

Summary for Input Data

Plot Reference	A 906		Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref		
Plot Address			SAP Version	10.2

SAP Rating	82 B	DER	5.37	TER	15.73
Environmental	96 A	% DER < TER			65.86
CO ₂ Emissions (t/year)	0.25	DFEE	31.16	TFEE	33.93
Compliance Check	See BREL	% DFEE < TFEE			8.15
% DPER < TPER	33.10	DPER	57.17	TPER	85.45

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

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

Orientation	Southwest
Property Tenture	1
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, Mid-Terrace
Position of Flat	Top-floor flat
Which Floor	9
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	165.81 kJ/m ² K
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:	9.18 m	51.11 m ²	2.80 m

8.0 Living Area	25.52 m ²
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Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.15	70.00	17.22	8.88	0.00	None	8.34	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	8.48	6.06	0.70	Stairwell Access Corridor 3	2.42	Enter Gross Area

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	55.24	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	117.49

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	51.11	51.11	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete planks floor, screed, carpeted	40.00	51.11

12.0 Opening Types

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

13.0 Openings

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

14.0 Conservatory

None

15.0 Draught Proofing

100 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate	Independently assessed	5.08	0.05	0.05	No
E4 Jamb	Independently assessed	12.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	2.79	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	3.03	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	3.36	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	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	19.73	0.00	0.00	No
E3 Sill	Independently assessed	1.59	0.04	0.04	No
E14 Flat roof	Independently assessed	9.18	0.05	0.05	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	19.73	0.05	0.05	No

Y-value

0.04 W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500625
Configuration	1
Manufacturer SFP	0.63
Duct Type	Rigid
MVHR Efficiency	90.00
Wet Rooms	1
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	0
Number of passive vents	0
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
			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 Reference
			Panel Manufacturer

Summary for Input Data



0.25

South West

Horizontal

Modest

No

0.80

34.0 Small-scale Hydro

None

Jan

Feb

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Recommendations

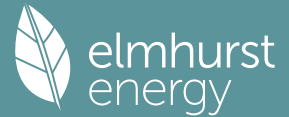
Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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Compliance Check	See BREL	% DFEE < TFEE				8.15	
% DPER < TPER	33.10	DPER	57.17	TPER	85.45		
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	51.1100 (1b)	2.8000 (2b)	143.1080 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1100		
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 143.1080 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1162 (21)

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

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.4200	1.0000	2.4200		(26)
Window			8.3400	1.1450	9.5496		(27)
External Wall 1	17.2200	8.3400	8.8800	0.1500	1.3320	70.0000	621.6000 (29a)
Corridor wall	8.4800	2.4200	6.0600	0.1900	1.1514	70.0000	424.2000 (29a)
External Roof 1	51.1100		51.1100	0.1000	5.1110	9.0000	459.9900 (30)
Total net area of external elements Aum(A, m ²)			76.8100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.5640		(33)
Main dwelling							
Party Wall 1			55.2400	0.0000	0.0000	70.0000	3866.8001 (32)
Party Floor 1			51.1100			40.0000	2044.4000 (32d)
Internal Wall 1			117.4900			9.0000	1057.4100 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8474.4000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							165.8071 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



