

Summary for Input Data

Plot Reference	A 508	Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	82 B	DER	5.17	TER	14.42
Environmental	96 A	% DER < TER			64.15
CO ₂ Emissions (t/year)	0.3	DFEE	33.83	TFEE	36.23
Compliance Check	See BREL	% DFEE < TFEE			6.62
% DPER < TPER	28.91	DPER	54.79	TPER	77.07

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	5	
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	155.36	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:	18.26 m	64.72 m ²	2.80 m

8.0 Living Area	33.09	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	28.22	18.51	0.00	None	9.71	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	22.89	20.47	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	41.69	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	137.37

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	64.72	64.72	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	64.73

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door Window	Manufacturer	Door to Corridor Window	Double Low-E Soft 0.1			0.00			1.00
	Manufacturer	Window				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	
Windows	Window	External Wall 1	North East	9.71	

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate	Independently assessed	5.99	0.05	0.05	No
E3 Sill	Independently assessed	2.50	0.04	0.04	No
E4 Jamb	Independently assessed	15.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	6.72	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	8.18	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	3.36	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.05	0.05	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	2.80	0.00	0.00	No
E18 Party wall between dwellings	Independently assessed	5.60	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
E25 Staggered party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	14.89	0.00	0.00	No
E16 Corner (normal)	Independently assessed	2.80	0.04	0.04	No
E14 Flat roof	Independently assessed	18.26	0.05	0.05	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	14.89	0.05	0.05	No

Y-value 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

Summary for Input Data

Number of intermittent extract fans

Number of passive vents

Number of flueless gas fires

21.0 Fixed Cooling System

22.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Test Method

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	75.00	15.00	1125.00	6

24.0 Main Heating 1

25.0 Main Heating 2

26.0 Heat Networks

Space Community Heating

Distribution Loss

Distribution Loss Value

SAP Code

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	Heat pump	Electricity	Space and Water	232.00	100.00					
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating

28.0 Water Heating

Water Heating

SAP Code

Flue Gas Heat Recovery System

Waste Water Heat Recovery Instantaneous System 1

Waste Water Heat Recovery Instantaneous System 2

Waste Water Heat Recovery Storage System

Solar Panel

Water use <= 125 litres/person/day

Cold Water Source

Bath Count

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	8.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Insulation Type

Cylinder Volume L

Loss kWh/day

32.0 Photovoltaic Unit

Export Capable Meter?

Connected To Dwelling

Summary for Input Data



Diverter

No

Battery Capacity [kWh]

0.00

PV Cells kWp

Orientation

Elevation

Overshading

FGHRS

MCS Certificate

**Overshading
Factor**

**MCS
Certificate
Reference**

**Panel
Manufacturer**

0.31

South East

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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% DPER < TPER	28.91	DPER	54.79	TPER	77.07		
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	64.7200 (1b)	2.8000 (2b)	181.2160 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.7200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	181.2160 (5)

2. Ventilation rate

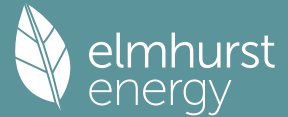
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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			9.7100	1.1450	11.1183		(27)
External Wall 1	28.2200	9.7100	18.5100	0.1500	2.7765	70.0000	1295.7000 (29a)
Corridor wall	22.8900	2.4200	20.4700	0.1900	3.8893	70.0000	1432.9000 (29a)
External Roof 1	64.7200		64.7200	0.1000	6.4720	9.0000	582.4800 (30)
Total net area of external elements Aum(A, m ²)			115.8300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.6761		(33)
Main dwelling							
Party Wall 1			41.6900	0.0000	0.0000	70.0000	2918.2999 (32)
Party Floor 1			64.7300			40.0000	2589.2000 (32d)
Internal Wall 1			137.3700			9.0000	1236.3300 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10054.9098 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							155.3602 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.9900	0.0500	0.2995
E3 Sill	2.5000	0.0400	0.1000
E4 Jamb	15.6000	0.0400	0.6240
E7 Party floor between dwellings (in blocks of flats)	6.7200	0.0500	0.3360
E7 Party floor between dwellings (in blocks of flats)	8.1800	0.0390	0.3190
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0500	0.1680
E16 Corner (normal)	2.8000	0.0500	0.1400
E17 Corner (inverted - internal area greater than external area)	2.8000	0.0000	0.0000
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E18 Party wall between dwellings	2.8000	0.0390	0.1092
E25 Staggered party wall between dwellings	2.8000	0.0390	0.1092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.8900	0.0000	0.0000
E16 Corner (normal)	2.8000	0.0390	0.1092
E14 Flat roof	18.2600	0.0500	0.9130
P4 Party wall - Roof (insulation at ceiling level)	14.8900	0.0500	0.7445
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.2516 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.9277 (37)

