

Summary for Input Data

Property Reference	Flat 1B	Issued on Date	01/02/2024
Assessment Reference	Be Green	Prop Type Ref	Conversion
Property			

SAP Rating	75 C	DER	5.94	TER	6.71
Environmental	95 A	% DER < TER			11.48
CO ₂ Emissions (t/year)	0.46	DFEE	61.26	TFEE	29.38
Compliance Check	See BREL	% DFEE < TFEE			-108.47
% DPER < TPER	-72.41	DPER	62.43	TPER	36.21

Assessor Details	Mr. Matthew Ray	Assessor ID	T806-0001
Client			

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

Orientation	Southeast
Property Tenture	ND
Transaction Type	6
Terrain Type	Urban
1.0 Property Type	Flat, Semi-Detached
Position of Flat	Mid-floor flat
Which Floor	1
2.0 Number of Storeys	1
3.0 Date Built	2023
3.0 Property Age Band	L
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
Thermal Mass	N/A
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

kJ/m²K

7.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	11.70 m	85.10 m²	2.80 m
1st Storey:	0.00 m	0.00 m²	0.00 m
2nd Storey:	0.00 m	0.00 m²	0.00 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	44.00	m²
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9.0 External Walls	Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
	Existing Ext Wall	Cavity Wall	Cavity wall : dense plaster, dense block, filled cavity, any outside structure	0.18	190.00	16.52	12.67	0.00	None	3.85	Enter Gross Area
	New Ext Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	16.24	10.03	0.00	None	6.21	Enter Gross Area

9.1 Party Walls	Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
	Party Wall	Filled Cavity with Edge Sealing	Steel frame	0.00	20.00	43.40	0.00	None
	Party Wall to Adjacent	Solid Wall	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	180.00	19.60	0.00	None

9.2 Internal Walls	Description	Construction	Kappa (kJ/m²K)	Area (m²)
	Internal Wall	Plasterboard on timber frame	9.00	145.04

Summary for Input Data

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling	Timber I-joists, carpeted	20.00	85.10

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Floor Over Commercial	Exposed Floor - Timber	Lowest occupied	Timber exposed floor, insulation between joists	0.25	None	0.00	20.00	85.10

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance Door	Manufacturer	Solid Door			None	0.00	Wood	0.70	1.00
Windows	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.20
Patio Doors	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front Elevation	Windows	Existing Ext Wall	North West	3.85	0
Entrance Door	Entrance Door	New Ext Wall	South East	1.89	0
Patio Doors	Patio Doors	New Ext Wall	South East	4.32	0

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

Y-value

 W/m²K

18.0 Pressure Testing

Designed AP₅₀

 m³/(h.m²) @ 50 Pa

Property Tested?

Test Method

As Built AP₅₀

 m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Low energy Lighting	75.00	5	375	15

24.0 Main Heating 1

Percentage of Heat

 %

Database Ref. No.

Fuel Type

SAP Code

In Winter

In Summer

Model Name

Manufacturer

System Type

Controls SAP Code

PCDF Controls

Delayed Start Stat

HETAS approved System

Summary for Input Data

Oil Pump Inside	No
FI Case	0.00
FI Water	0.00
Flue Type	None or Unknown
Smoke Control Area	Unknown
Fan Assisted Flue	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in Wood
Flow Temperature	Enter value
Flow Temperature Value	35.00
Boiler Interlock	Yes
Electric CPSU Temperature	0.00

25.0 Main Heating 2	None
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26.0 Heat Networks	None
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	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None			0.00	0.00	0.00	0.00	0.00		
Heat source 2	None			0.00	0.00	0.00	0.00	0.00		
Heat source 3	None			0.00	0.00	0.00	0.00	0.00		
Heat source 4	None			0.00	0.00	0.00	0.00	0.00		
Heat source 5	None			0.00	0.00	0.00	0.00	0.00		

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Immersion Heater	Dual
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Baths connected to WWHRS	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

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

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Measured Loss
Insulation Thickness	0

Summary for Input Data



Cylinder Volume	210.00	L
Loss	1.94	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

31.0 Thermal Store

	None
Thermal Store Pipework	within a single casing

34.0 Small-scale Hydro

	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Recommendations

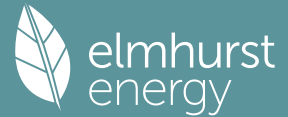
Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating			0	0
			0	0
			0	0

Full SAP Calculation Printout



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% DPER < TPER	-72.41	DPER	62.43	TPER	36.21	
Assessor Details	Mr. Matthew Ray				Assessor ID	T806-0001
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)
Ground floor	85.1000 (1b)	2.8000 (2b)	238.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1000		238.2800 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 238.2800 (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) = 0.1259 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8759 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7445 (21)

