

Summary for Input Data



Plot Reference	A 109	Issued on Date	15/05/2026
Assessment Reference	Be Green 260515	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	84 B	DER	4.63	TER	13.41
Environmental	96 A	% DER < TER			65.47
CO ₂ Emissions (t/year)	0.29	DFEE	31.05	TFEE	33.87
Compliance Check	See BREL	% DFEE < TFEE			8.32
% DPER < TPER	31.49	DPER	49.02	TPER	71.55

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

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

Orientation	Northwest	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	1	
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	249.75	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:	16.57 m	70.52 m ²	2.80 m

8.0 Living Area	32.46	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	30.80	20.08	0.00	None	10.72	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	15.60	13.18	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	57.40	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	154.84

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	70.52

Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
Heatloss Floor 1	Exposed Floor - Solid	Lowest occupied	Other	0.10	None	0.00	110.00	70.52

Summary for Input Data

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	North West	2.42	
Windows	Window	External Wall 1	South East	10.72	

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	6.67	0.05	0.05	No
E3 Sill	Independently assessed	3.17	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	6.64	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	5.57	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	4.36	0.10	0.10	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	4.36	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	2.80	0.05	0.05	No
E20 Exposed floor (normal)	Independently assessed	6.64	0.10	0.10	No
E21 Exposed floor (inverted)	Independently assessed	5.57	0.10	0.10	No
E25 Staggered party wall between dwellings	Independently assessed	2.80	0.05	0.05	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	20.50	0.00	0.00	No
P7 Party Wall - Exposed floor (normal)	Independently assessed	20.50	0.08	0.08	No
E16 Corner (normal)	Independently assessed	2.80	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	5.60	0.00	0.00	No
E18 Party wall between dwellings	Independently assessed	2.80	0.04	0.04	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	2
Manufacturer SFP	0.61
Duct Type	Rigid
MVHR Efficiency	89.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

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

Summary for Input Data

Number of passive vents

Number of flueless gas fires

21.0 Fixed Cooling System

22.0 Pressure Testing

Designed AP₅₀ m²/(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	7

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	
Shower 2	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

Diverter

Summary for Input Data



Battery Capacity [kWh]

0.00

PV Cells kWp

Orientation

Elevation

Overshading

FGHRS

MCS Certificate

**Overshading
Factor**

**MCS
Certificate
Reference**

**Panel
Manufacturer**

0.36

North 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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Environmental	96 A		% DER < TER				65.47
CO ₂ Emissions (t/year)	0.29		DFEE	31.05		TFEE	33.87
Compliance Check	See BREL		% DFEE < TFEE				8.32
% DPER < TPER	31.49		DPER	49.02		TPER	71.55
Assessor Details	Mr. Robert Tanner				Assessor ID	W344-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	70.5200 (1b)	2.8000 (2b)	197.4560 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.5200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	197.4560 (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)

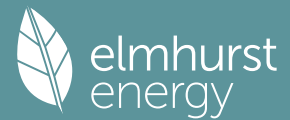
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1162 (21)

	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) =												80.1000 (23c)
Effective ac	0.2477	0.2448	0.2419	0.2274	0.2245	0.2099	0.2099	0.2070	0.2157	0.2245	0.2303	0.2361 (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			10.7200	1.1450	12.2748		(27)
Heatloss Floor 1			70.5200	0.1000	7.0520	110.0000	7757.2000 (28b)
External Wall 1	30.8000	10.7200	20.0800	0.1500	3.0120	70.0000	1405.5999 (29a)
Corridor wall	15.6000	2.4200	13.1800	0.1900	2.5042	70.0000	922.6000 (29a)
Total net area of external elements Aum(A, m ²)			116.9200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.2630		(33)
Main dwelling							
Party Wall 1			57.4000	0.0000	0.0000	70.0000	4018.0000 (32)
Party Ceiling 1			70.5200			30.0000	2115.6000 (32b)
Internal Wall 1			154.8400			9.0000	1393.5600 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		17612.5599 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							249.7527 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	6.6700	0.0500	0.3335
E3 Sill	3.1700	0.0400	0.1268
E4 Jamb	15.6000	0.0400	0.6240
E7 Party floor between dwellings (in blocks of flats)	6.6400	0.0500	0.3320
E7 Party floor between dwellings (in blocks of flats)	5.5700	0.0390	0.2172
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.1000	0.4360
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180
E16 Corner (normal)	2.8000	0.0500	0.1400
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E20 Exposed floor (normal)	6.6400	0.1000	0.6640
E21 Exposed floor (inverted)	5.5700	0.1000	0.5570
E25 Staggered party wall between dwellings	2.8000	0.0500	0.1400
E25 Staggered party wall between dwellings	2.8000	0.0390	0.1092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.5000	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	20.5000	0.0800	1.6400
E16 Corner (normal)	2.8000	0.0390	0.1092
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0390	0.1092

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

Point Thermal bridges (36a) = 5.8961 (36)

Total fabric heat loss (33) + (36) + (36a) = 33.1591 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	16.1415	15.9521	15.7627	14.8159	14.6265	13.6796	13.6796	13.4903	14.0584	14.6265	15.0052	15.3840	(38)
Average = Sum(39)m / 12 =	49.3006	49.1112	48.9219	47.9750	47.7856	46.8388	46.8388	46.6494	47.2175	47.7856	48.1644	48.5431	(39)
													47.9277
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6991	0.6964	0.6937	0.6803	0.6776	0.6642	0.6642	0.6615	0.6696	0.6776	0.6830	0.6884	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