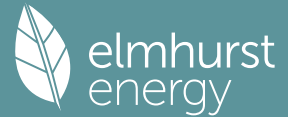
K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E4 Jamb	12.6000	0.0400	0.5040
E7 Party floor between dwellings (in blocks of flats)	2.7900	0.0500	0.1395
E7 Party floor between dwellings (in blocks of flats)	3.0300	0.0390	0.1182
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0500	0.1680
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E25 Staggered party wall between dwellings	5.6000	0.0390	0.2184
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	19.7300	0.0000	0.0000
E3 Sill	1.5900	0.0400	0.0636
E14 Flat roof	9.1800	0.0500	0.4590
P4 Party wall - Roof (insulation at ceiling level)	19.7300	0.0500	0.9865
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.1912 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	22.7552 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)			
(38)m	Jan 11.4862	Feb 11.3489	Mar 11.2117
Heat transfer coeff	34.2413	34.1041	33.9669
Average = Sum(39)m / 12 =	33.2806	33.1434	32.4571
	Jun 9.7019	Jul 9.7019	Aug 9.5647
	Sep 9.9764	Oct 10.3882	Nov 10.6627
	Dec 10.9372	(38)	
	Jan 0.6700	Feb 0.6673	Mar 0.6646
HLP (average)	0.6512	0.6485	0.6350
Days in mont	31	28	31
	Apr 0.6512	May 0.6485	Jun 0.6350
	Jul 0.6350	Aug 0.6324	Sep 0.6404
	Oct 0.6485	Nov 0.6538	Dec 0.6592
			0.6505
			31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7228 (42)
Hot water usage for mixer showers												
51.7637	50.9712	49.8033	48.0066	46.3969	44.1448	42.3636	44.4459	45.4933	47.7239	50.0468	51.7171	(42a)
Hot water usage for baths												
22.4485	22.1096	21.6275	20.9056	20.2549	19.3592	18.6797	19.5107	19.9467	20.8342	21.7569	22.4307	(42b)
Hot water usage for other uses												
32.2734	31.0998	29.9262	28.7526	27.5790	26.4055	26.4055	27.5790	28.7526	29.9262	31.0998	32.2734	(42c)
Average daily hot water use (litres/day)												97.8766 (43)
Daily hot water use	Jan 106.4856	Feb 104.1806	Mar 101.3570	Apr 97.6648	May 94.2308	Jun 89.9095	Jul 87.4488	Aug 91.5356	Sep 94.1927	Oct 98.4843	Nov 102.9035	Dec 106.4211
Energy conte	156.7651	137.8520	144.8371	127.5747	121.4260	103.9774	96.6335	107.7391	109.2588	126.9069	139.0775	156.2872
Energy content (annual)										Total = Sum(45)m =		1528.3352
Distribution loss (46)m = 0.15 x (45)m												
23.5148	20.6778	21.7256	19.1362	18.2139	15.5966	14.4950	16.1609	16.3888	19.0360	20.8616	23.4431	(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	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												
212.0419	187.7795	200.1139	181.0683	176.7028	157.4710	151.9103	163.0159	162.7524	182.1838	192.5712	211.5640	(62)
WWHRS	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	(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	212.0419	187.7795	200.1139	181.0683	176.7028	157.4710	151.9103	163.0159	162.7524	182.1838	192.5712	(64)
12Total per year (kWh/year)												2179.1750 (64)
Electric shower(s)												2179 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
96.3458	85.7777	92.3798	85.2135	84.5956	77.3674	76.3521	80.0447	79.1235	86.4180	89.0382	96.1869	(65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan 86.1408	Feb 86.1408	Mar 86.1408	Apr 86.1408	May 86.1408	Jun 86.1408	Jul 86.1408	Aug 86.1408	Sep 86.1408	Oct 86.1408	Nov 86.1408	Dec 86.1408
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
78.6912	87.1224	78.6912	81.3143	78.6912	81.3143	78.6912	78.6912	81.3143	78.6912	81.3143	78.6912	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
150.1164	151.6741	147.7487	139.3918	128.8429	118.9283	112.3048	110.7470	114.6725	123.0293	133.5783	143.4928	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	(71)
Water heating gains (Table 5)												
129.4971	127.6455	124.1664	118.3521	113.7037	107.4547	102.6237	107.5870	109.8937	116.1532	123.6642	129.2835	(72)
Total internal gains	407.1469	415.2842	399.4485	387.9005	370.0801	356.5396	342.4620	345.8675	354.7227	366.7160	387.3990	400.3098
												(73)

6. Solar gains							
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	8.3400	11.2829	0.3500	0.7000	0.7700	15.9767	(75)

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Solar gains	15.9767	32.5211	58.5926	96.2260	129.3466	137.8971	128.9999	102.8402	71.3961	39.7433	20.1029	13.0474 (83)
Total gains	423.1237	447.8053	458.0411	484.1264	499.4266	494.4367	471.4619	448.7077	426.1188	406.4593	407.5018	413.3572 (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	68.7473	69.0240	69.3029	70.7319	71.0248	72.5265	72.5265	72.8345	71.9183	71.0248	70.4414	69.8675
alpha	5.5832	5.6016	5.6202	5.7155	5.7350	5.8351	5.8351	5.8556	5.7946	5.7350	5.6961	5.6578
util living area	0.9439	0.9204	0.8780	0.7630	0.6017	0.4186	0.3027	0.3310	0.5236	0.7734	0.9003	0.9480 (86)
MIT	20.4404	20.5554	20.7063	20.8913	20.9748	20.9975	20.9997	20.9995	20.9911	20.9009	20.6817	20.4331 (87)
Th 2	20.3674	20.3698	20.3722	20.3842	20.3866	20.3986	20.3986	20.4010	20.3938	20.3866	20.3818	20.3770 (88)
util rest of house	0.9352	0.9087	0.8607	0.7354	0.5658	0.3798	0.2614	0.2880	0.4797	0.7414	0.8845	0.9399 (89)
MIT 2	19.7242	19.8670	20.0513	20.2745	20.3643	20.3968	20.3984	20.4007	20.3871	20.2902	20.0328	19.7233 (90)
Living area fraction									fLA = Living area / (4) =			0.4993 (91)
MIT	20.0818	20.2107	20.3783	20.5825	20.6692	20.6967	20.6986	20.6997	20.6887	20.5952	20.3568	20.0777 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0818	20.2107	20.3783	20.5825	20.6692	20.6967	20.6986	20.6997	20.6887	20.5952	20.3568	20.0777 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9308	0.9055	0.8609	0.7445	0.5825	0.3991	0.2820	0.3095	0.5012	0.7526	0.8838	0.9356 (94)
Useful gains	393.8429	405.4836	394.3175	360.4334	290.9362	197.3142	132.9706	138.8650	213.5793	305.9175	360.1394	386.7326 (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	540.3905	522.1590	471.4032	388.8009	297.2682	197.8825	133.0300	138.9652	215.6583	331.2728	443.0144	534.9585 (97)
Space heating kWh	109.0314	78.4059	57.3518	20.4246	4.7110	0.0000	0.0000	0.0000	0.0000	18.8644	59.6700	110.2801 (98a)
Space heating requirement - total per year (kWh/year)												458.7391
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	109.0314	78.4059	57.3518	20.4246	4.7110	0.0000	0.0000	0.0000	0.0000	18.8644	59.6700	110.2801 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												458.7391
Space heating per m2										(98c) / (4) =		8.9755 (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	109.0314	78.4059	57.3518	20.4246	4.7110	0.0000	0.0000	0.0000	0.0000	18.8644	59.6700	110.2801 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	163.5471	117.6089	86.0277	30.6370	7.0664	0.0000	0.0000	0.0000	0.0000	28.2965	89.5049	165.4201
Space heating requirement	163.5471	117.6089	86.0277	30.6370	7.0664	0.0000	0.0000	0.0000	0.0000	28.2965	89.5049	165.4201 (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	212.0419	187.7795	200.1139	181.0683	176.7028	157.4710	151.9103	163.0159	162.7524	182.1838	192.5712	211.5640 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	318.0629	281.6692	300.1709	271.6025	265.0542	236.2066	227.8654	244.5239	244.1287	273.2756	288.8568	317.3459
Water heating fuel	318.0629	281.6692	300.1709	271.6025	265.0542	236.2066	227.8654	244.5239	244.1287	273.2756	288.8568	317.3459 (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	11.6773	10.5473	11.6773	11.3006	11.6773	11.3006	11.6773	11.6773	11.3006	11.6773	11.3006	11.6773 (311)
Lighting	16.7292	13.4208	12.0840	8.8532	6.8385	5.5871	6.2383	8.1088	10.5325	13.8192	15.6088	17.1942 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-2.7484	-4.8855	-9.0278	-12.7294	-15.9384	-15.7315	-15.4036	-13.2437	-9.9404	-6.3776	-3.3023	-2.2432 (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												688.1086 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3268.7625 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												6.8811 (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)												137.4910 (330a)
Total electricity for the above, kWh/year												137.4910 (331)
Electricity for lighting (calculated in Appendix L)												135.0145 (332)
Energy saving/generation technologies (Appendices M ,N and Q)												