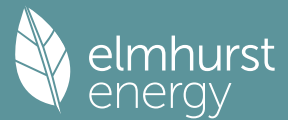
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9493	0.9306	0.9120	0.8190	0.8004	0.7073	0.7073	0.6887	0.7445	0.8004	0.8376	0.8748 (22b)
Effective ac	0.9505	0.9331	0.9159	0.8354	0.8203	0.7501	0.7501	0.7371	0.7772	0.8203	0.8508	0.8826 (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
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			3.8500	1.1450	4.4084		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.1000	0.2500	21.2750	20.0000	1702.0000 (28b)
Existing Ext Wall	16.5200	3.8500	12.6700	0.1800	2.2806	190.0000	2407.3000 (29a)
New Ext Wall	16.2400	6.2100	10.0300	0.1800	1.8054	9.0000	90.2700 (29a)
Total net area of external elements Aum(A, m ²)			117.8600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6060		(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Wall to Adjacent			19.6000	0.0000	0.0000	180.0000	3528.0000 (32)
Party Ceiling			85.1000			20.0000	1702.0000 (32b)
Internal Wall			145.0400			9.0000	1305.3600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11602.9300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							136.3447 (35)
Thermal bridges (Default value 0.200 * total exposed area)							23.5720 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	60.1780 (37)

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

Full SAP Calculation Printout



(38)m	Jan 74.7437	Feb 73.3681	Mar 72.0196	Apr 65.6860	May 64.5010	Jun 58.9846	Jul 58.9846	Aug 57.9630	Sep 61.1094	Oct 64.5010	Nov 66.8982	Dec 69.4044	(38)
Heat transfer coeff	134.9217	133.5460	132.1976	125.8639	124.6789	119.1625	119.1625	118.1410	121.2873	124.6789	127.0762	129.5824	(39)
Average = Sum(39)m / 12 =												125.8582	
HLP	Jan 1.5854	Feb 1.5693	Mar 1.5534	Apr 1.4790	May 1.4651	Jun 1.4003	Jul 1.4003	Aug 1.3883	Sep 1.4252	Oct 1.4651	Nov 1.4933	Dec 1.5227	(40)
HLP (average)												1.4789	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5525	(42)
Hot water usage for mixer showers														
67.0175	66.0104	64.5428	61.7348	59.6625	57.3516	56.0381	57.4946	59.0912	61.5724	64.4407	66.7607	66.7607	(42a)	
Hot water usage for baths														
28.9429	28.5131	27.9078	26.7917	25.9560	25.0293	24.5288	25.1299	25.7843	26.7759	27.9150	28.8451	28.8451	(42b)	
Hot water usage for other uses														
40.7706	39.2880	37.8055	36.3229	34.8403	33.3578	33.3578	34.8403	36.3229	37.8055	39.2880	40.7706	40.7706	(42c)	
Average daily hot water use (litres/day)												125.6868	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
136.7311	133.8115	130.2560	124.8494	120.4589	115.7387	113.9246	117.4648	121.1984	126.1538	131.6437	136.3764	136.3764	(44)	
Energy content (annual)	216.5486	190.5458	200.1987	170.9126	162.1608	142.3142	137.7820	145.4459	149.4497	171.1895	187.5506	213.5326	(45)	
Energy content (annual)										Total = Sum(45)m =		2087.6309		
Distribution loss (46)m = 0.15 x (45)m														
32.4823	28.5819	30.0298	25.6369	24.3241	21.3471	20.6673	21.8169	22.4175	25.6784	28.1326	32.0299	32.0299	(46)	
Water storage loss:														
Store volume												210.0000	(47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.9400	(48)	
Temperature factor from Table 2b												0.5400	(49)	
Enter (49) or (54) in (55)												1.0476	(55)	
Total storage loss														
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	(56)	
If cylinder contains dedicated solar storage														
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	(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														
272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	269.2706	(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														
272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	269.2706	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2743.9009	(64)	
Electric shower(s)												2744	(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	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														
116.5928	103.6317	111.1565	99.9804	98.5089	90.4715	90.4029	92.9512	92.8440	101.5109	105.5126	115.5900	115.5900	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 127.6272	Feb 127.6272	Mar 127.6272	Apr 127.6272	May 127.6272	Jun 127.6272	Jul 127.6272	Aug 127.6272	Sep 127.6272	Oct 127.6272	Nov 127.6272	Dec 127.6272	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
131.1923	145.2486	131.1923	135.5654	131.1923	135.5654	131.1923	135.5654	131.1923	135.5654	131.1923	135.5654	131.1923	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
229.7690	232.1533	226.1450	213.3540	197.2077	182.0324	171.8944	169.5101	175.5184	188.3094	204.4557	219.6310	219.6310	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	(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)													
-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	(71)
Water heating gains (Table 5)													
156.7108	154.2138	149.4038	138.8617	132.4044	125.6548	121.5093	124.9344	128.9501	136.4394	146.5452	155.3629	155.3629	(72)
Total internal gains													
578.9602	592.9039	568.0293	549.0692	522.0925	504.5407	485.8841	486.9249	501.3220	517.2292	547.8545	567.4743	567.4743	(73)