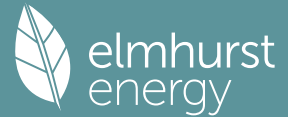
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	14.5448	14.3710	14.1972	13.3282	13.1544	12.2854	12.2854	12.1116	12.6330	13.1544	13.5020	13.8496 (38)
Average = Sum(39)m / 12 =	45.4725	45.2987	45.1249	44.2560	44.0822	43.2132	43.2132	43.0394	43.5608	44.0822	44.4297	44.2125 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7026	0.6999	0.6972	0.6838	0.6811	0.6677	0.6677	0.6650	0.6731	0.6811	0.6865	0.6919 (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												2.1115 (42)
Hot water usage for mixer showers	58.1157	57.2259	55.9147	53.8975	52.0903	49.5618	47.5620	49.8999	51.0758	53.5801	56.1880	58.0633 (42a)
Hot water usage for baths	25.1893	24.8081	24.2672	23.4571	22.7271	21.7221	20.9596	21.8920	22.3813	23.3771	24.4124	25.1684 (42b)
Hot water usage for other uses	36.2536	34.9353	33.6169	32.2986	30.9803	29.6620	29.6620	30.9803	32.2986	33.6169	34.9353	36.2536 (42c)
Average daily hot water use (litres/day)												109.8915 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	119.5576	116.9693	113.7988	109.6533	105.7976	100.9459	98.1836	102.7722	105.7557	110.5741	115.5357	119.4852 (44)
Energy content (annual)	176.0094	154.7740	162.6162	143.2346	136.3310	116.7406	108.4958	120.9648	122.6713	142.4859	156.1504	175.4728 (45)
Distribution loss (46)m = 0.15 x (45)m	26.4014	23.2161	24.3924	21.4852	20.4496	17.5111	16.2744	18.1447	18.4007	21.3729	23.4226	26.3209 (46)
Water storage loss (or HIU loss):												110.0000 (47)
Store volume												0.0152 (51)
b) If manufacturer declared loss factor is not known :												1.0294 (52)
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.6000 (53)
Volume factor from Table 2a												1.0327 (55)
Temperature factor from Table 2b												
Enter (49) or (54) in (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	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	231.2862	204.7015	217.8930	196.7283	191.6078	170.2343	163.7726	176.2416	176.1650	197.7627	209.6440	230.7496 (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	231.2862	204.7015	217.8930	196.7283	191.6078	170.2343	163.7726	176.2416	176.1650	197.7627	209.6440	230.7496 (64)
12Total per year (kWh/year)												2366.7866 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	102.7446	91.4043	98.2913	90.4205	89.5515	81.6112	80.2963	84.4422	83.5832	91.5980	94.7149	102.5661 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	98.4615	109.0110	98.4615	101.7436	98.4615	101.7436	98.4615	98.4615	101.7436	98.4615	101.7436	98.4615 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	184.6751	186.5915	181.7623	171.4817	158.5042	146.3072	138.1588	136.2425	141.0716	151.3523	164.3298	176.5268 (68)
Pumps, fans	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588 (71)
Total internal gains	138.0976	136.0183	132.1120	125.5840	120.3649	113.3489	107.9251	113.4976	116.0877	123.1156	131.5485	137.8577 (72)
	475.9063	486.2929	467.0079	453.4813	432.0027	416.0717	399.2175	402.8737	413.5750	427.6014	452.2939	467.5181 (73)