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PV generation	-111.5718 (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	4117.8048 (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	1705.5479	0.1574	46.6719 (367)
Electrical energy for heat distribution (space & water)	6.8811	0.0000	5.6826 (372)
Overall CO2 factor for heat network			0.0633 (386)
Total CO2 associated with community systems			250.6227 (373)
Space and water heating			250.6227 (376)
Pumps, fans and electric keep-hot	137.4910	0.1387	19.0717 (378)
Energy for lighting	135.0145	0.1443	19.4868 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-111.5718	0.1305	-14.5603
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-14.5603 (380)
Total CO2, kg/year			274.6208 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.3700 (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	1705.5479	1.5826	469.3826 (467)
Electrical energy for heat distribution (space & water)	6.8811	0.0000	60.5855 (472)
Overall CO2 factor for heat network			0.6753 (486)
Total CO2 associated with community systems			2672.0275 (473)
Space and water heating			2672.0275 (476)
Pumps, fans and electric keep-hot	137.4910	1.5128	207.9964 (478)
Energy for lighting	135.0145	1.5338	207.0898 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-111.5718	1.4821	-165.3577
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-165.3577 (480)
Total Primary energy kWh/year			2921.7560 (483)
Dwelling Primary energy Rate (DPER)			57.1700 (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	51.1100 (1b)	x 2.8000 (2b)	= 143.1080 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 143.1080 (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) =	0.1398 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3898	(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) =		0.3021 (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)
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												

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Effective ac	0.3851	0.3776	0.3700	0.3323	0.3247	0.2870	0.2870	0.2794	0.3021	0.3247	0.3398	0.3549 (22b)
	0.5742	0.5713	0.5685	0.5552	0.5527	0.5412	0.5412	0.5390	0.5456	0.5527	0.5577	0.5630 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.4200	1.0000	2.4200		(26)
TER Opening Type			8.3400	1.1450	9.5496		(27)
External Wall 1	17.2200	8.3400	8.8800	0.1800	1.5984		(29a)
Corridor wall	8.4800	2.4200	6.0600	0.1800	1.0908		(29a)
External Roof 1	51.1100		51.1100	0.1100	5.6221		(30)
Total net area of external elements Aum(A, m2)			76.8100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.2809		(33)
Main dwelling							
Party Wall 1			55.2400	0.0000	0.0000		(32)

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

165.8071 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E4 Jamb	12.6000	0.0500	0.6300
E7 Party floor between dwellings (in blocks of flats)	2.7900	0.0700	0.1953
E7 Party floor between dwellings (in blocks of flats)	3.0300	0.0700	0.2121
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0200	0.0672
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)	19.7300	0.0000	0.0000
E3 Sill	1.5900	0.0500	0.0795
E14 Flat roof	9.1800	0.0800	0.7344
P4 Party wall - Roof (insulation at ceiling level)	19.7300	0.1200	2.3676