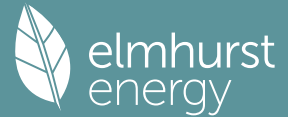
6. Solar gains

[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							
Northwest	3.8500	11.2829	0.6300	0.8000	0.7700	15.1721	(81)						
Southeast	4.3200	36.7938	0.6300	0.8000	0.7700	55.5166	(77)						
Solar gains	70.6887	125.4486	185.0302	251.6984	302.4026	309.2240	294.3762	255.1713	207.9007	142.2566	85.5865	59.9009	(83)
Total gains	649.6489	718.3524	753.0595	800.7676	824.4951	813.7648	780.2602	742.0962	709.2227	659.4858	633.4410	627.3753	(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	23.8882	24.1343	24.3805	25.6073	25.8507	27.0474	27.0474	27.2813	26.5736	25.8507	25.3630	24.8725
alpha	2.5925	2.6090	2.6254	2.7072	2.7234	2.8032	2.8032	2.8188	2.7716	2.7234	2.6909	2.6582
util living area												
	0.9714	0.9611	0.9459	0.9083	0.8412	0.7127	0.5792	0.6152	0.7924	0.9152	0.9584	0.9737 (86)

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Living	18.1617	18.4355	18.8752	19.5694	20.1592	20.6647	20.8671	20.8400	20.4986	19.7492	18.9232	18.2155
Non living	16.3900	16.7427	17.3051	18.2028	18.9223	19.5166	19.6994	19.6891	19.3399	18.4419	17.3950	16.4827
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.5480	18.4355	18.8752	19.5694	20.1592	20.6647	20.8671	20.8400	20.4986	19.7492	18.9232	18.6050 (87)
Th 2	19.6240	19.6359	19.6477	19.7033	19.7138	19.7631	19.7631	19.7723	19.7440	19.7138	19.6926	19.6705 (88)
util rest of house	0.9654	0.9530	0.9337	0.8859	0.7973	0.6274	0.4484	0.4894	0.7217	0.8902	0.9484	0.9682 (89)
MIT 2	18.3347	16.7427	17.3051	18.2028	18.9223	19.5166	19.6994	19.6891	19.3399	18.4419	17.3950	17.0572 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	18.9620	17.6179	18.1169	18.9094	19.5618	20.1102	20.3032	20.2841	19.9390	19.1178	18.1851	17.8574 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9620	17.6179	18.1169	18.9094	19.5618	20.1102	20.3032	20.2841	19.9390	19.1178	18.1851	17.8574 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9619	0.9360	0.9151	0.8687	0.7912	0.6538	0.5094	0.5459	0.7343	0.8753	0.9324	0.9581 (94)
Useful gains	624.8710	672.3833	689.1328	695.6024	652.3039	532.0439	397.4669	405.1270	520.8017	577.2443	590.6179	601.0660 (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	1978.2287	1698.4277	1535.7235	1259.8187	980.2011	656.6074	441.2771	458.8756	708.1989	1061.9899	1408.6548	1769.7645 (97)
Space heating kWh	1006.8982	689.5018	629.8635	406.2357	243.9555	0.0000	0.0000	0.0000	0.0000	360.6507	588.9866	869.5116 (98a)
Space heating requirement - total per year (kWh/year)												4795.6037
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	1006.8982	689.5018	629.8635	406.2357	243.9555	0.0000	0.0000	0.0000	0.0000	360.6507	588.9866	869.5116 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4795.6037
Space heating per m2										(98c) / (4) =		56.3526 (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 %)												324.7603 (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	1006.8982	689.5018	629.8635	406.2357	243.9555	0.0000	0.0000	0.0000	0.0000	360.6507	588.9866	869.5116 (98)
Space heating efficiency (main heating system 1)	324.7603	324.7603	324.7603	324.7603	324.7603	0.0000	0.0000	0.0000	0.0000	324.7603	324.7603	324.7603 (210)
Space heating fuel (main heating system)	310.0435	212.3110	193.9472	125.0879	75.1187	0.0000	0.0000	0.0000	0.0000	111.0514	181.3604	267.7395 (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	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706 (64)
Efficiency of water heater (217)m	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722 (216)
Fuel for water heating, kWh/month	168.8367	149.3685	158.6986	139.4243	135.1125	121.6913	119.9959	124.7481	126.1158	140.7109	149.7410	166.9665 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.6233	26.1716	23.5646	17.2645	13.3356	10.8953	12.1651	15.8127	20.5392	26.9485	30.4383	33.5300 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)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 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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												1476.6595 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												161.2722
Water heating fuel used												1701.4101 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												263.2885 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (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												3441.3582 (238)

Full SAP Calculation Printout



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	1476.6595	0.1545	228.1140	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1701.4101	0.1409	239.7163	(264)
Space and water heating			467.8302	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	263.2885	0.1443	38.0007	(268)
Total CO2, kg/year			505.8309	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.9400	(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	1476.6595	1.5719	2321.1312	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1701.4101	1.5210	2587.7935	(278)
Space and water heating			4908.9247	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	263.2885	1.5338	403.8407	(282)
Total Primary energy kWh/year			5312.7654	(286)
Dwelling Primary energy Rate (DPER)			62.4300	(287)