6. Solar gains												
[Jan]	Area	Solar flux	g	FF	Access	Gains						

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				m2	Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W
Northeast				9.7100	11.2829	0.3500		0.7000		0.7700		18.6012 (75)
Solar gains	18.6012	37.8633	68.2176	112.0329	150.5941	160.5493	150.1906	119.7337	83.1242	46.2719	23.4051	15.1907 (83)
Total gains	494.5075	524.1561	535.2255	565.5141	582.5968	576.6210	549.4081	522.6073	496.6991	473.8734	475.6990	482.7088 (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	61.4224	61.6580	61.8955	63.1108	63.3597	64.6338	64.6338	64.8948	64.1180	63.3597	62.8640	62.3760
alpha	5.0948	5.1105	5.1264	5.2074	5.2240	5.3089	5.3089	5.3263	5.2745	5.2240	5.1909	5.1584
util living area	0.9577	0.9400	0.9082	0.8152	0.6662	0.4745	0.3453	0.3775	0.5875	0.8251	0.9260	0.9611 (86)
MIT	20.2355	20.3667	20.5494	20.7996	20.9413	20.9921	20.9988	20.9981	20.9764	20.8185	20.5242	20.2264 (87)
Th 2	20.3385	20.3409	20.3433	20.3552	20.3575	20.3695	20.3695	20.3718	20.3647	20.3575	20.3528	20.3480 (88)
util rest of house	0.9509	0.9308	0.8941	0.7898	0.6284	0.4295	0.2962	0.3265	0.5387	0.7961	0.9134	0.9549 (89)
MIT 2	19.4494	19.6141	19.8408	20.1470	20.3038	20.3637	20.3688	20.3708	20.3462	20.1749	19.8206	19.4455 (90)
Living area fraction	fLA = Living area / (4) = 0.5113 (91)											
MIT	19.8513	19.9989	20.2031	20.4807	20.6297	20.6850	20.6909	20.6915	20.6684	20.5039	20.1803	19.8448 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.8513	19.9989	20.2031	20.4807	20.6297	20.6850	20.6909	20.6915	20.6684	20.5039	20.1803	19.8448 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9452	0.9253	0.8908	0.7950	0.6447	0.4522	0.3212	0.3525	0.5623	0.8031	0.9097	0.9494 (94)
Useful gains	467.4075	485.0257	476.7547	449.5685	375.6018	260.7217	176.4900	184.2351	279.2957	380.5515	432.7316	458.2618 (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	707.1577	683.9602	618.3510	512.5141	393.6410	262.9507	176.7816	184.7048	286.1232	436.5866	581.1559	700.5312 (97)
Space heating kWh	178.3741	133.6840	105.3477	45.3208	13.4212	0.0000	0.0000	0.0000	0.0000	41.6901	106.8655	180.2484 (98a)
Space heating requirement - total per year (kWh/year)												804.9518
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	178.3741	133.6840	105.3477	45.3208	13.4212	0.0000	0.0000	0.0000	0.0000	41.6901	106.8655	180.2484 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												804.9518
Space heating per m2	(98c) / (4) = 12.4375 (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												
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50	178.3741	133.6840	105.3477	45.3208	13.4212	0.0000	0.0000	0.0000	0.0000	41.6901	106.8655	180.2484 (98)
307a	267.5612	200.5260	158.0216	67.9812	20.1317	0.0000	0.0000	0.0000	0.0000	62.5352	160.2982	270.3727
Space heating requirement	267.5612	200.5260	158.0216	67.9812	20.1317	0.0000	0.0000	0.0000	0.0000	62.5352	160.2982	270.3727 (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												
	231.2862	204.7015	217.8930	196.7283	191.6078	170.2343	163.7726	176.2416	176.1650	197.7627	209.6440	230.7496 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50	346.9294	307.0522	326.8395	295.0925	287.4116	255.3514	245.6589	264.3624	264.2475	296.6440	314.4661	346.1244
310a	346.9294	307.0522	326.8395	295.0925	287.4116	255.3514	245.6589	264.3624	264.2475	296.6440	314.4661	346.1244
Water heating fuel	346.9294	307.0522	326.8395	295.0925	287.4116	255.3514	245.6589	264.3624	264.2475	296.6440	314.4661	346.1244 (310)
Cooling System Energy Efficiency Ratio	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	14.7869	13.3559	14.7869	14.3099	14.7869	14.3099	14.7869	14.7869	14.3099	14.7869	14.3099	14.7869 (331)
Lighting	21.3938	17.1629	15.4533	11.3217	8.7452	7.1449	7.9777	10.3697	13.4692	17.6724	19.9609	21.9884 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-3.4052	-6.0506	-11.1745	-15.7454	-19.7016	-19.4388	-19.0330	-16.3708	-12.2959	-7.8953	-4.0907	-2.7794 (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	1207.4277 (307)											
Space heating fuel - secondary	0.0000 (309)											
Water heating fuel - community heating	3550.1798 (310)											
Efficiency of water heater	0.0000 (311)											
Electricity used for heat distribution	12.0743 (313)											
Space cooling fuel	0.0000 (321)											
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7875)												174.1033 (330a)
mechanical ventilation fans (SFP = 0.7875)												

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Total electricity for the above, kWh/year	174.1033 (331)
Electricity for lighting (calculated in Appendix L)	172.6603 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-137.9811 (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	4966.3900 (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	2050.6929	0.1566	81.4798 (367)
Electrical energy for heat distribution (space & water)	12.0743	0.0000	6.8886 (372)
Overall CO2 factor for heat network			0.0639 (386)
Total CO2 associated with community systems			303.8098 (373)
Space and water heating			303.8098 (376)
Pumps, fans and electric keep-hot	174.1033	0.1387	24.1503 (378)
Energy for lighting	172.6603	0.1443	24.9202 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-137.9811	0.1305	-18.0085
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-18.0085 (380)
Total CO2, kg/year			334.8719 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.1700 (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	2050.6929	1.5796	822.0996 (467)
Electrical energy for heat distribution (space & water)	12.0743	0.0000	73.0560 (472)
Overall CO2 factor for heat network			0.6772 (486)
Total CO2 associated with community systems			3222.0199 (473)
Space and water heating			3222.0199 (476)
Pumps, fans and electric keep-hot	174.1033	1.5128	263.3834 (478)
Energy for lighting	172.6603	1.5338	264.8322 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-137.9811	1.4821	-204.5045
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-204.5045 (480)
Total Primary energy kWh/year			3545.7310 (483)
Dwelling Primary energy Rate (DPER)			54.7900 (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	64.7200 (1b)	2.8000 (2b)	181.2160 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.7200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	181.2160 (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) = 0.1104 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3604 (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) = 0.2793 (21)

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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													
Effective ac	0.3561	0.3491	0.3421	0.3072	0.3002	0.2653	0.2653	0.2583	0.2793	0.3002	0.3142	0.3282	(22b)
	0.5634	0.5609	0.5585	0.5472	0.5451	0.5352	0.5352	0.5334	0.5390	0.5451	0.5494	0.5538	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.4200	1.0000	2.4200		(26)
TER Opening Type			9.7100	1.1450	11.1183		(27)
External Wall 1	28.2200	9.7100	18.5100	0.1800	3.3318		(29a)
Corridor wall	22.8900	2.4200	20.4700	0.1800	3.6846		(29a)
External Roof 1	64.7200		64.7200	0.1100	7.1192		(30)
Total net area of external elements Aum(A, m2)			115.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.6739	(33)
Main dwelling							
Party Wall 1			41.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							155.3602 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.9900	0.0500	0.2995
E3 Sill	2.5000	0.0500	0.1250
E4 Jamb	15.6000	0.0500	0.7800
E7 Party floor between dwellings (in blocks of flats)	6.7200	0.0700	0.4704
E7 Party floor between dwellings (in blocks of flats)	8.1800	0.0700	0.5726
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0200	0.0672
E16 Corner (normal)	2.8000	0.0900	0.2520
E17 Corner (inverted - internal area greater than external area)	2.8000	-0.0900	-0.2520
E18 Party wall between dwellings	5.6000	0.0600	0.3360
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.8900	0.0000	0.0000
E16 Corner (normal)	2.8000	0.0900	0.2520
E14 Flat roof	18.2600	0.0800	1.4608
P4 Party wall - Roof (insulation at ceiling level)	14.8900	0.1200	1.7868
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.4863 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	34.1602 (37)