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

5.2121 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 25.4930 (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	27.1151	26.9791	26.8458	26.2197	26.1025	25.5572	25.5572	25.4562	25.7673	26.1025	26.3395	26.5873 (38)
Average = Sum(39)m / 12 =	52.6081	52.4721	52.3388	51.7127	51.5956	51.0502	51.0502	50.9492	51.2603	51.5956	51.8325	52.0803 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0293	1.0267	1.0240	1.0118	1.0095	0.9988	0.9988	0.9969	1.0029	1.0095	1.0141	1.0190 (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												1.7228 (42)
Hot water usage for mixer showers	53.1054	52.3074	51.1444	48.9193	47.2773	45.4461	44.4052	45.5594	46.8245	48.7907	51.0636	52.9020 (42a)
Hot water usage for baths	22.9603	22.6193	22.1391	21.2537	20.5908	19.8557	19.4586	19.9354	20.4546	21.2412	22.1448	22.8827 (42b)
Hot water usage for other uses	32.2734	31.0998	29.9262	28.7526	27.5790	26.4055	26.4055	27.5790	28.7526	29.9262	31.0998	32.2734 (42c)
Average daily hot water use (litres/day)												99.5887 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	108.3391	106.0265	103.2097	98.9257	95.4471	91.7072	90.2693	93.0738	96.0317	99.9581	104.3081	108.0580 (44)
Distribution loss (46)m = 0.15 x (45)m	171.5827	150.9803	158.6295	135.4243	128.4901	112.7647	109.1728	115.2448	118.4167	135.6422	148.6061	169.1927 (45)
Water storage loss (or HIU loss):	Total = Sum(45)m = 1654.1470											
Store volume	25.7374	22.6470	23.7944	20.3137	19.2735	16.9147	16.3759	17.2867	17.7625	20.3463	22.2909	25.3789 (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	22.5120	23.2624	22.5120	23.2624	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	220.8253	195.4575	207.8722	183.0785	177.7328	160.4189	158.4155	164.4875	166.0709	184.8848	196.2603	218.4354 (62)
PV diverter	-24.2776	-21.4713	-22.4835	-18.6172	-17.3506	-14.8470	-13.9167	-14.7990	-15.3613	-18.1093	-20.5156	-23.8280 (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)	196.5477	173.9862	185.3887	164.4613	160.3822	145.5719	144.4988	149.6884	150.7096	166.7755	175.7446	194.6074 (64)
Electric shower(s)	Total per year (kWh/year) = Sum(64)m = 2008.3625 (64)											
Heat gains from 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 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)											
	96.4454	85.7827	92.1385	83.1520	82.1171	75.6176	75.6941	77.7130	77.4969	84.4952	87.5349	95.6507 (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	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	78.6912	87.1224	78.6912	81.3143	78.6912	81.3143	78.6912	78.6912	81.3143	78.6912	81.3143	78.6912 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	150.1164	151.6741	147.7487	139.3918	128.8429	118.9283	112.3048	110.7470	114.6725	123.0293	133.5783	143.4928 (68)

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Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141 (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)	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126 (71)
Water heating gains (Table 5)	129.6309	127.6529	123.8420	115.4888	110.3725	105.0245	101.7394	104.4530	107.6346	113.5688	121.5762	128.5628 (72)
Total internal gains	410.2807	418.2917	402.1241	388.0372	369.7488	354.1093	341.5776	342.7335	352.4636	367.1315	388.3110	402.5891 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			

Northeast				8.3400	11.2829	0.6300	0.7000	0.7700	28.7581 (75)			

Solar gains	28.7581	58.5379	105.4668	173.2067	232.8238	248.2148	232.1999	185.1124	128.5129	71.5380	36.1851	23.4853 (83)
Total gains	439.0388	476.8296	507.5909	561.2439	602.5726	602.3241	573.7775	527.8459	480.9765	438.6695	424.4961	426.0744 (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	44.7459	44.8619	44.9762	45.5207	45.6241	46.1115	46.1115	46.2029	45.9225	45.6241	45.4155	45.1994
alpha	3.9831	3.9908	3.9984	4.0347	4.0416	4.0741	4.0741	4.0802	4.0615	4.0416	4.0277	4.0133
util living area	0.9674	0.9528	0.9234	0.8424	0.7017	0.5209	0.3862	0.4349	0.6646	0.8733	0.9475	0.9706 (86)
MIT	19.6627	19.8487	20.1438	20.5473	20.8311	20.9615	20.9910	20.9857	20.8990	20.5454	20.0586	19.6368 (87)
Th 2	20.0590	20.0612	20.0633	20.0735	20.0754	20.0843	20.0843	20.0860	20.0809	20.0754	20.0716	20.0675 (88)
util rest of house	0.9610	0.9437	0.9083	0.8129	0.6521	0.4536	0.3082	0.3524	0.5961	0.8426	0.9358	0.9648 (89)
MIT 2	18.5195	18.7537	19.1212	19.6117	19.9264	20.0586	20.0803	20.0791	20.0052	19.6221	19.0273	18.4931 (90)
Living area fraction	19.0903	19.3004	19.6318	20.0789	20.3781	20.5094	20.5351	20.5318	20.4515	20.0831	19.5423	19.0642 (91)
MIT	19.0903	19.3004	19.6318	20.0789	20.3781	20.5094	20.5351	20.5318	20.4515	20.0831	19.5423	19.0642 (92)
Temperature adjustment	19.0903	19.3004	19.6318	20.0789	20.3781	20.5094	20.5351	20.5318	20.4515	20.0831	19.5423	19.0642 (93)
adjusted MIT	19.0903	19.3004	19.6318	20.0789	20.3781	20.5094	20.5351	20.5318	20.4515	20.0831	19.5423	19.0642 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9527	0.9347	0.9003	0.8130	0.6690	0.4854	0.3469	0.3931	0.6249	0.8428	0.9278	0.9569 (94)
Useful gains	418.2575	445.6829	456.9605	456.3182	403.1249	292.3980	199.0619	207.5085	300.5435	369.7286	393.8309	407.7139 (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	778.0919	755.6211	687.3029	578.0894	447.7530	301.6787	200.8856	210.5106	325.5789	489.2856	644.9137	774.1305 (97)
Space heating kWh	267.7168	208.2784	171.3748	87.6753	33.2034	0.0000	0.0000	0.0000	0.0000	88.9504	180.7797	272.6139 (98a)
Space heating requirement - total per year (kWh/year)												1310.5925
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	267.7168	208.2784	171.3748	87.6753	33.2034	0.0000	0.0000	0.0000	0.0000	88.9504	180.7797	272.6139 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1310.5925
Space heating per m2										(98c) / (4) =		25.6426 (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	267.7168	208.2784	171.3748	87.6753	33.2034	0.0000	0.0000	0.0000	0.0000	88.9504	180.7797	272.6139 (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)	290.0507	225.6538	185.6715	94.9894	35.9733	0.0000	0.0000	0.0000	0.0000	96.3709	195.8609	295.3563 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	196.5477	173.9862	185.3887	164.4613	160.3822	145.5719	144.4988	149.6884	150.7096	166.7755	175.7446	194.6074 (64)
Efficiency of water heater (217)m	84.7533	84.4643	83.8839	82.7151	81.2117	79.8000	79.8000	79.8000	79.8000	82.7160	84.1232	79.8000 (216)
Fuel for water heating, kWh/month	231.9056	205.9880	221.0063	198.8286	197.4865	182.4209	181.0762	187.5795	188.8592	201.6242	208.9134	229.4474 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	16.3505	13.1170	11.8104	8.6528	6.6837	5.4606	6.0971	7.9252	10.2940	13.5063	15.2554	16.8049 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-6.8137	-10.5194	-16.5414	-20.4069	-23.6586	-22.7086	-22.4424	-20.3532	-16.9887	-12.7878	-7.8103	-5.7899 (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)