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)	
Ground floor	85.1000	(1b)	x 2.8000	(2b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1000		= 238.2800	(1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.2800	(4)

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	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) = 0.1259 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3759 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3195 (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	0.4074	0.3994	0.3914	0.3515	0.3435	0.3035	0.3035	0.2956	0.3195	0.3435	0.3595	0.3754	(22b)
Effective ac	0.5830	0.5798	0.5766	0.5618	0.5590	0.5461	0.5461	0.5437	0.5510	0.5590	0.5646	0.5705	(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	
TER Opaque door			1.8900	1.0000	1.8900			(26)
TER Opening Type (Uw = 1.20)			8.1700	1.1450	9.3550			(27)
Floor Over Commercial			85.1000	0.1300	11.0630			(28b)
Existing Ext Wall	16.5200	3.8500	12.6700	0.1800	2.2806			(29a)
New Ext Wall	16.2400	6.2100	10.0300	0.1800	1.8054			(29a)
Total net area of external elements Aum (A, m2)			117.8600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.3940			(33)
Party Wall			43.4000	0.0000	0.0000			(32)
Party Wall to Adjacent			19.6000	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							146.3447	(35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.8930	(36)

elmhurst
energy

$$\begin{aligned} (33) + (36) + (36a) &= 32.2870 \quad (37) \end{aligned}$$
[illegible]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9181	0.9151	0.9122	0.8985	0.8959	0.8840	0.8840	0.8818	0.8886	0.8959	0.9011	0.9065 (40)
HLP (average)												0.8985
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy	2.5525 (42)
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[illegible]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	136.7311	133.8115	130.2560	124.8494	120.4589	115.7387	113.9246	117.4648	121.1984	126.1538	131.6437	136.3764 (44)
Energy conte	216.5486	190.5458	200.1987	170.9126	162.1608	142.3142	137.7820	145.4459	149.4497	171.1895	187.5506	213.5326 (45)
Energy content (annual)										Total =	Sum(45)m =	2087.6309

Energy content (umadaz)											Total = Sum(45)m = 2007.0503	
Distribution loss (46)m = 0.15 x (45)m												
	32.4823	28.5819	30.0298	25.6369	24.3241	21.3471	20.6673	21.8169	22.4175	25.6784	28.1326	32.0299 (46)
Water storage loss:												

[illegible]

Total storage loss	28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842 (56)
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[illegible]

	28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842 (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												

268.2952	237.2847	251.9453	220.9899	213.9074	192.3916	189.5286	197.1925	199.5271	222.9361	237.6279	265.2791 (62)
20.6376	27.0062	20.3735	22.4044	21.0050	10.7325	17.5625	10.6750	10.3055	22.0524	25.0001	20.0702 (63)

[illegible][illegible][illegible]

237.6576	210.1885	223.5717	197.4955	192.0114	173.6551	171.9661	178.5166	180.1416	200.0827	211.7378	235.2089	(64)
Total per year (kWh/year) = Sum(64)m = 2412.2335 (64)												

12Total per year (kWh/year)	2412 (64)
Electricity charges (€)	2412 (64)

[illegible]

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month	113.3997	100.7476	107.9633	96.8903	95.3157	87.3814	87.2098	89.7580	89.7539	98.3178	102.4225	112.3968 (65)
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Metabolic gains (Table 5), Watts

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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[illegible]

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

134.9654 149.4260 134.9654 139.4643 134.9654 139.4643 134.9654 134.9654 139.4643 134.9654 139.4643 134.9654 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

229.7690 232.1533 226.1450 213.3540 197.2077 182.0324 171.8944 169.5101 175.5184 188.3094 204.4557 219.6310 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a); also see Table 5

[illegible]

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)												

Water heating gains (Table 5)

Water heating gains (Table 5)	152.4189	149.9220	145.1120	134.5699	128.1126	121.3630	117.2174	120.6425	124.6582	132.1475	142.2534	151.0710 (72)
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Total internal gains	501,4415	505,7004	570,5106	551,6762	504,5730	504,1470	405,2654	406,4060	500,0000	510,7105	550,4616	560,0556	473,1111
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581.4415	595.7894	570.5106	551.6763	524.5738	504.1478	485.3654	486.4062	500.9290	519.7105	550.4616	569.9556 (73)
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[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	4.3200	36.7938	0.6300	0.7000	0.7700	48.5770 (77)
Northwest	3.8500	11.2829	0.6300	0.7000	0.7700	13.2756 (81)