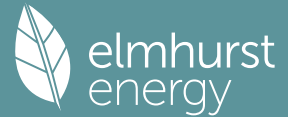
Assumed occupancy													2.2587 (42)
Hot water usage for mixer showers													
60.5216	59.5950	58.2295	56.1289	54.2468	51.6137	49.5311	51.9657	53.1903	55.7982	58.5142	60.4671	60.4671	(42a)
Hot water usage for baths													
26.2261	25.8302	25.2670	24.4236	23.6634	22.6170	21.8232	22.7939	23.3034	24.3402	25.4182	26.2053	26.2053	(42b)
Hot water usage for other uses													
37.7612	36.3880	35.0149	33.6418	32.2686	30.8955	30.8955	32.2686	33.6418	35.0149	36.3880	37.7612	37.7612	(42c)
Average daily hot water use (litres/day)													114.4424 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
124.5089	121.8133	118.5114	114.1942	110.1788	105.1262	102.2497	107.0283	110.1355	115.1534	120.3204	124.4336	124.4336	(44)
Energy conte	183.2987	161.1837	169.3504	149.1662	141.9766	121.5749	112.9890	125.9743	127.7516	148.3868	162.6171	182.7398	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
27.4948	24.1775	25.4026	22.3749	21.2965	18.2362	16.9483	18.8961	19.1627	22.2580	24.3926	27.4110	27.4110	(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	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	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	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													
238.5755	211.1111	224.6272	202.6599	197.2534	175.0686	168.2658	181.2511	181.2453	203.6636	216.1108	238.0166	238.0166	(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	238.5755	211.1111	224.6272	202.6599	197.2534	175.0686	168.2658	181.2511	181.2453	203.6636	216.1108	238.0166	(64)
12Total per year (kWh/year)													2437.8487 (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													
105.1682	93.5355	100.5305	92.3927	91.4287	83.2186	81.7903	86.1079	85.2724	93.5600	96.8651	104.9824	104.9824	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
105.5472	116.8558	105.5472	109.0654	105.5472	109.0654	105.5472	105.5472	109.0654	105.5472	109.0654	105.5472	105.5472	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
198.5077	200.5675	195.3767	184.3260	170.3764	157.2658	148.5072	146.4473	151.6381	162.6888	176.6384	189.7490	189.7490	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	(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)													
-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	(71)
Water heating gains (Table 5)													
141.3552	139.1898	135.1216	128.3232	122.8880	115.5814	109.9332	115.7364	118.4338	125.7527	134.5349	141.1054	141.1054	(72)
Total internal gains	502.2902	513.4933	492.9257	478.5948	455.6918	438.7929	420.8677	424.6111	436.0176	450.8690	477.1189	493.2818	(73)

6. Solar gains

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[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	Specific data or Table 6c	FF		Access factor Table 6d		Gains W
Southeast				10.7200	36.7938	0.3500		0.7000		0.7700		66.9683 (77)

Solar gains	66.9683	114.0718	156.0779	193.3881	216.6108	215.0444	207.3258	190.0006	168.9994	126.0736	80.2126	57.3109 (83)
Total gains	569.2585	627.5651	649.0036	671.9830	672.3027	653.8373	628.1935	614.6117	605.0170	576.9426	557.3315	550.5927 (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	99.2356	99.6183	100.0039	101.9776	102.3818	104.4515	104.4515	104.8755	103.6136	102.3818	101.5767	100.7842
alpha	7.6157	7.6412	7.6669	7.7985	7.8255	7.9634	7.9634	7.9917	7.9076	7.8255	7.7718	7.7189
util living area												
	0.9806	0.9592	0.9199	0.8120	0.6520	0.4580	0.3280	0.3491	0.5366	0.8106	0.9496	0.9838 (86)
MIT	20.5606	20.6870	20.8136	20.9420	20.9899	20.9995	21.0000	20.9999	20.9981	20.9513	20.7668	20.5451 (87)
Th 2	20.3416	20.3440	20.3464	20.3583	20.3606	20.3726	20.3726	20.3750	20.3678	20.3606	20.3559	20.3511 (88)
util rest of house												
	0.9757	0.9496	0.9026	0.7806	0.6102	0.4133	0.2813	0.3017	0.4883	0.7738	0.9365	0.9796 (89)
MIT 2	19.8408	19.9981	20.1514	20.3045	20.3529	20.3723	20.3726	20.3749	20.3667	20.3180	20.1073	19.8296 (90)
Living area fraction												
MIT	20.1721	20.3152	20.4562	20.5979	20.6461	20.6610	20.6614	20.6626	20.6573	20.6095	20.4109	20.1590 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1721	20.3152	20.4562	20.5979	20.6461	20.6610	20.6614	20.6626	20.6573	20.6095	20.4109	20.1590 (93)

8. Space heating requirement												

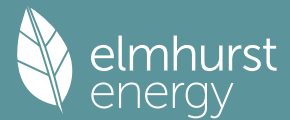
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9742	0.9492	0.9058	0.7927	0.6290	0.4339	0.3028	0.3235	0.5105	0.7886	0.9378	0.9782 (94)
Useful gains	554.5580	595.6572	587.8371	532.6518	422.9092	283.6787	190.2190	198.8327	308.8617	454.9983	522.6519	538.5669 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	782.5060	757.0597	682.7635	561.2082	427.4960	283.8879	190.2288	198.8490	309.6202	478.3091	641.1102	774.6987 (97)
Space heating kWh	169.5933	108.4625	70.6252	20.5606	3.4126	0.0000	0.0000	0.0000	0.0000	17.3433	85.2899	175.6821 (98a)
Space heating requirement - total per year (kWh/year)												650.9696
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	169.5933	108.4625	70.6252	20.5606	3.4126	0.0000	0.0000	0.0000	0.0000	17.3433	85.2899	175.6821 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												650.9696
Space heating per m2										(98c) / (4) =		9.2310 (99)