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

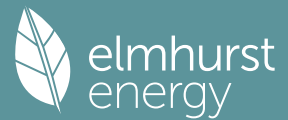
(38)m	Jan 33.6920	Feb 33.5447	Mar 33.4004	Apr 32.7226	May 32.5958	Jun 32.0055	Jul 32.0055	Aug 31.8961	Sep 32.2329	Oct 32.5958	Nov 32.8524	Dec 33.1206	(38)
Heat transfer coeff	67.8522	67.7050	67.5607	66.8829	66.7560	66.1657	66.1657	66.0564	66.3931	66.7560	67.0126	67.2808	(39)
Average = Sum(39)m / 12 =												66.8822	
HLP	Jan 1.0484	Feb 1.0461	Mar 1.0439	Apr 1.0334	May 1.0315	Jun 1.0223	Jul 1.0223	Aug 1.0206	Sep 1.0259	Oct 1.0315	Nov 1.0354	Dec 1.0396	(40)
HLP (average)												1.0334	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1115 (42)
Hot water usage for mixer showers	59.6220	58.7260	57.4204	54.9222	53.0787	51.0228	49.8542	51.1500	52.5704	54.7778	57.3296	59.3936	(42a)
Hot water usage for baths	25.7627	25.3800	24.8412	23.8478	23.1039	22.2791	21.8335	22.3686	22.9511	23.8337	24.8476	25.6756	(42b)
Hot water usage for other uses	36.2536	34.9353	33.6169	32.2986	30.9803	29.6620	29.6620	30.9803	32.2986	33.6169	34.9353	36.2536	(42c)
Average daily hot water use (litres/day)												111.8133	(43)
Daily hot water use	Jan 121.6383	Feb 119.0413	Mar 115.8786	Apr 111.0687	May 107.1629	Jun 102.9639	Jul 101.3497	Aug 104.4988	Sep 107.8201	Oct 112.2285	Nov 117.1125	Dec 121.3227	(44)
Energy conte	192.6453	169.5133	178.1010	152.0475	144.2619	126.6061	122.5737	129.3914	132.9530	152.2930	166.8482	189.9621	(45)
Energy content (annual)										Total = Sum(45)m =		1857.1962	
Distribution loss (46)m = 0.15 x (45)m	28.8968	25.4270	26.7152	22.8071	21.6393	18.9909	18.3861	19.4087	19.9429	22.8439	25.0272	28.4943	(46)
Water storage loss (or HIU loss):													
Store volume												180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5520	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8381	(55)
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	241.8879	213.9905	227.3437	199.7017	193.5046	174.2603	171.8164	178.6341	180.6072	201.5356	214.5024	239.2047	(62)
WWHRS	-27.2567	-24.1061	-25.2425	-20.9018	-19.4797	-16.6689	-15.6244	-16.6150	-17.2463	-20.3315	-23.0331	-26.7519	(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	214.6312	189.8845	202.1012	178.7999	174.0249	157.5914	156.1919	162.0190	163.3609	181.2041	191.4693	212.4528	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2183.7311	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	103.4487	91.9450	98.6127	88.6791	87.3612	80.2199	80.1499	82.4168	82.3302	90.0315	93.6004	102.5565	(65)

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

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Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.4615	109.0110	98.4615	101.7436	98.4615	101.7436	98.4615	98.4615	101.7436	98.4615	101.7436	98.4615 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	184.6751	186.5915	181.7623	171.4817	158.5042	146.3072	138.1588	136.2425	141.0716	151.3523	164.3298	176.5268 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574 (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)	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588 (71)
Water heating gains (Table 5)	139.0439	136.8229	132.5440	123.1655	117.4210	111.4165	107.7284	110.7752	114.3475	121.0101	130.0005	137.8448 (72)
Total internal gains	479.8527	490.0974	470.4399	454.0628	432.0588	414.1393	399.0208	400.1513	411.8348	428.4960	453.7459	470.5052 (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	
-----					9.7100	11.2829	0.6300	0.7000			0.7700	33.4822 (75)	