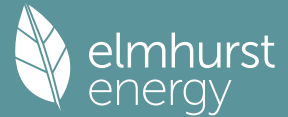
Solar gains	61.8526	109.7675	161.9014	220.2361	264.6023	270.5710	257.5791	223.2749	181.9131	124.4745	74.8882	52.4133 (83)
Total gains	643.2941	705.5569	732.4120	771.9124	789.1761	774.7188	742.9445	709.6811	682.8422	644.1850	625.3498	622.3689 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
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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	44.2789	44.4229	44.5650	45.2450	45.3745	45.9873	45.9873	46.1026	45.7493	45.3745	45.1132	44.8433

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alpha	3.9519	3.9615	3.9710	4.0163	4.0250	4.0658	4.0658	4.0735	4.0500	4.0250	4.0075	3.9896
util living area	0.9680	0.9524	0.9281	0.8659	0.7560	0.5841	0.4361	0.4728	0.6825	0.8745	0.9476	0.9714 (86)
MIT	19.6363	19.8357	20.1070	20.4837	20.7737	20.9415	20.9859	20.9805	20.8876	20.5380	20.0489	19.6128 (87)
Th 2	20.1522	20.1547	20.1572	20.1688	20.1710	20.1811	20.1811	20.1830	20.1772	20.1710	20.1666	20.1620 (88)
util rest of house	0.9624	0.9442	0.9154	0.8421	0.7139	0.5204	0.3588	0.3942	0.6218	0.8476	0.9373	0.9664 (89)
MIT 2	18.5630	18.8149	19.1555	19.6228	19.9580	20.1379	20.1739	20.1724	20.0868	19.6965	19.0943	18.5403 (90)
Living area fraction	19.1180	19.3427	19.6475	20.0679	20.3798	20.5534	20.5938	20.5902	20.5009	20.1316	19.5879	19.0948 (92)
MIT												0.5170 (91)
Temperature adjustment												0.0000
adjusted MIT	19.1180	19.3427	19.6475	20.0679	20.3798	20.5534	20.5938	20.5902	20.5009	20.1316	19.5879	19.0948 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9539	0.9348	0.9064	0.8389	0.7250	0.5501	0.3983	0.4339	0.6467	0.8461	0.9287	0.9583 (94)
Useful gains	613.6473	659.5480	663.8566	647.5453	572.1917	426.1448	295.8780	307.9623	441.5800	545.0628	580.7357	596.4429 (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	1157.6994	1124.7206	1020.5910	853.8956	661.7588	447.8505	300.4326	314.4215	484.0135	726.7071	957.6094	1149.0565 (97)
Space heating kWh	404.7748	312.5960	265.4104	148.5722	66.6379	0.0000	0.0000	0.0000	0.0000	135.1433	271.3491	411.1445 (98a)
Space heating requirement - total per year (kWh/year)												2015.6282
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	404.7748	312.5960	265.4104	148.5722	66.6379	0.0000	0.0000	0.0000	0.0000	135.1433	271.3491	411.1445 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2015.6282
Space heating per m2										(98c) / (4) =		23.6854 (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	404.7748	312.5960	265.4104	148.5722	66.6379	0.0000	0.0000	0.0000	0.0000	135.1433	271.3491	411.1445 (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)	438.5425	338.6739	287.5519	160.9666	72.1970	0.0000	0.0000	0.0000	0.0000	146.4175	293.9860	445.4437 (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	237.6576	210.1885	223.5717	197.4955	192.0114	173.6551	171.9661	178.5166	180.1416	200.0827	211.7378	235.2089 (64)
Efficiency of water heater (217)m	85.2435	84.9481	84.4455	83.4302	81.9396	79.8000	79.8000	79.8000	79.8000	83.1994	84.6172	79.8000 (216)
Fuel for water heating, kWh/month	278.7985	247.4318	264.7527	236.7195	234.3329	217.6129	215.4963	223.7050	225.7413	240.4856	250.2304	85.2992 (217)
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	28.0431	22.4973	20.2563	14.8406	11.4633	9.3656	10.4572	13.5927	17.6556	23.1651	26.1649	28.8226 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-65.2726	-85.5354	-114.3379	-119.2407	-121.2287	-110.6229	-109.2623	-106.6503	-101.1323	-93.2035	-69.4268	-57.2296 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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)	-59.3305	-121.3465	-235.1159	-344.7270	-448.0345	-447.4061	-442.0911	-377.7203	-281.5270	-170.4939	-78.1669	-47.1778 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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												2183.7792 (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												2911.0527 (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)												226.3243 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-4206.2807 (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												1200.8754 (238)

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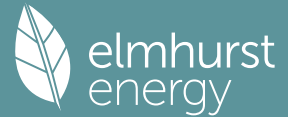
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2183.7792	0.2100	458.5936 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2911.0527	0.2100	611.3211 (264)
Space and water heating			1069.9147 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	226.3243	0.1443	32.6656 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1153.1431	0.1362	-157.0458
PV Unit electricity exported	-3053.1377	0.1266	-386.5954
Total			-543.6412 (269)
Total CO2, kg/year			570.8683 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			6.7100 (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	2183.7792	1.1300	2467.6705 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2911.0527	1.1300	3289.4895 (278)
Space and water heating			5757.1600 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	226.3243	1.5338	347.1437 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1153.1431	1.5034	-1733.6582
PV Unit electricity exported	-3053.1377	0.4648	-1419.1689
Total			-3152.8271 (283)
Total Primary energy kWh/year			3081.5774 (286)
Target Primary Energy Rate (TPER)			36.2100 (287)

