9958	311.4522	467.4749 (98a)
Space heating requirement - total per year (kWh/year)												2195.5653
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	454.7629	338.8686	271.7573	141.6850	58.5685	0.0000	0.0000	0.0000	0.0000	150.9958	311.4522	467.4749 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2195.5653
Space heating per m ²												31.3563 (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	700.1682	551.1962	565.0617	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8890	0.9312	0.9099	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	622.4579	513.2484	514.1388	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	974.5650	932.4193	857.7902	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	253.5171	311.8632	255.6766	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			
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	63.3793	77.9658	63.9192	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												205.2642 (107)
Energy for space heating												31.3563 (99)
Energy for space cooling												2.9315 (108)
Total												34.2878 (109)
Fabric Energy Efficiency (TFEE)												34.3 (109)