Solar gains	33.4822	68.1539	122.7916	201.6591	271.0695	288.9887	270.3430	215.5206	149.6235	83.2895	42.1292	27.3432	(83)
Total gains	513.3348	558.2513	593.2316	655.7219	703.1282	703.1280	669.3638	615.6719	561.4583	511.7855	495.8751	497.8484	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	41.1635	41.2530	41.3411	41.7600	41.8394	42.2127	42.2127	42.2825	42.0681	41.8394	41.6792	41.5130
alpha	3.7442	3.7502	3.7561	3.7840	3.7893	3.8142	3.8142	3.8188	3.8045	3.7893	3.7786	3.7675
util living area	0.9711	0.9586	0.9340	0.8651	0.7394	0.5643	0.4245	0.4761	0.7049	0.8922	0.9546	0.9740 (86)
MIT	19.4593	19.6520	19.9656	20.4101	20.7538	20.9348	20.9829	20.9737	20.8477	20.4204	19.8839	19.4294 (87)
Th 2	20.0432	20.0451	20.0469	20.0556	20.0572	20.0648	20.0648	20.0662	20.0618	20.0572	20.0539	20.0505 (88)
util rest of house	0.9655	0.9507	0.9209	0.8387	0.6916	0.4936	0.3387	0.3865	0.6374	0.8652	0.9445	0.9689 (89)
MIT 2	18.2594	18.5030	18.8962	19.4421	19.8332	20.0193	20.0568	20.0529	19.9429	19.4672	18.8043	18.2267 (90)
Living area fraction									fLA = Living area / (4) =			0.5113 (91)
MIT	18.8729	19.0905	19.4430	19.9370	20.3038	20.4874	20.5303	20.5237	20.4055	19.9546	19.3563	18.8416 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8729	19.0905	19.4430	19.9370	20.3038	20.4874	20.5303	20.5237	20.4055	19.9546	19.3563	18.8416 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9568	0.9408	0.9111	0.8351	0.7048	0.5264	0.3820	0.4313	0.6635	0.8618	0.9353	0.9607 (94)
Useful gains	491.1421	525.2141	540.4743	547.5666	495.5904	370.1480	255.6851	265.5169	372.5255	441.0772	463.8050	478.2667 (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	988.8016	960.7646	874.4344	738.1878	574.3588	389.5425	260.0496	272.3986	418.6406	624.4745	821.3257	985.0979 (97)
Space heating kWh	370.2586	292.6899	248.4663	137.2472	58.6037	0.0000	0.0000	0.0000	0.0000	136.4476	257.4149	377.0825 (98a)
Space heating requirement - total per year (kWh/year)												1878.2107
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	370.2586	292.6899	248.4663	137.2472	58.6037	0.0000	0.0000	0.0000	0.0000	136.4476	257.4149	377.0825 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1878.2107
Space heating per m ²										(98c) / (4) =		29.0206 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												
Fraction of space heat from main system(s)												
Efficiency of main space heating system 1 (in %)												
Efficiency of main space heating system 2 (in %)												
Efficiency of secondary/supplementary heating system, %												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	370.2586	292.6899	248.4663	137.2472	58.6037	0.0000	0.0000	0.0000	0.0000	136.4476	257.4149	377.0825 (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)	401.1470	317.1072	269.1943	148.6969	63.4926	0.0000	0.0000	0.0000	0.0000	147.8305	278.8894	408.5400 (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	214.6312	189.8845	202.1012	178.7999	174.0249	157.5914	156.1919	162.0190	163.3609	181.2041	191.4693	212.4528 (64)
Efficiency of water heater	85.2709	85.0267	84.5241	83.4739	81.8909	79.8000	79.8000	79.8000	79.8000	83.4323	84.7242	79.8000 (216)
Fuel for water heating, kWh/month	251.7050	223.3233	239.1049	214.1985	212.5083	197.4829	195.7292	203.0314	204.7129	217.1871	225.9912	248.9726 (219)

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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	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.4584	16.4125	14.7776	10.8267	8.3629	6.8325	7.6289	9.9163	12.8803	16.8996	19.0881	21.0270	21.0270	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-14.3937	-21.6126	-33.0623	-39.6425	-44.9451	-42.7679	-42.2567	-38.7999	-33.0940	-25.7835	-16.2891	-12.2957	-12.2957	(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	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	-4.5589	-9.8548	-20.0908	-30.9285	-41.6418	-42.1102	-41.6060	-34.8746	-25.1098	-14.3258	-6.1604	-3.5850	-3.5850	(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													2034.8978	(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													2633.9473	(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)													165.1107	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-639.7896	(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													4280.1661	(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	2034.8978	0.2100	427.3285	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2633.9473	0.2100	553.1289	(264)
Space and water heating			980.4575	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	165.1107	0.1443	23.8306	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-364.9430	0.1333	-48.6405	
PV Unit electricity exported	-274.8466	0.1252	-34.4069	
Total			-83.0473	(269)
Total CO2, kg/year			933.1700	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.4200	(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	2034.8978	1.1300	2299.4345	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2633.9473	1.1300	2976.3604	(278)
Space and water heating			5275.7950	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	165.1107	1.5338	253.2523	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-364.9430	1.4925	-544.6828	
PV Unit electricity exported	-274.8466	0.4595	-126.2875	
Total			-670.9703	(283)
Total Primary energy kWh/year			4988.1778	(286)
Target Primary Energy Rate (TPER)			77.0700	(287)