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Property Reference	Flat 1B				Issued on Date	01/02/2024	
Assessment Reference	Be Green			Prop Type Ref	Conversion		
Property							
SAP Rating	75 C		DER	5.94		TER	6.71
Environmental	95 A		% DER < TER				11.48
CO ₂ Emissions (t/year)	0.46		DFEE	61.26		TFEE	29.38
Compliance Check	See BREL		% DFEE < TFEE				-108.47
% DPER < TPER	-72.41		DPER	62.43		TPER	36.21
Assessor Details	Mr. Matthew Ray					Assessor ID	T806-0001
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)
Ground floor	85.1000 (1b)	2.8000 (2b)	238.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	238.2800 (5)

2. Ventilation rate

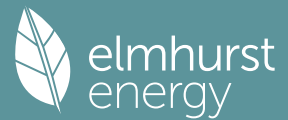
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1259 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8759 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7445 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9493	0.9306	0.9120	0.8190	0.8004	0.7073	0.7073	0.6887	0.7445	0.8004	0.8376	0.8748 (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	0.9505	0.9331	0.9159	0.8354	0.8203	0.7501	0.7501	0.7371	0.7772	0.8203	0.8508	0.8826 (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
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			3.8500	1.1450	4.4084		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.1000	0.2500	21.2750	20.0000	1702.0000 (28b)
Existing Ext Wall	16.5200	3.8500	12.6700	0.1800	2.2806	190.0000	2407.3000 (29a)
New Ext Wall	16.2400	6.2100	10.0300	0.1800	1.8054	9.0000	90.2700 (29a)
Total net area of external elements Aum(A, m ²)			117.8600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6060		(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Wall to Adjacent			19.6000	0.0000	0.0000	180.0000	3528.0000 (32)
Party Ceiling			85.1000			30.0000	2553.0000 (32b)
Internal Wall			145.0400			9.0000	1305.3600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12453.9300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							146.3447 (35)
Thermal bridges (Default value 0.200 * total exposed area)							23.5720 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	60.1780 (37)

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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	74.7437	73.3681	72.0196	65.6860	64.5010	58.9846	58.9846	57.9630	61.1094	64.5010	66.8982	69.4044	(38)
Heat transfer coeff	134.9217	133.5460	132.1976	125.8639	124.6789	119.1625	119.1625	118.1410	121.2873	124.6789	127.0762	129.5824	(39)
Average = Sum(39)m / 12 =												125.8582	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.5854	1.5693	1.5534	1.4790	1.4651	1.4003	1.4003	1.3883	1.4252	1.4651	1.4933	1.5227	(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													2.5525 (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	28.9429	28.5131	27.9078	26.7917	25.9560	25.0293	24.5288	25.1299	25.7843	26.7759	27.9150	28.8451	(42b)
Hot water usage for other uses	40.7706	39.2880	37.8055	36.3229	34.8403	33.3578	33.3578	34.8403	36.3229	37.8055	39.2880	40.7706	(42c)
Average daily hot water use (litres/day)												63.8989	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	69.7136	67.8011	65.7133	63.1146	60.7963	58.3871	57.8866	59.9702	62.1072	64.5814	67.2030	69.6157	(44)
Energy content (annual)	110.4092	96.5479	100.9988	86.4008	81.8436	71.7938	70.0088	74.2556	76.5844	87.6363	95.7430	109.0014	(45)
Distribution loss (46)m = 0.15 x (45)m												1061.2236	
Water 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	(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	93.8478	82.0657	85.8490	73.4406	69.5670	61.0247	59.5075	63.1173	65.0968	74.4909	81.3815	92.6512	(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	93.8478	82.0657	85.8490	73.4406	69.5670	61.0247	59.5075	63.1173	65.0968	74.4909	81.3815	92.6512	(64)
12Total per year (kWh/year)												902.0401	(64)
Electric shower(s)	53.6699	47.8203	52.2179	49.8309	50.7660	48.4258	50.0400	50.7660	49.8309	52.2179	51.2360	53.6699	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												610.4915	(64a)
Heat gains from water heating, kWh/month	36.8794	32.4715	34.5167	30.8179	30.0833	27.3626	27.3869	28.4708	28.7319	31.6772	33.1544	36.5803	(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	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	131.1923	145.2486	131.1923	135.5654	131.1923	135.5654	131.1923	131.1923	135.5654	131.1923	135.5654	131.1923	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.7690	232.1533	226.1450	213.3540	197.2077	182.0324	171.8944	169.5101	175.5184	188.3094	204.4557	219.6310	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	(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)	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	(71)
Water heating gains (Table 5)	49.5691	48.3207	46.3935	42.8026	40.4345	38.0036	36.8103	38.2672	39.9054	42.5769	46.0478	49.1670	(72)
Total internal gains	471.8186	487.0108	465.0189	453.0101	430.1226	416.8895	401.1851	400.2577	412.2774	423.3667	447.3570	461.2785	(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	
Northwest					3.8500	11.2829		0.6300	0.8000	0.7700		15.1721 (81)	
Southeast					4.3200	36.7938		0.6300	0.8000	0.7700		55.5166 (77)	
Solar gains	70.6887	125.4486	185.0302	251.6984	302.4026	309.2240	294.3762	255.1713	207.9007	142.2566	85.5865	59.9009	(83)
Total gains	542.5073	612.4593	650.0491	704.7085	732.5252	726.1136	695.5613	655.4291	620.1781	565.6233	532.9435	521.1794	(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	25.6402	25.9044	26.1686	27.4854	27.7467	29.0312	29.0312	29.2822	28.5226	27.7467	27.2232	26.6967	
alpha	2.7093	2.7270	2.7446	2.8324	2.8498	2.9354	2.9354	2.9521	2.9015	2.8498	2.8149	2.7798	
util living area	0.9839	0.9765	0.9654	0.9361	0.8800	0.7639	0.6332	0.6734	0.8426	0.9447	0.9758	0.9856	(86)
MIT	18.1181	18.3884	18.8221	19.5147	20.1111	20.6351	20.8528	20.8203	20.4518	19.6839	18.8633	18.1691	(87)
Th 2	19.6240	19.6359	19.6477	19.7033	19.7138	19.7631	19.7631	19.7723	19.7440	19.7138	19.6926	19.6705	(88)