9b. Energy requirements												

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (301)
Fraction of space heat from community system												1.0000 (302)
Fraction of heat from community Heat pump-Space and Water												1.0000 (303a)
Factor for control and charging method (Table 4c(3)) for space heating												1.0000 (305)
Factor for charging method (Table 4c(3)) for water heating												1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system												1.5000 (306)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating:												
Space heating requirement												
	169.5933	108.4625	70.6252	20.5606	3.4126	0.0000	0.0000	0.0000	0.0000	17.3433	85.2899	175.6821 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	254.3900	162.6938	105.9379	30.8409	5.1189	0.0000	0.0000	0.0000	0.0000	26.0149	127.9349	263.5231
Space heating requirement												
	254.3900	162.6938	105.9379	30.8409	5.1189	0.0000	0.0000	0.0000	0.0000	26.0149	127.9349	263.5231 (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												
	238.5755	211.1111	224.6272	202.6599	197.2534	175.0686	168.2658	181.2511	181.2453	203.6636	216.1108	238.0166 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	357.8632	316.6666	336.9408	303.9898	295.8801	262.6029	252.3986	271.8766	271.8680	305.4954	324.1662	357.0249
Water heating fuel												
	357.8632	316.6666	336.9408	303.9898	295.8801	262.6029	252.3986	271.8766	271.8680	305.4954	324.1662	357.0249 (310)
Cooling System Energy Efficiency Ratio												
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 (314)
Pumps and Fa	15.6005	14.0908	15.6005	15.0973	15.6005	15.0973	15.6005	15.6005	15.0973	15.6005	15.0973	15.6005 (315)
Lighting	22.4386	18.0011	16.2080	11.8747	9.1723	7.4939	8.3673	10.8762	14.1270	18.5355	20.9358	23.0623 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-3.9338	-6.9735	-12.8435	-18.0416	-22.5197	-22.1972	-21.7348	-18.7222	-14.0977	-9.0841	-4.7209	-3.2123 (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												976.4544 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3656.7731 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												9.7645 (313)
Space cooling fuel												0.0000 (321)

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Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7625)	
mechanical ventilation fans (SFP = 0.7625)	183.6834 (330a)
Total electricity for the above, kWh/year	183.6834 (331)
Electricity for lighting (calculated in Appendix L)	181.0926 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-158.0814 (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	4839.9222 (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	1997.0808	0.1583	66.6386 (367)
Electrical energy for heat distribution (space & water)	9.7645	0.0000	6.6952 (372)
Overall CO2 factor for heat network			0.0637 (386)
Total CO2 associated with community systems			295.2799 (373)
Space and water heating			295.2799 (376)
Pumps, fans and electric keep-hot	183.6834	0.1387	25.4792 (378)
Energy for lighting	181.0926	0.1443	26.1373 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-158.0814	0.1306	-20.6395
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-20.6395 (380)
Total CO2, kg/year			326.2569 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6300 (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	1997.0808	1.5861	667.5660 (467)
Electrical energy for heat distribution (space & water)	9.7645	0.0000	71.0948 (472)
Overall CO2 factor for heat network			0.6767 (486)
Total CO2 associated with community systems			3135.5242 (473)
Space and water heating			3135.5242 (476)
Pumps, fans and electric keep-hot	183.6834	1.5128	277.8763 (478)
Energy for lighting	181.0926	1.5338	277.7659 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-158.0814	1.4823	-234.3244
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-234.3244 (480)
Total Primary energy kWh/year			3456.8420 (483)
Dwelling Primary energy Rate (DPER)			49.0200 (484)

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

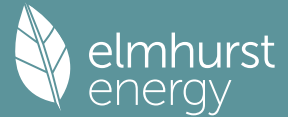
1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	70.5200 (1b)	x 2.8000 (2b)	= 197.4560 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.5200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 197.4560 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1519 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4019 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)

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Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.3115 (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)
Effective ac	0.3972	0.3894	0.3816	0.3426	0.3349	0.2959	0.2959	0.2881	0.3115	0.3349	0.3504	0.3660	(22b)
	0.5789	0.5758	0.5728	0.5587	0.5561	0.5438	0.5438	0.5415	0.5485	0.5561	0.5614	0.5670	(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			10.7200	1.1450	12.2748		(27)
Heatloss Floor 1			70.5200	0.1300	9.1676		(28b)
External Wall 1	30.8000	10.7200	20.0800	0.1800	3.6144		(29a)
Corridor wall	15.6000	2.4200	13.1800	0.1800	2.3724		(29a)
Total net area of external elements Aum(A, m2)			116.9200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.8492		(33)
Main dwelling							
Party Wall 1			57.4000	0.0000	0.0000		(32)

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

249.7527 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	6.6700	0.0500	0.3335
E3 Sill	3.1700	0.0500	0.1585
E4 Jamb	15.6000	0.0500	0.7800
E7 Party floor between dwellings (in blocks of flats)	6.6400	0.0700	0.4648
E7 Party floor between dwellings (in blocks of flats)	5.5700	0.0700	0.3899
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872
E16 Corner (normal)	2.8000	0.0900	0.2520
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E20 Exposed floor (normal)	6.6400	0.3200	2.1248
E21 Exposed floor (inverted)	5.5700	0.3200	1.7824
E25 Staggered 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)	20.5000	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	20.5000	0.1600	3.2800
E16 Corner (normal)	2.8000	0.0900	0.2520
E17 Corner (inverted - internal area greater than external area)	5.6000	-0.0900	-0.5040
E18 Party wall between dwellings	2.8000	0.0600	0.1680