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Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-1.5013	-3.2863	-6.7783	-10.5546	-14.3295	-14.5298	-11.9698	-8.5469	-4.8092	-2.0389	-1.1774	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1											1419.9269	(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											2435.1357	(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)											131.9578	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											-280.6933	(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											3792.3270	(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	1419.9269	0.2100	298.1846	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2435.1357	0.2100	511.3785	(264)
Space and water heating			809.5631	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	131.9578	0.1443	19.0456	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-186.8209	0.1327	-24.7963	
PV Unit electricity exported	-93.8724	0.1249	-11.7222	
Total			-36.5184	(269)
Total CO2, kg/year			804.0196	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.7300	(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	1419.9269	1.1300	1604.5174	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2435.1357	1.1300	2751.7034	(278)
Space and water heating			4356.2207	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	131.9578	1.5338	202.4012	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-186.8209	1.4904	-278.4437	
PV Unit electricity exported	-93.8724	0.4583	-43.0237	
Total			-321.4674	(283)
Total Primary energy kWh/year			4367.2554	(286)
Target Primary Energy Rate (TPER)			85.4500	(287)

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Plot Reference	A 906				Issued on Date	19/03/2026	
Assessment Reference	Be Green			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	82 B	DER	5.37	TER	15.73		
Environmental	96 A	% DER < TER				65.86	
CO ₂ Emissions (t/year)	0.25	DFEE	31.16	TFEE	33.93		
Compliance Check	See BREL	% DFEE < TFEE				8.15	
% DPER < TPER	33.10	DPER	57.17	TPER	85.45		
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	51.1100 (1b)	2.8000 (2b)	143.1080 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1100		143.1080 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 143.1080 (5)

2. Ventilation rate

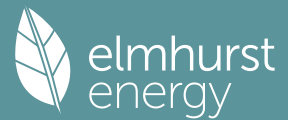
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1398 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2898 (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) = 0.2246 (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	0.2863	0.2807	0.2751	0.2470	0.2414	0.2133	0.2133	0.2077	0.2246	0.2414	0.2526	0.2639 (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	0.5410	0.5394	0.5378	0.5305	0.5291	0.5228	0.5228	0.5216	0.5252	0.5291	0.5319	0.5348 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.4200	1.0000	2.4200		(26)
Window			8.3400	1.1450	9.5496		(27)
External Wall 1	17.2200	8.3400	8.8800	0.1500	1.3320	70.0000	621.6000 (29a)
Corridor wall	8.4800	2.4200	6.0600	0.1900	1.1514	70.0000	424.2000 (29a)
External Roof 1	51.1100		51.1100	0.1000	5.1110	9.0000	459.9900 (30)
Total net area of external elements A _{um} (A, m ²)			76.8100				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 19.5640		(33)
Main dwelling							
Party Wall 1			55.2400	0.0000	0.0000	70.0000	3866.8001 (32)
Party Floor 1			51.1100			40.0000	2044.4000 (32a)
Internal Wall 1			117.4900			9.0000	1057.4100 (32c)
Heat capacity C _m = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	8474.4000 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							165.8071 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					5.0800	0.0500	0.2540
E4 Jamb					12.6000	0.0400	0.5040