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util rest of house	0.9802	0.9711	0.9568	0.9186	0.8420	0.6813	0.4968	0.5441	0.7792	0.9262	0.9693	0.9824 (89)
MIT 2	17.0499	17.3253	17.7623	18.4776	19.0536	19.5515	19.7080	19.6988	19.3930	18.6564	17.8348	17.1300 (90)
Living area fraction									FLA = Living area / (4) =			0.5170 (91)
MIT	17.6022	17.8750	18.3103	19.0138	19.6004	20.1118	20.2999	20.2787	19.9404	19.1877	18.3666	17.6672 (92)
Temperature adjustment												0.0000
adjusted MIT	17.6022	17.8750	18.3103	19.0138	19.6004	20.1118	20.2999	20.2787	19.9404	19.1877	18.3666	17.6672 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9724	0.9613	0.9453	0.9067	0.8380	0.7074	0.5609	0.6025	0.7909	0.9163	0.9602	0.9754	(94)
Useful gains	527.5284	588.7393	614.4595	638.9551	613.8304	513.6254	390.1073	394.9154	490.4687	518.2706	511.7343	508.3407	(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	1794.7522	1732.7532	1561.2883	1272.9655	985.0124	656.7940	440.8897	458.2288	708.3723	1070.7031	1431.7138	1745.1159	(97)
Space heating kWh	942.8145	768.7774	704.4406	456.4875	276.1594	0.0000	0.0000	0.0000	0.0000	411.0098	662.3853	920.1608	(98a)
Space heating requirement - total per year (kWh/year)												5142.2352	
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	942.8145	768.7774	704.4406	456.4875	276.1594	0.0000	0.0000	0.0000	0.0000	411.0098	662.3853	920.1608	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5142.2352	
Space heating per m2										(98c) / (4) =		60.4258	(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	1120.1276	881.8026	897.8713	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6036	0.6848	0.6537	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	676.0844	603.8623	586.8958	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	786.5220	753.7670	709.5605	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	79.5151	111.5291	91.2625	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	19.8788	27.8823	22.8156	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												70.5767 (107)
Energy for space heating												60.4258 (99)
Energy for space cooling												0.8293 (108)
Total												61.2551 (109)
Fabric Energy Efficiency (DFEE)												61.3 (109)

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

1. Overall dwelling characteristics

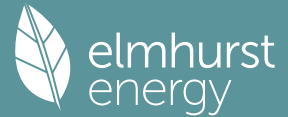
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	85.1000 (1b)	x 2.8000 (2b)	= 238.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.2800 (5)

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	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) = 0.1259 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3759 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3195 (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)