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

Point Thermal Bridges

(36a) = 10.1603 (36)

Total fabric heat loss

(33) + (36) + (36a) = 40.0095 (37)

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

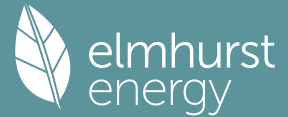
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	37.7193	37.5198	37.3241	36.4054	36.2335	35.4333	35.4333	35.2851	35.7415	36.2335	36.5812	36.9448	(38)
Average = Sum(39)m / 12 =	77.7288	77.5293	77.3337	76.4149	76.2430	75.4428	75.4428	75.2946	75.7510	76.2430	76.5908	76.9543	(39)
												76.4141	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1022	1.0994	1.0966	1.0836	1.0812	1.0698	1.0698	1.0677	1.0742	1.0812	1.0861	1.0912	(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													2.2587 (42)
Hot water usage for mixer showers													
62.0903	61.1572	59.7975	57.1960	55.2761	53.1351	51.9181	53.2675	54.7467	57.0456	59.7030	61.8524	(42a)	
Hot water usage for baths													
26.8241	26.4257	25.8647	24.8304	24.0558	23.1970	22.7331	23.2902	23.8967	24.8157	25.8714	26.7334	(42b)	
Hot water usage for other uses													
37.7612	36.3880	35.0149	33.6418	32.2686	30.8955	30.8955	32.2686	33.6418	35.0149	36.3880	37.7612	(42c)	
Average daily hot water use (litres/day)													116.4437 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
126.6756	123.9710	120.6772	115.6681	111.6006	107.2276	105.5467	108.8263	112.2852	116.8762	121.9624	126.3470	(44)	
Energy content	200.6232	176.5331	185.4763	158.3439	150.2358	131.8488	127.6496	134.7497	138.4589	158.5998	173.7578	197.8289	(45)
Energy content (annual)										Total = Sum(45)m =			1934.1058
Distribution loss (46)m = 0.15 x (45)m													
30.0935	26.4800	27.8214	23.7516	22.5354	19.7773	19.1474	20.2125	20.7688	23.7900	26.0637	29.6743	(46)	
Water storage loss (or HIU loss):													
Store volume													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5520 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8381 (55)
Total storage loss													
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)	
If cylinder contains dedicated solar storage													
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month													
249.8659	221.0103	234.7190	205.9981	199.4785	179.5030	176.8923	183.9924	186.1131	207.8425	221.4120	247.0716	(62)	
WWHRS	-28.3851	-25.1040	-26.2875	-21.7671	-20.2861	-17.3590	-16.2713	-17.3029	-17.9603	-21.1732	-23.9867	-27.8595	(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													
221.4808	195.9063	208.4315	184.2310	179.1923	162.1440	160.6210	166.6895	168.1528	186.6693	197.4253	219.2121	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			2250.1560 (64)
Electric shower(s)													2250 (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)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													

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106.1013 94.2790 101.0650 90.7727 89.3475 81.9631 81.8376 84.1984 84.1609 92.1286 95.8978 105.1723 (65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	105.5472	116.8558	105.5472	109.0654	105.5472	109.0654	105.5472	105.5472	109.0654	105.5472	109.0654	105.5472	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.5077	200.5675	195.3767	184.3260	170.3764	157.2658	148.5072	146.4473	151.6381	162.6888	176.6384	189.7490	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	(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)	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	(71)
Water heating gains (Table 5)	142.6093	140.2962	135.8401	126.0732	120.0908	113.8376	109.9968	113.1699	116.8902	123.8287	133.1914	141.3606	(72)
Total internal gains	506.5444	517.5998	496.6442	479.3448	455.8946	437.0491	420.9314	422.0446	434.4740	451.9450	478.7755	496.5369	(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
Southeast				10.7200	36.7938		0.6300		0.7000		0.7700		120.5429 (77)
Solar gains	120.5429	205.3292	280.9403	348.0987	389.8995	387.0800	373.1864	342.0011	304.1989	226.9325	144.3826	103.1596	(83)
Total gains	627.0873	722.9289	777.5845	827.4435	845.7942	824.1291	794.1178	764.0457	738.6729	678.8775	623.1581	599.6965	(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	62.9416	63.1036	63.2632	64.0239	64.1682	64.8488	64.8488	64.9765	64.5850	64.1682	63.8769	63.5751		
alpha	5.1961	5.2069	5.2175	5.2683	5.2779	5.3233	5.3233	5.3318	5.3057	5.2779	5.2585	5.2383		
util living area	0.9881	0.9747	0.9494	0.8832	0.7585	0.5713	0.4157	0.4496	0.6704	0.8982	0.9743	0.9903	(86)	
MIT	19.9588	20.1653	20.4115	20.7016	20.8960	20.9814	20.9971	20.9957	20.9576	20.7179	20.2958	19.9252	(87)	
Th 2	19.9990	20.0013	20.0036	20.0143	20.0163	20.0256	20.0256	20.0273	20.0220	20.0163	20.0122	20.0080	(88)	
util rest of house	0.9845	0.9673	0.9347	0.8512	0.7006	0.4906	0.3249	0.3565	0.5896	0.8633	0.9655	0.9874	(89)	
MIT 2	18.8117	19.0723	19.3778	19.7278	19.9342	20.0156	20.0247	20.0258	19.9961	19.7555	19.2472	18.7760	(90)	
Living area fraction									FLA = Living area / (4) =			0.4603	(91)	
MIT	19.3397	19.5754	19.8536	20.1760	20.3769	20.4602	20.4723	20.4723	20.4387	20.1985	19.7299	19.3050	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.3397	19.5754	19.8536	20.1760	20.3769	20.4602	20.4723	20.4723	20.4387	20.1985	19.7299	19.3050	(93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9814	0.9634	0.9322	0.8570	0.7229	0.5272	0.3667	0.3995	0.6252	0.8705	0.9624	0.9846	(94)
Useful gains	615.4140	696.4926	724.8359	709.1107	611.4308	434.5154	291.2345	305.2028	461.8543	590.9739	599.7061	590.4858	(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	1169.0191	1137.7738	1032.6841	861.6565	661.5551	442.1083	292.1367	306.6186	480.1618	731.8178	967.3338	1162.3919	(97)
Space heating kWh	411.8821	296.5410	229.0391	109.8329	37.2925	0.0000	0.0000	0.0000	0.0000	104.7878	264.6920	425.4981	(98a)
Space heating requirement - total per year (kWh/year)												1879.5655	
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	411.8821	296.5410	229.0391	109.8329	37.2925	0.0000	0.0000	0.0000	0.0000	104.7878	264.6920	425.4981	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1879.5655	
Space heating per m ²										(98c) / (4) =		26.6529	(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	411.8821	296.5410	229.0391	109.8329	37.2925	0.0000	0.0000	0.0000	0.0000	104.7878	264.6920	425.4981	(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)	446.2428	321.2795	248.1463	118.9956	40.4035	0.0000	0.0000	0.0000	0.0000	113.5296	286.7735	460.9947	(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													