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E7 Party floor between dwellings (in blocks of flats)	2.7900	0.0500	0.1395
E7 Party floor between dwellings (in blocks of flats)	3.0300	0.0390	0.1182
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0500	0.1680
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E25 Staggered party wall between dwellings	5.6000	0.0390	0.2184
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	19.7300	0.0000	0.0000
E3 Sill	1.5900	0.0400	0.0636
E14 Flat roof	9.1800	0.0500	0.4590
P4 Party wall - Roof (insulation at ceiling level)	19.7300	0.0500	0.9865
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.1912 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	22.7552 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	25.5485	25.4733	25.3997	25.0536	24.9889	24.6875	24.6875	24.6316	24.8035	24.9889	25.1198	25.2568 (38)
Average = Sum(39)m / 12 =	48.3037	48.2285	48.1548	47.8088	47.7440	47.4426	47.4426	47.3868	47.5587	47.7440	47.8750	48.0120 (39)
												47.8085
HLP (average)	0.9451	0.9436	0.9422	0.9354	0.9341	0.9282	0.9282	0.9272	0.9305	0.9341	0.9367	0.9394 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

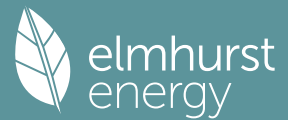
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7228 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	22.4485	22.1096	21.6275	20.9056	20.2549	19.3592	18.6797	19.5107	19.9467	20.8342	21.7569	22.4307 (42b)
Hot water usage for other uses	32.2734	31.0998	29.9262	28.7526	27.5790	26.4055	26.4055	27.5790	28.7526	29.9262	31.0998	32.2734 (42c)
Average daily hot water use (litres/day)												50.1545 (43)
Daily hot water use	54.7218	53.2094	51.5537	49.6582	47.8340	45.7647	45.0852	47.0897	48.6994	50.7604	52.8567	54.7040 (44)
Energy content (annual)	80.5600	70.4068	73.6692	64.8660	61.6389	52.9254	49.8205	55.4254	56.4888	65.4099	71.4376	80.3368 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (62)
Total heat required for water heating calculated for each month	68.4760	59.8457	62.6188	55.1361	52.3931	44.9866	42.3474	47.1116	48.0155	55.5984	60.7220	68.2863 (63a)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64)
Output from w/h	68.4760	59.8457	62.6188	55.1361	52.3931	44.9866	42.3474	47.1116	48.0155	55.5984	60.7220	68.2863 (64)
12Total per year (kWh/year)												665.5375 (64)
Electric shower(s)	42.5286	37.8933	41.3781	39.4866	40.2275	38.3732	39.6523	40.2275	39.4866	41.3781	40.6000	42.5286 (64a)
Heat gains from water heating, kWh/month	27.7511	24.4348	25.9992	23.6557	23.1552	20.8399	20.4999	21.8348	21.8755	24.2441	25.3305	27.7037 (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	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.6912	87.1224	78.6912	81.3143	78.6912	81.3143	78.6912	78.6912	81.3143	78.6912	81.3143	78.6912 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	150.1164	151.6741	147.7487	139.3918	128.8429	118.9283	112.3048	110.7470	114.6725	123.0293	133.5783	143.4928 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141 (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)	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126 (71)
Water heating gains (Table 5)	37.2999	36.3613	34.9452	32.8551	31.1225	28.9444	27.5537	29.3478	30.3827	32.5862	35.1812	37.2362 (72)
Total internal gains	314.9498	324.0000	310.2273	302.4034	287.4988	278.0292	267.3919	267.6283	275.2117	283.1490	298.9160	308.2625 (73)

6. Solar gains												
[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Northeast	8.3400	11.2829	0.3500	0.7000	0.7700	15.9767 (75)						
Solar gains	15.9767	32.5211	58.5926	96.2260	129.3466	137.8971	128.9999	102.8402	71.3961	39.7433	20.1029	13.0474 (83)
Total gains	330.9265	356.5211	368.8200	398.6294	416.8454	415.9263	396.3918	370.4686	346.6077	322.8923	319.0189	321.3099 (84)