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Plot Reference	A 508				Issued on Date	19/03/2026	
Assessment Reference	Be Green			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	82 B	DER	5.17	TER	14.42		
Environmental	96 A	% DER < TER				64.15	
CO ₂ Emissions (t/year)	0.3	DFEE	33.83	TFEE	36.23		
Compliance Check	See BREL	% DFEE < TFEE				6.62	
% DPER < TPER	28.91	DPER	54.79	TPER	77.07		
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	64.7200 (1b)	2.8000 (2b)	181.2160 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.7200		181.2160 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 181.2160 (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) = 0.1104 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2604 (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) = 0.2018 (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	0.2573	0.2522	0.2472	0.2220	0.2169	0.1917	0.1917	0.1866	0.2018	0.2169	0.2270	0.2371 (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	0.5331	0.5318	0.5306	0.5246	0.5235	0.5184	0.5184	0.5174	0.5204	0.5235	0.5258	0.5281 (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			9.7100	1.1450	11.1183		(27)
External Wall 1	28.2200	9.7100	18.5100	0.1500	2.7765	70.0000	1295.7000 (29a)
Corridor wall	22.8900	2.4200	20.4700	0.1900	3.8893	70.0000	1432.9000 (29a)
External Roof 1	64.7200		64.7200	0.1000	6.4720	9.0000	582.4800 (30)
Total net area of external elements A _{um} (A, m ²)			115.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 26.6761		(33)
Main dwelling							
Party Wall 1			41.6900	0.0000	0.0000	70.0000	2918.2999 (32)
Party Floor 1			64.7300			40.0000	2589.2000 (32a)
Internal Wall 1			137.3700			9.0000	1236.3300 (32c)
Heat capacity C _m = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 10054.9098 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							155.3602 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					5.9900	0.0500	0.2995
E3 Sill					2.5000	0.0400	0.1000

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
	31.8798	31.8029	31.7276	31.3738	31.3076	30.9994	30.9994	30.9423	31.1181	31.3076	31.4415	31.5815 (38)
Heat transfer coeff	62.8075	62.7306	62.6553	62.3015	62.2353	61.9271	61.9271	61.8701	62.0458	62.2353	62.3692	62.5092 (39)
Average = Sum(39)m / 12 =												62.3012
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9704	0.9693	0.9681	0.9626	0.9616	0.9568	0.9568	0.9560	0.9587	0.9616	0.9637	0.9658 (40)
HLP (average)												0.9626
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												2.1115 (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 (42a)
Hot water usage for baths	25.1883	24.8081	24.2672	23.4571	22.7271	21.7221	20.9596	21.8920	22.3813	23.3771	24.4124	25.1684 (42b)
Hot water usage for other uses	36.2536	34.9353	33.6169	32.2986	30.9803	29.6620	29.6620	30.9803	32.2986	33.6169	34.9353	36.2536 (42c)
Average daily hot water use (litres/day)												56.3134 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	61.4419	59.7434	57.8841	55.7558	53.7074	51.3841	50.6216	52.8723	54.6799	56.9940	59.3477	61.4219 (44)
Distribution loss (46)m = 0.15 x (45)m	90.4531	79.0526	82.7152	72.8310	69.2074	59.4240	55.9384	62.2317	63.4260	73.4426	80.2103	90.2026 (45)
Total = Sum(45)m =												879.1347
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												
WWHRS	76.8851	67.1947	70.3079	61.9063	58.8263	50.5104	47.5476	52.8969	53.9121	62.4262	68.1788	76.6722 (62)
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 (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	76.8851	67.1947	70.3079	61.9063	58.8263	50.5104	47.5476	52.8969	53.9121	62.4262	68.1788	76.6722 (64)
Total per year (kWh/year) = Sum(64a)m =												747.2645 (64a)
Electric shower(s)	47.7473	42.5432	46.4556	44.3320	45.1639	43.0820	44.5180	45.1639	44.3320	46.4556	45.5820	47.7473 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												543.1228 (64a)
Heat gains from water heating, kWh/month												
	31.1581	27.4345	29.1909	26.5596	25.9975	23.3981	23.0164	24.5152	24.5610	27.2204	28.4402	31.1049 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.4615	109.0110	98.4615	101.7436	98.4615	101.7436	98.4615	98.4615	101.7436	98.4615	101.7436	98.4615 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	184.6751	186.5915	181.7623	171.4817	158.5042	146.3072	138.1588	136.2425	141.0716	151.3523	164.3298	176.5268 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574 (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)	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588 (71)
Water heating gains (Table 5)	41.8792	40.8251	39.2351	36.8883	34.9429	32.4973	30.9360	32.9505	34.1125	36.5866	39.5003	41.8076 (72)
Total internal gains	379.6879	391.0996	374.1310	364.7856	346.5807	335.2201	322.2284	322.3266	331.5998	341.0725	360.2457	371.4680 (73)