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Water heating requirement	221.4808	195.9063	208.4315	184.2310	179.1923	162.1440	160.6210	166.6895	168.1528	186.6693	197.4253	219.2121	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.4307	84.9869	84.2717	82.9397	81.2180	79.8000	79.8000	79.8000	79.8000	82.8178	84.7181	85.5205	(217)
Fuel for water heating, kWh/month	259.2519	230.5136	247.3327	222.1265	220.6313	203.1880	201.2794	208.8841	210.7178	225.3976	233.0381	256.3270	(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	21.9306	17.5936	15.8410	11.6058	8.9647	7.3242	8.1779	10.6299	13.8072	18.1158	20.4618	22.5401	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-15.6410	-23.4623	-35.8553	-42.9434	-48.6408	-46.2622	-45.7039	-41.9847	-35.8432	-27.9650	-17.6910	-13.3634	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-5.0100	-10.8252	-22.0612	-33.9520	-45.7057	-46.2224	-45.6744	-38.2922	-27.5766	-15.7387	-6.7703	-3.9405	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2036.3657	(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												2718.6881	(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)												176.9927	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-697.1255	(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												4320.9209	(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	2036.3657	0.2100	427.6368	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2718.6881	0.2100	570.9245	(264)
Space and water heating			998.5613	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	176.9927	0.1443	25.5455	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.3564	0.1333	-52.7034	
PV Unit electricity exported	-301.7691	0.1252	-37.7788	
Total			-90.4822	(269)
Total CO2, kg/year			945.5539	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.4100	(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	2036.3657	1.1300	2301.0932	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2718.6881	1.1300	3072.1176	(278)
Space and water heating			5373.2108	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	176.9927	1.5338	271.4772	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.3564	1.4926	-590.1104	
PV Unit electricity exported	-301.7691	0.4595	-138.6638	
Total			-728.7742	(283)
Total Primary energy kWh/year			5046.0146	(286)
Target Primary Energy Rate (TPER)			71.5500	(287)

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Plot Reference	A 109			Issued on Date	15/05/2026		
Assessment Reference	Be Green 260515		Plot Type Ref				
Plot Address				SAP Version	10.2		
SAP Rating	84 B		DER	4.63		TER	13.41
Environmental	96 A		% DER < TER				65.47
CO ₂ Emissions (t/year)	0.29		DFEE	31.05		TFEE	33.87
Compliance Check	See BREL		% DFEE < TFEE				8.32
% DPER < TPER	31.49		DPER	49.02		TPER	71.55
Assessor Details	Mr. Robert Tanner				Assessor ID	W344-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	70.5200 (1b)	2.8000 (2b)	197.4560 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.5200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	197.4560 (5)

2. Ventilation rate

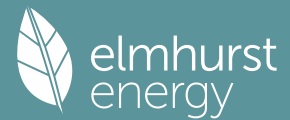
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1519 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.3019 (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) = 0.2340 (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	0.2983	0.2925	0.2866	0.2574	0.2515	0.2223	0.2223	0.2164	0.2340	0.2515	0.2632	0.2749 (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	0.5445	0.5428	0.5411	0.5331	0.5316	0.5247	0.5247	0.5234	0.5274	0.5316	0.5346	0.5378 (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			10.7200	1.1450	12.2748		(27)
Heatloss Floor 1			70.5200	0.1000	7.0520	110.0000	7757.2000 (28b)
External Wall 1	30.8000	10.7200	20.0800	0.1500	3.0120	70.0000	1405.5999 (29a)
Corridor wall	15.6000	2.4200	13.1800	0.1900	2.5042	70.0000	922.6000 (29a)
Total net area of external elements Aum(A, m ²)			116.9200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 27.2630		(33)
Main dwelling							
Party Wall 1			57.4000	0.0000	0.0000	70.0000	4018.0000 (32)
Party Ceiling 1			70.5200			30.0000	2115.6000 (32b)
Internal Wall 1			154.8400			9.0000	1393.5600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17612.5599 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							249.7527 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					6.6700	0.0500	0.3335
E3 Sill					3.1700	0.0400	0.1268