7. Mean internal temperature (heating season)

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Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	48.7333	48.8093	48.8840	49.2378	49.3046	49.6178	49.6178	49.6763	49.4967	49.3046	49.1697	49.0295
alpha	4.2489	4.2540	4.2589	4.2825	4.2870	4.3079	4.3079	4.3118	4.2998	4.2870	4.2780	4.2686
util living area	0.9865	0.9799	0.9677	0.9266	0.8355	0.6674	0.5103	0.5622	0.7885	0.9384	0.9771	0.9881 (86)
MIT	19.5538	19.7132	19.9713	20.3687	20.7109	20.9213	20.9805	20.9707	20.8341	20.4155	19.9323	19.5248 (87)
Th 2	20.1293	20.1306	20.1318	20.1375	20.1386	20.1436	20.1436	20.1445	20.1416	20.1386	20.1364	20.1342 (88)
util rest of house	0.9836	0.9757	0.9605	0.9094	0.7968	0.5969	0.4180	0.4683	0.7285	0.9205	0.9715	0.9856 (89)
MIT 2	18.8070	18.9656	19.2210	19.6099	19.9249	20.0990	20.1362	20.1325	20.0364	19.6608	19.1881	18.7819 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.1799	19.3389	19.5957	19.9888	20.3174	20.5096	20.5578	20.5510	20.4347	20.0376	19.5597	19.1528 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.1799	19.3389	19.5957	19.9888	20.3174	20.5096	20.5578	20.5510	20.4347	20.0376	19.5597	19.1528 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9797	0.9708	0.9550	0.9060	0.8055	0.6283	0.4635	0.5141	0.7505	0.9180	0.9668	0.9819 (94)
Useful gains	324.1962	346.1276	352.2412	361.1525	335.7747	261.3085	183.7373	190.4686	260.1344	296.4158	308.4274	315.4868 (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	718.7529	696.3667	630.6196	530.1414	411.4272	280.3665	187.7668	196.7041	301.2705	450.5899	596.5092	717.9142 (97)
Space heating kWh	293.5501	235.3607	207.1135	121.6720	56.2855	0.0000	0.0000	0.0000	0.0000	114.7056	207.4189	299.4060 (98a)
Space heating requirement - total per year (kWh/year)	1535.5123											
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	293.5501	235.3607	207.1135	121.6720	56.2855	0.0000	0.0000	0.0000	0.0000	114.7056	207.4189	299.4060 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1535.5123											
Space heating per m2	(98c) / (4) = 30.0433 (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	445.9608	351.0755	360.1399	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8205	0.8872	0.8570	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	365.9315	311.4592	308.6314	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	456.0289	434.9075	406.0312	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	64.8701	91.8456	72.4654	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	16.2175	22.9614	18.1164	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	57.2953 (107)											
Energy for space heating	30.0433 (99)											
Energy for space cooling	1.1210 (108)											
Total	31.1643 (109)											
Fabric Energy Efficiency (DFEE)	31.2 (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	51.1100 (1b)	x 2.8000 (2b)	= 143.1080 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	143.1080 (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)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1398 (8)
Pressure test	Yes

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Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
5.0000 (17)
0.3898 (18)
3 (19)

Shelter factor

(20) = 1 - [0.075 x (19)] = 0.7750 (20)
(21) = (18) x (20) = 0.3021 (21)

Infiltration rate adjusted to include shelter factor

Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.3851	0.3776	0.3700	0.3323	0.3247	0.2870	0.2870	0.2794	0.3021	0.3247	0.3398	0.3549	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5742	0.5713	0.5685	0.5552	0.5527	0.5412	0.5412	0.5390	0.5456	0.5527	0.5577	0.5630	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.4200	1.0000	2.4200		(26)
TER Opening Type			8.3400	1.1450	9.5496		(27)
External Wall 1	17.2200		8.8800	0.1800	1.5984		(29a)
Corridor wall	8.4800	2.4200	6.0600	0.1800	1.0908		(29a)
External Roof 1	51.1100		51.1100	0.1100	5.6221		(30)
Total net area of external elements Aum (A, m2)			76.8100				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 20.2809		(33)
Main dwelling							
Party Wall 1			55.2400	0.0000	0.0000		(32)

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

165.8071 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E4 Jamb	12.6000	0.0500	0.6300
E7 Party floor between dwellings (in blocks of flats)	2.7900	0.0700	0.1953
E7 Party floor between dwellings (in blocks of flats)	3.0300	0.0700	0.2121
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0200	0.0672
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)	19.7300	0.0000	0.0000
E3 Sill	1.5900	0.0500	0.0795
E14 Flat roof	9.1800	0.0800	0.7344
P4 Party wall - Roof (insulation at ceiling level)	19.7300	0.1200	2.3676
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2121 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	25.4930 (37)