[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					9.7100	11.2829	0.3500	0.7000	0.7700		18.6012 (75)	
Solar gains	18.6012	37.8633	68.2176	112.0329	150.5941	160.5493	150.1906	119.7337	83.1242	46.2719	23.4051	15.1907 (83)
Total gains	398.2891	428.9629	442.3486	476.8185	497.1748	495.7694	472.4190	442.0602	414.7239	387.3444	383.6508	386.6587 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)
Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	44.4697	44.5242	44.5777	44.8309	44.8786	45.1019	45.1019	45.1435	45.0156	44.8786	44.7822	44.6819	21.0000 (85)
alpha	3.9646	3.9683	3.9718	3.9887	3.9919	4.0068	4.0068	4.0096	4.0010	3.9919	3.9855	3.9788	
util living area	0.9865	0.9805	0.9697	0.9342	0.8554	0.7024	0.5480	0.5997	0.8125	0.9440	0.9780	0.9881	(86)
MIT	19.3736	19.5382	19.8103	20.2337	20.6185	20.8803	20.9662	20.9515	20.7733	20.3001	19.7786	19.3414	(87)
Th 2	20.1080	20.1090	20.1100	20.1146	20.1154	20.1194	20.1194	20.1202	20.1179	20.1154	20.1137	20.1119	(88)
util rest of house	0.9838	0.9765	0.9631	0.9187	0.8199	0.6323	0.4499	0.5017	0.7560	0.9278	0.9727	0.9856	(89)
MIT 2	18.6179	18.7816	19.0513	19.4670	19.8269	20.0490	20.1060	20.0993	19.9690	19.5368	19.0246	18.5888	(90)
Living area fraction									FLA = Living area /	(4) =		0.5113	(91)
MIT	19.0043	19.1685	19.4393	19.8590	20.2317	20.4740	20.5458	20.5350	20.3802	19.9271	19.4101	18.9736	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0043	19.1685	19.4393	19.8590	20.2317	20.4740	20.5458	20.5350	20.3802	19.9271	19.4101	18.9736	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9794	0.9711	0.9569	0.9135	0.8251	0.6620	0.4988	0.5496	0.7744	0.9237	0.9675	0.9816	(94)
Useful gains	390.0908	416.5801	423.2909	435.5925	410.2055	328.2007	235.6254	242.9770	321.1476	357.7848	371.1697	379.5289	(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	923.5378	895.0701	810.7187	682.7627	530.9702	363.7604	244.3526	255.8342	389.6630	580.4718	767.7693	923.4843	(97)
Space heating kWh	396.8846	321.5453	288.2463	177.9625	89.8489	0.0000	0.0000	0.0000	0.0000	165.6791	285.5517	404.7028	(98a)
Space heating requirement - total per year (kWh/year)												2130.4212	
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	396.8846	321.5453	288.2463	177.9625	89.8489	0.0000	0.0000	0.0000	0.0000	165.6791	285.5517	404.7028	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2130.4212	
Space heating per m2										(98c) / (4) =		32.9175	(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	582.1150	458.2608	470.2125	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7685	0.8434	0.8088	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	447.3400	386.4906	380.3220	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	539.1460	514.0092	480.3556	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	66.1003	94.8738	74.4250	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	16.5251	23.7184	18.6062	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												58.8498	(107)
Energy for space heating												32.9175	(99)
Energy for space cooling												0.9093	(108)
Total												33.8268	(109)
Fabric Energy Efficiency (DFEE)												33.8	(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	64.7200	x	181.2160	(1b) - (3b)
Ground floor		2.8000		(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.7200			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	181.2160	(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)

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Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =										Air changes per hour		0.1104 (8)
Pressure test											20.0000 / (5) =		Yes (8)
Pressure Test Method											Blower Door		
Measured/design AP50													5.0000 (17)
Infiltration rate													0.3604 (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) =		0.2793 (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)	
	0.3561	0.3491	0.3421	0.3072	0.3002	0.2653	0.2653	0.2583	0.2793	0.3002	0.3142	0.3282 (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	0.5634	0.5609	0.5585	0.5472	0.5451	0.5352	0.5352	0.5334	0.5390	0.5451	0.5494	0.5538 (25)	

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.4200	1.0000	2.4200		(26)
TER Opening Type			9.7100	1.1450	11.1183		(27)
External Wall 1	28.2200	9.7100	18.5100	0.1800	3.3318		(29a)
Corridor wall	22.8900	2.4200	20.4700	0.1800	3.6846		(29a)
External Roof 1	64.7200		64.7200	0.1100	7.1192		(30)
Total net area of external elements Aum(A, m2)			115.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					27.6739		(33)
Main dwelling							
Party Wall 1			41.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							155.3602 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.9900	0.0500	0.2995
E3 Sill	2.5000	0.0500	0.1250
E4 Jamb	15.6000	0.0500	0.7800
E7 Party floor between dwellings (in blocks of flats)	6.7200	0.0700	0.4704
E7 Party floor between dwellings (in blocks of flats)	8.1800	0.0700	0.5726
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0200	0.0672
E16 Corner (normal)	2.8000	0.0900	0.2520
E17 Corner (inverted - internal area greater than external area)	2.8000	-0.0900	-0.2520
E18 Party wall between dwellings	5.6000	0.0600	0.3360
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.8900	0.0000	0.0000
E16 Corner (normal)	2.8000	0.0900	0.2520
E14 Flat roof	18.2600	0.0800	1.4608
P4 Party wall - Roof (insulation at ceiling level)	14.8900	0.1200	1.7868
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.4863 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 34.1602 (37)

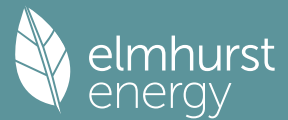
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	33.6920	33.5447	33.4004	32.7226	32.5958	32.0055	32.0055	31.8961	32.2329	32.5958	32.8524	33.1206 (38)
Average = Sum(39)m / 12 =	67.8522	67.7050	67.5607	66.8829	66.7560	66.1657	66.1657	66.0564	66.3931	66.7560	67.0126	67.2808 (39)
												66.8822
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0484	1.0461	1.0439	1.0334	1.0315	1.0223	1.0223	1.0206	1.0259	1.0315	1.0354	1.0396 (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												2.1115 (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	25.7627	25.3800	24.8412	23.8478	23.1039	22.2791	21.8335	22.3686	22.9511	23.8337	24.8476	25.6756 (42b)
Hot water usage for other uses	36.2536	34.9353	33.6169	32.2986	30.9803	29.6620	29.6620	30.9803	32.2986	33.6169	34.9353	36.2536 (42c)
Average daily hot water use (litres/day)												56.8438 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	62.0162	60.3153	58.4582	56.1464	54.0842	51.9411	51.4955	53.3489	55.2497	57.4507	59.7829	61.9291 (44)
Energy content (annual)	98.2185	85.8882	89.8481	76.8617	72.8078	63.8676	62.2794	66.0571	68.1285	77.9600	85.1717	96.9660 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m =											944.0545
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	83.4858	73.0050	76.3709	65.3324	61.8866	54.2875	52.9375	56.1485	57.9092	66.2660	72.3959	82.4211 (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	83.4858	73.0050	76.3709	65.3324	61.8866	54.2875	52.9375	56.1485	57.9092	66.2660	72.3959	82.4211 (64)
	Total per year (kWh/year) = Sum(64)m =											802.4463 (64)