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E4 Jamb	15.6000	0.0400	0.6240
E7 Party floor between dwellings (in blocks of flats)	6.6400	0.0500	0.3320
E7 Party floor between dwellings (in blocks of flats)	5.5700	0.0390	0.2172
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.1000	0.4360
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180
E16 Corner (normal)	2.8000	0.0500	0.1400
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E20 Exposed floor (normal)	6.6400	0.1000	0.6640
E21 Exposed floor (inverted)	5.5700	0.1000	0.5570
E25 Staggered party wall between dwellings	2.8000	0.0500	0.1400
E25 Staggered party wall between dwellings	2.8000	0.0390	0.1092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.5000	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	20.5000	0.0800	1.6400
E16 Corner (normal)	2.8000	0.0390	0.1092
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0390	0.1092
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.8961 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =		33.1591 (37)

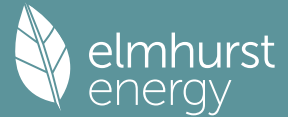
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	35.4802	35.3676	35.2572	34.7388	34.6418	34.1902	34.1902	34.1066	34.3642	34.6418	34.8380	35.0432 (38)
Average = Sum(39)m / 12 =	68.6394	68.5268	68.4164	67.8979	67.8009	67.3494	67.3494	67.2658	67.5233	67.8009	67.9972	68.2023 (39)
												67.8975
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9733	0.9717	0.9702	0.9628	0.9614	0.9550	0.9550	0.9539	0.9575	0.9614	0.9642	0.9671 (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												2.2587 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	26.2261	25.8302	25.2670	24.4236	23.6634	22.6170	21.8232	22.7939	23.3034	24.3402	25.4182	26.2053 (42b)
Hot water usage for other uses	37.7612	36.3880	35.0149	33.6418	32.2686	30.8955	30.8955	32.2686	33.6418	35.0149	36.3880	37.7612 (42c)
Average daily hot water use (litres/day)												58.6462 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	63.9873	62.2183	60.2819	58.0653	55.9321	53.5125	52.7187	55.0626	56.9452	59.3551	61.8063	63.9665 (44)
Energy content (annual)	94.2004	82.3274	86.1416	75.8479	72.0741	61.8855	58.2557	64.8097	66.0536	76.4851	83.5332	93.9395 (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	80.0703	69.9782	73.2204	64.4707	61.2630	52.6027	49.5173	55.0882	56.1455	65.0123	71.0032	79.8486 (64)
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	80.0703	69.9782	73.2204	64.4707	61.2630	52.6027	49.5173	55.0882	56.1455	65.0123	71.0032	79.8486 (64)
12Total per year (kWh/year)												778 (64)
Electric shower(s)	49.7240	44.3045	48.3788	46.1673	47.0336	44.8655	46.3610	47.0336	46.1673	48.3788	47.4691	49.7240 (64a)
Heat gains from water heating, kWh/month	32.4486	28.5707	30.3998	27.6595	27.0742	24.3670	23.9696	25.5305	25.5782	28.3478	29.6181	32.3931 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	105.5472	116.8558	105.5472	109.0654	105.5472	109.0654	105.5472	105.5472	109.0654	105.5472	109.0654	105.5472 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.5077	200.5675	195.3767	184.3260	170.3764	157.2658	148.5072	146.4473	151.6381	162.6888	176.6384	189.7490 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934 (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)	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473 (71)
Water heating gains (Table 5)	43.6137	42.5159	40.8599	38.4160	36.3900	33.8431	32.2172	34.3151	35.5253	38.1019	41.1362	43.5392 (72)
Total internal gains	404.5488	416.8195	398.6641	388.6876	369.1939	357.0546	343.1518	343.1898	353.1091	363.2181	383.7203	395.7156 (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							
Southeast	10.7200	36.7938	0.3500	0.7000	0.7700	66.9683 (77)						