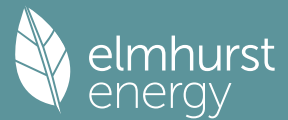
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan 27.1151	Feb 26.9791	Mar 26.8458	Apr 26.2197	May 26.1025	Jun 25.5572	Jul 25.5572	Aug 25.4562	Sep 25.7673	Oct 26.1025	Nov 26.3395	Dec 26.5873	(38)
Heat transfer coeff	52.6081	52.4721	52.3388	51.7127	51.5956	51.0502	51.0502	50.9492	51.2603	51.5956	51.8325	52.0803	(39)
Average = Sum(39)m / 12 =												51.7121	
HLP	Jan 1.0293	Feb 1.0267	Mar 1.0240	Apr 1.0118	May 1.0095	Jun 0.9988	Jul 0.9988	Aug 0.9969	Sep 1.0029	Oct 1.0095	Nov 1.0141	Dec 1.0190	(40)
HLP (average)												1.0118	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7228 (42)
Hot water usage for mixer showers													(42a)
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	
Hot water usage for baths	22.9603	22.6193	22.1391	21.2537	20.5908	19.8557	19.4586	19.9354	20.4546	21.2412	22.1448	22.8827	(42b)
Hot water usage for other uses	32.2734	31.0998	29.9262	28.7526	27.5790	26.4055	26.4055	27.5790	28.7526	29.9262	31.0998	32.2734	(42c)
Average daily hot water use (litres/day)												50.6272	(43)
Daily hot water use	Jan 55.2337	Feb 53.7191	Mar 52.0653	Apr 50.0064	May 48.1698	Jun 46.2611	Jul 45.8640	Aug 47.5145	Sep 49.2072	Oct 51.1674	Nov 53.2446	Dec 55.1560	(44)
Energy conte	87.4766	76.4953	80.0225	68.4562	64.8458	56.8835	55.4686	58.8328	60.6774	69.4337	75.8567	86.3610	(45)
Energy content (annual)										Total = Sum(45)m =		840.8101	
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	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	74.3551	65.0210	68.0191	58.1878	55.1190	48.3509	47.1483	50.0079	51.5758	59.0186	64.4782	73.4069	(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	74.3551	65.0210	68.0191	58.1878	55.1190	48.3509	47.1483	50.0079	51.5758	59.0186	64.4782	73.4069	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		714.6885	(64)
Electric shower(s)	42.5286	37.8933	41.3781	39.4866	40.2275	38.3732	39.6523	40.2275	39.4866	41.3781	40.6000	42.5286	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												483.7604	(64a)
Heat gains from water heating, kWh/month	29.2209	25.7286	27.3493	24.4186	23.8366	21.6810	21.7001	22.5589	22.7656	25.0992	26.2695	28.9839	(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	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408	86.1408 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.6912	87.1224	78.6912	81.3143	78.6912	81.3143	78.6912	78.6912	81.3143	78.6912	81.3143	78.6912 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	150.1164	151.6741	147.7487	139.3918	128.8429	118.9283	112.3048	110.7470	114.6725	123.0293	133.5783	143.4928 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141	31.6141 (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)	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126	-68.9126 (71)
Water heating gains (Table 5)	39.2754	38.2866	36.7598	33.9147	32.0385	30.1125	29.1669	30.3210	31.6189	33.7354	36.4855	38.9568 (72)
Total internal gains	316.9253	325.9254	312.0419	303.4631	288.4148	279.1973	269.0051	268.6015	276.4479	284.2982	300.2203	309.9831 (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	8.3400		11.2829		0.6300		0.7000		0.7700		28.7581 (75)	
Solar gains	28.7581	58.5379	105.4668	173.2067	232.8238	248.2148	232.1999	185.1124	128.5129	71.5380	36.1851	23.4853 (83)
Total gains	345.6834	384.4633	417.5087	476.6698	521.2386	527.4122	501.2050	453.7140	404.9608	355.8362	336.4054	333.4684 (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	44.7459	44.8619	44.9762	45.5207	45.6241	46.1115	46.1115	46.2029	45.9225	45.6241	45.4155	45.1994
alpha	3.9831	3.9908	3.9984	4.0347	4.0416	4.0741	4.0741	4.0802	4.0615	4.0416	4.0277	4.0133
util living area	0.9851	0.9760	0.9566	0.8935	0.7672	0.5827	0.4386	0.4991	0.7448	0.9267	0.9746	0.9870 (86)
MIT	19.4146	19.6154	19.9391	20.4085	20.7632	20.9425	20.9858	20.9764	20.8454	20.3874	19.8386	19.3874 (87)
Th 2	20.0590	20.0612	20.0633	20.0735	20.0754	20.0843	20.0843	20.0860	20.0809	20.0754	20.0716	20.0675 (88)
util rest of house	0.9819	0.9709	0.9469	0.8702	0.7204	0.5112	0.3515	0.4072	0.6785	0.9056	0.9683	0.9842 (89)
MIT 2	18.6162	18.8160	19.1353	19.5910	19.9077	20.0535	20.0793	20.0769	19.9864	19.5819	19.0463	18.5957 (90)
Living area fraction	19.0149	19.2152	19.5367	19.9992	20.3348	20.4974	20.5319	20.5261	20.4154	19.9841	19.4419	18.9910 (91)
MIT	19.0149	19.2152	19.5367	19.9992	20.3348	20.4974	20.5319	20.5261	20.4154	19.9841	19.4419	18.9910 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0149	19.2152	19.5367	19.9992	20.3348	20.4974	20.5319	20.5261	20.4154	19.9841	19.4419	18.9910 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9773	0.9651	0.9404	0.8681	0.7343	0.5443	0.3947	0.4523	0.7041	0.9032	0.9629	0.9800 (94)
Useful gains	337.8301	371.0280	392.6409	413.8044	382.7555	287.0895	197.8036	205.2313	285.1475	321.3758	323.9302	326.8004 (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	774.1222	751.1472	682.3235	573.9693	445.5198	301.0623	200.7243	210.2197	323.7266	484.1780	639.7127	770.3203 (97)
Space heating kWh	324.6013	255.4401	215.5239	115.3187	46.6966	0.0000	0.0000	0.0000	0.0000	121.1249	227.3634	329.9788 (98a)
Space heating requirement - total per year (kWh/year)												1636.0477
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	324.6013	255.4401	215.5239	115.3187	46.6966	0.0000	0.0000	0.0000	0.0000	121.1249	227.3634	329.9788 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1636.0477
Space heating per m ²										(98c) / (4) =		32.0103 (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	479.8720	377.7716	387.2141	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8741	0.9232	0.8924	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	419.4724	348.7523	345.5612	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	586.1399	557.1441	503.1667	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	120.0006	155.0434	117.2585	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	30.0002	38.7609	29.3146	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												98.0756 (107)
Energy for space heating												32.0103 (99)
Energy for space cooling												1.9189 (108)
Total												33.9292 (109)
Fabric Energy Efficiency (TFEE)												33.9 (109)