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12Total per year (kWh/year)	802 (64)										
Electric shower(s)	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =										
47.7473	42.5432	46.4556	44.3320	45.1639	43.0820	44.5180	45.1639	44.3320	46.4556	45.5820	47.7473 (64a)
Heat gains from water heating, kWh/month											543.1228 (64a)
32.8083	28.8870	30.7066	27.4161	26.7626	24.3424	24.3639	25.3281	25.5603	28.1804	29.4945	32.5421 (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	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735	105.5735 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.4615	109.0110	98.4615	101.7436	98.4615	101.7436	98.4615	98.4615	101.7436	98.4615	101.7436	98.4615 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	184.6751	186.5915	181.7623	171.4817	158.5042	146.3072	138.1588	136.2425	141.0716	151.3523	164.3298	176.5268 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574	33.5574 (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)	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588	-84.4588 (71)
Water heating gains (Table 5)	44.0971	42.9867	41.2723	38.0779	35.9713	33.8088	32.7471	34.0431	35.5004	37.8769	40.9646	43.7394 (72)
Total internal gains	381.9059	393.2612	376.1683	365.9752	347.6090	336.5316	324.0395	323.4192	332.9877	342.3627	361.7100	373.3998 (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	
-----					9.7100	11.2829	0.6300	0.7000	-----		0.7700	33.4822 (75)	
-----									-----				
Solar gains	33.4822	68.1539	122.7916	201.6591	271.0695	288.9887	270.3430	215.5206	149.6235	83.2895	42.1292	27.3432	(83)
Total gains	415.3880	461.4151	498.9599	567.6344	618.6785	625.5204	594.3826	538.9398	482.6112	425.6522	403.8392	400.7430	(84)

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	41.1635	41.2530	41.3411	41.7600	41.8394	42.2127	42.2127	42.2825	42.0681	41.8394	41.6792	41.5130
alpha	3.7442	3.7502	3.7561	3.7840	3.7893	3.8142	3.8142	3.8188	3.8045	3.7893	3.7786	3.7675
util living area	0.9851	0.9767	0.9594	0.9045	0.7926	0.6187	0.4728	0.5344	0.7708	0.9330	0.9755	0.9869 (86)
MIT	19.2424	19.4467	19.7824	20.2788	20.6818	20.9109	20.9753	20.9612	20.7896	20.2753	19.6904	19.2118 (87)
Th 2	20.0432	20.0451	20.0469	20.0556	20.0572	20.0648	20.0648	20.0662	20.0618	20.0572	20.0539	20.0505 (88)
util rest of house	0.9820	0.9718	0.9507	0.8835	0.7485	0.5456	0.3794	0.4374	0.7072	0.9138	0.9695	0.9842 (89)
MIT 2	18.4401	18.6434	18.9752	19.4593	19.8259	20.0151	20.0556	20.0505	19.9287	19.4661	18.8930	18.4151 (90)
Living area fraction	FLA = Living area / (4) =											0.5113 (91)
MIT	18.8503	19.0541	19.3879	19.8783	20.2635	20.4731	20.5258	20.5161	20.3689	19.8798	19.3007	18.8224 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8503	19.0541	19.3879	19.8783	20.2635	20.4731	20.5258	20.5161	20.3689	19.8798	19.3007	18.8224 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9770	0.9655	0.9432	0.8790	0.7589	0.5786	0.4264	0.4855	0.7297	0.9095	0.9635	0.9796 (94)
Useful gains	405.8212	445.4859	470.6414	498.9451	469.4858	361.9526	253.4166	261.6363	352.1394	387.1405	389.1128	392.5733 (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	987.2707	958.3046	870.7163	734.2591	571.6654	388.5964	259.7554	271.8949	416.2092	619.4852	817.5990	983.8096 (97)
Space heating kWh	432.5984	344.6142	297.6558	169.4261	76.0216	0.0000	0.0000	0.0000	0.0000	172.8645	308.5100	439.8798 (98a)
Space heating requirement - total per year (kWh/year)	2241.5704											
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	432.5984	344.6142	297.6558	169.4261	76.0216	0.0000	0.0000	0.0000	0.0000	172.8645	308.5100	439.8798 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2241.5704											
Space heating per m2	(98c) / (4) =											34.6349 (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	621.9575	489.6261	502.0284	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8316	0.8901	0.8530	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	517.2043	435.8130	428.2491	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	690.5815	656.2582	593.4069	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	124.8315	164.0112	122.8774	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	31.2079	41.0028	30.7194	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	102.9300 (107)											

Full SAP Calculation Printout



Energy for space heating
Energy for space cooling
Total
Fabric Energy Efficiency (TFEE)

34.6349 (99)
1.5904 (108)
36.2253 (109)
36.2 (109)