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Solar gains	66.9683	114.0718	156.0779	193.3881	216.6108	215.0444	207.3258	190.0006	168.9994	126.0736	80.2126	57.3109 (83)
Total gains	471.5170	530.8912	554.7420	582.0758	585.8047	572.0990	550.4775	533.1904	522.1085	489.2917	463.9328	453.0265 (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	71.2765	71.3937	71.5089	72.0549	72.1580	72.6418	72.6418	72.7321	72.4547	72.1580	71.9497	71.7333
alpha	5.7518	5.7596	5.7673	5.8037	5.8105	5.8428	5.8428	5.8488	5.8303	5.8105	5.7966	5.7822
util living area	0.9964	0.9923	0.9843	0.9564	0.8826	0.7119	0.5316	0.5700	0.8009	0.9601	0.9917	0.9972 (86)
MIT	19.9367	20.0935	20.2985	20.5828	20.8212	20.9625	20.9941	20.9913	20.9247	20.6292	20.2362	19.9077 (87)
Th 2	20.1056	20.1070	20.1083	20.1144	20.1156	20.1210	20.1210	20.1220	20.1189	20.1156	20.1133	20.1108 (88)
util rest of house	0.9953	0.9898	0.9790	0.9410	0.8417	0.6306	0.4290	0.4665	0.7295	0.9429	0.9886	0.9963 (89)
MIT 2	19.1380	19.2947	19.4981	19.7778	19.9935	20.1035	20.1194	20.1194	20.0787	19.8260	19.4421	19.1133 (90)
Living area fraction	19.5056	19.6624	19.8665	20.1483	20.3745	20.4989	20.5220	20.5207	20.4681	20.1957	19.8076	19.4790 (92)
MIT	19.5056	19.6624	19.8665	20.1483	20.3745	20.4989	20.5220	20.5207	20.4681	20.1957	19.8076	19.4790 (93)
Temperature adjustment												0.0000
adjusted MIT	19.5056	19.6624	19.8665	20.1483	20.3745	20.4989	20.5220	20.5207	20.4681	20.1957	19.8076	19.4790 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9943	0.9883	0.9772	0.9416	0.8549	0.6670	0.4764	0.5144	0.7598	0.9447	0.9872	0.9954 (94)
Useful gains	468.8275	524.6577	542.0970	548.1035	500.7801	381.5737	262.2518	274.2518	396.6821	462.2382	458.0059	450.9464 (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	1043.7043	1011.6179	914.4871	763.7387	588.1374	397.2878	264.1468	277.1851	429.9950	650.5966	864.0826	1042.0629 (97)
Space heating kWh	427.7084	327.2373	277.0582	155.2573	64.9938	0.0000	0.0000	0.0000	0.0000	140.1386	292.3753	439.7906 (98a)
Space heating requirement - total per year (kWh/year)												2124.5595
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	427.7084	327.2373	277.0582	155.2573	64.9938	0.0000	0.0000	0.0000	0.0000	140.1386	292.3753	439.7906 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2124.5595
Space heating per m2												(98c) / (4) = 30.1270 (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	633.0841	498.3854	511.2197	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8484	0.9214	0.9043	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	537.1173	459.2030	462.2960	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	625.1383	602.1616	583.9269	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	63.3751	106.3612	90.4934	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	15.8438	26.5903	22.6233	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												65.0574 (107)
Energy for space heating												30.1270 (99)
Energy for space cooling												0.9225 (108)
Total												31.0496 (109)
Fabric Energy Efficiency (DFEE)												31.0 (109)

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

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	70.5200 (1b)	x 2.8000 (2b)	= 197.4560 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.5200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	197.4560 (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)

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Number of intermittent extract fans
Number of passive vents
Number of flueless gas fires

3 * 10 = 30.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1519 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.4019 (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) = 0.3115 (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	0.3972	0.3894	0.3816	0.3426	0.3349	0.2959	0.2959	0.2881	0.3115	0.3349	0.3504	0.3660 (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	0.5789	0.5758	0.5728	0.5587	0.5561	0.5438	0.5438	0.5415	0.5485	0.5561	0.5614	0.5670 (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			10.7200	1.1450	12.2748		(27)
Heatloss Floor 1			70.5200	0.1300	9.1676		(28b)
External Wall 1	30.8000	10.7200	20.0800	0.1800	3.6144		(29a)
Corridor wall	15.6000	2.4200	13.1800	0.1800	2.3724		(29a)
Total net area of external elements Aum(A, m2)			116.9200				(31)
Fabric heat loss, W/K = Sum (A x U)					29.8492		(33)
Main dwelling							
Party Wall 1			57.4000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							249.7527 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	6.6700	0.0500	0.3335
E3 Sill	3.1700	0.0500	0.1585
E4 Jamb	15.6000	0.0500	0.7800
E7 Party floor between dwellings (in blocks of flats)	6.6400	0.0700	0.4648
E7 Party floor between dwellings (in blocks of flats)	5.5700	0.0700	0.3899
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872
E16 Corner (normal)	2.8000	0.0900	0.2520
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E20 Exposed floor (normal)	6.6400	0.3200	2.1248
E21 Exposed floor (inverted)	5.5700	0.3200	1.7824
E25 Staggered 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)	20.5000	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	20.5000	0.1600	3.2800
E16 Corner (normal)	2.8000	0.0900	0.2520
E17 Corner (inverted - internal area greater than external area)	5.6000	-0.0900	-0.5040
E18 Party wall between dwellings	2.8000	0.0600	0.1680

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

Point Thermal Bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 40.0095 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	37.7193	37.5198	37.3241	36.4054	36.2335	35.4333	35.4333	35.2851	35.7415	36.2335	36.5812	36.9448 (38)
Heat transfer coeff	77.7288	77.5293	77.3337	76.4149	76.2430	75.4428	75.4428	75.2946	75.7510	76.2430	76.5908	76.9543 (39)
Average = Sum(39)m / 12 =												76.4141

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1022	1.0994	1.0966	1.0836	1.0812	1.0698	1.0698	1.0677	1.0742	1.0812	1.0861	1.0912 (40)
HLP (average)												1.0836
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2587 (42)

Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)

Hot water usage for baths 26.8241 26.4257 25.8647 24.8304 24.0558 23.1970 22.7331 23.2902 23.8967 24.8157 25.8714 26.7334 (42b)

Hot water usage for other uses 37.7612 36.3880 35.0149 33.6418 32.2686 30.8955 30.8955 32.2686 33.6418 35.0149 36.3880 37.7612 (42c)

Average daily hot water use (litres/day) 59.1985 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	64.5853	62.8138	60.8796	58.4721	56.3245	54.0925	53.6286	55.5588	57.5385	59.8306	62.2594	64.4946 (44)
Energy conte	102.2873	89.4460	93.5697	80.0454	75.8236	66.5130	64.8591	68.7934	70.9507	81.1896	88.6999	100.9829 (45)
Energy content (annual)												983.1607
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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	86.9442	76.0291	79.5343	68.0386	64.4500	56.5361	55.1303	58.4744	60.3081	69.0111	75.3950	85.8355 (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)

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PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	86.9442	76.0291	79.5343	68.0386	64.4500	56.5361	55.1303	58.4744	60.3081	69.0111	75.3950	85.8355 (64)
Total per year (kWh/year) = Sum(64)m =											835.6866 (64)	836 (64)
12Total per year (kWh/year)												
Electric shower(s)	49.7240	44.3045	48.3788	46.1673	47.0336	44.8655	46.3610	47.0336	46.1673	48.3788	47.4691	49.7240 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											565.6077 (64a)	
Heat gains from water heating, kWh/month	34.1671	30.0834	31.9783	28.5515	27.8709	25.3504	25.3728	26.3770	26.6189	29.3475	30.7160	33.8899 (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	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341	112.9341 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	105.5472	116.8558	105.5472	109.0654	105.5472	109.0654	105.5472	105.5472	109.0654	105.5472	109.0654	105.5472 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	198.5077	200.5675	195.3767	184.3260	170.3764	157.2658	148.5072	146.4473	151.6381	162.6888	176.6384	189.7490 (68)
Pumps, fans	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934	34.2934 (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)	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473	-90.3473 (71)
Total internal gains	45.9235	44.7670	42.9815	39.6548	37.4609	35.2089	34.1033	35.4530	36.9706	39.4455	42.6611	45.5509 (72)
	406.8585	419.0705	400.7857	389.9265	370.2648	358.4204	345.0378	344.3277	354.5544	364.5618	385.2452	397.7273 (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		
Southeast				10.7200	36.7938		0.6300		0.7000	0.7700		120.5429 (77)
Solar gains	120.5429	205.3292	280.9403	348.0987	389.8995	387.0800	373.1864	342.0011	304.1989	226.9325	144.3826	103.1596 (83)
Total gains	527.4014	624.3997	681.7260	738.0251	760.1643	745.5004	718.2242	686.3287	658.7534	591.4943	529.6278	500.8869 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	62.9416	63.1036	63.2632	64.0239	64.1682	64.8488	64.8488	64.9765	64.5850	64.1682	63.8769	63.5751
util living area	5.1961	5.2069	5.2175	5.2683	5.2779	5.3233	5.3233	5.3318	5.3057	5.2779	5.2585	5.2383
	0.9945	0.9862	0.9694	0.9186	0.8101	0.6235	0.4581	0.4980	0.7309	0.9357	0.9871	0.9957 (86)
MIT	19.8128	20.0290	20.2926	20.6202	20.8563	20.9722	20.9954	20.9930	20.9364	20.6311	20.1660	19.7789 (87)
Th 2	19.9990	20.0013	20.0036	20.0143	20.0163	20.0256	20.0256	20.0273	20.0220	20.0163	20.0122	20.0080 (88)
util rest of house	0.9927	0.9820	0.9596	0.8932	0.7560	0.5386	0.3588	0.3962	0.6499	0.9100	0.9822	0.9943 (89)
MIT 2	18.9298	19.1451	19.4044	19.7215	19.9247	20.0136	20.0245	20.0254	19.9904	19.7394	19.2907	18.9032 (90)
Living area fraction									fLA = Living area / (4) =			0.4603 (91)
MIT	19.3362	19.5519	19.8132	20.1352	20.3535	20.4548	20.4714	20.4708	20.4259	20.1498	19.6936	19.3063 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3362	19.5519	19.8132	20.1352	20.3535	20.4548	20.4714	20.4708	20.4259	20.1498	19.6936	19.3063 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9912	0.9795	0.9574	0.8967	0.7758	0.5770	0.4046	0.4432	0.6851	0.9140	0.9803	0.9930 (94)
Ext temp.	522.7349	611.6222	652.6860	661.7881	589.7233	430.1873	290.6232	304.1884	451.3056	540.6321	519.1732	497.4049 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	1168.7498	1135.9529	1029.5590	858.5348	659.7715	441.7051	292.0689	306.5087	479.1910	728.1091	964.5536	1162.4932 (97)
Space heating requirement - total per year (kWh/year)	480.6351	352.3502	280.3935	141.6576	52.1159	0.0000	0.0000	0.0000	0.0000	139.4829	320.6739	494.8257 (98a)
Solar heating kWh												2262.1347
Solar heating contribution - total per year (kWh/year)	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)
Space heating kWh	480.6351	352.3502	280.3935	141.6576	52.1159	0.0000	0.0000	0.0000	0.0000	139.4829	320.6739	494.8257 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2262.1347
Space heating per m ²										(98c) / (4) =		32.0779 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	709.1624	558.2768	572.2392	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8991	0.9499	0.9356	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	637.6123	530.3044	535.3808	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	827.5846	797.9108	762.7276	0.0000	0.0000	0.0000	0.0000 (103)
	0.0000	0.0000	0.0000	0.0000	0.0000	136.7801	199.0991	169.1461	0.0000	0.0000	0.0000	0.0000 (104)

Full SAP Calculation Printout



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 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	34.1950	49.7748	42.2865	0.0000	0.0000	0.0000 (107)
Space cooling requirement											126.2563 (107)
Energy for space heating											32.0779 (99)
Energy for space cooling											1.7904 (108)
Total											33.8683 (109)
Fabric Energy Efficiency (TFEE)											33.9 (109)