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Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.4074	0.3994	0.3914	0.3515	0.3435	0.3035	0.3035	0.2956	0.3195	0.3435	0.3595	0.3754 (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	0.5830	0.5798	0.5766	0.5618	0.5590	0.5461	0.5461	0.5437	0.5510	0.5590	0.5646	0.5705 (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
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.20)			8.1700	1.1450	9.3550		(27)
Floor Over Commercial			85.1000	0.1300	11.0630		(28b)
Existing Ext Wall	16.5200	3.8500	12.6700	0.1800	2.2806		(29a)
New Ext Wall	16.2400	6.2100	10.0300	0.1800	1.8054		(29a)
Total net area of external elements Aum(A, m ²)			117.8600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.3940		(33)
Party Wall			43.4000	0.0000	0.0000		(32)
Party Wall to Adjacent			19.6000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							146.3447 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.8930 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	32.2870 (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	45.8412	45.5878	45.3395	44.1729	43.9547	42.9387	42.9387	42.7505	43.3300	43.9547	44.3962	44.8578 (38)
Average = Sum(39)m / 12 =	78.1281	77.8748	77.6264	76.4599	76.2416	75.2256	75.2256	75.0375	75.6170	76.2416	76.6832	77.1448 (39)
												76.4589
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9181	0.9151	0.9122	0.8985	0.8959	0.8840	0.8840	0.8818	0.8886	0.8959	0.9011	0.9065 (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												2.5525 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	28.9429	28.5131	27.9078	26.7917	25.9560	25.0293	24.5288	25.1299	25.7843	26.7759	27.9150	28.8451 (42b)
Hot water usage for other uses	40.7706	39.2880	37.8055	36.3229	34.8403	33.3578	33.3578	34.8403	36.3229	37.8055	39.2880	40.7706 (42c)
Average daily hot water use (litres/day)												63.8989 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	69.7136	67.8011	65.7133	63.1146	60.7963	58.3871	57.8866	59.9702	62.1072	64.5814	67.2030	69.6157 (44)
Energy content (annual)	110.4092	96.5479	100.9988	86.4008	81.8436	71.7938	70.0088	74.2556	76.5844	87.6363	95.7430	109.0014 (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:												
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												
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 (57)
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 (59)
Total heat required for water heating calculated for each month	93.8478	82.0657	85.8490	73.4406	69.5670	61.0247	59.5075	63.1173	65.0968	74.4909	81.3815	92.6512 (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	93.8478	82.0657	85.8490	73.4406	69.5670	61.0247	59.5075	63.1173	65.0968	74.4909	81.3815	92.6512 (64)
12Total per year (kWh/year)												902.0401 (64)
Electric shower(s)	53.6699	47.8203	52.2179	49.8309	50.7660	48.4258	50.0400	50.7660	49.8309	52.2179	51.2360	53.6699 (64a)
Heat gains from water heating, kWh/month	36.8794	32.4715	34.5167	30.8179	30.0833	27.3626	27.3869	28.4708	28.7319	31.6772	33.1544	36.5803 (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	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	134.9654	149.4260	134.9654	139.4643	134.9654	139.4643	134.9654	139.4643	139.4643	134.9654	139.4643	134.9654 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	229.7690	232.1533	226.1450	213.3540	197.2077	182.0324	171.8944	169.5101	175.5184	188.3094	204.4557	219.6310 (68)
Pumps, fans	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627 (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)	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018 (71)
Total internal gains	49.5691	48.3207	46.3935	42.8026	40.4345	38.0036	36.8103	38.2672	39.9054	42.5769	46.0478	49.1670 (72)
	475.5917	491.1882	468.7920	456.9090	433.8957	420.7884	404.9582	404.0309	416.1763	427.1398	451.2559	465.0516 (73)

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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				4.3200	36.7938	0.6300	0.7000	0.7700	48.5770 (77)			
Northwest				3.8500	11.2829	0.6300	0.7000	0.7700	13.2756 (81)			
Solar gains	61.8526	109.7675	161.9014	220.2361	264.6023	270.5710	257.5791	223.2749	181.9131	124.4745	74.8882	52.4133 (83)
Total gains	537.4443	600.9557	630.6935	677.1451	698.4980	691.3595	662.5374	627.3058	598.0894	551.6144	526.1441	517.4649 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	44.2789	44.4229	44.5650	45.2450	45.3745	45.9873	45.9873	46.1026	45.7493	45.3745	45.1132	44.8433
alpha	3.9519	3.9615	3.9710	4.0163	4.0250	4.0658	4.0658	4.0735	4.0500	4.0250	4.0075	3.9896
util living area	0.9821	0.9710	0.9533	0.9032	0.8070	0.6386	0.4843	0.5274	0.7438	0.9158	0.9692	0.9844 (86)
MIT	19.4466	19.6586	19.9498	20.3695	20.7074	20.9193	20.9795	20.9711	20.8449	20.4209	19.8829	19.4219 (87)
Th 2	20.1522	20.1547	20.1572	20.1688	20.1710	20.1811	20.1811	20.1830	20.1772	20.1710	20.1666	20.1620 (88)
util rest of house	0.9788	0.9656	0.9443	0.8840	0.7684	0.5732	0.4003	0.4425	0.6851	0.8952	0.9626	0.9815 (89)
MIT 2	18.7276	18.9386	19.2266	19.6399	19.9514	20.1335	20.1727	20.1704	20.0769	19.6962	19.1709	18.7105 (90)
Living area fraction	19.0993	19.3109	19.6005	20.0171	20.3423	20.5398	20.5899	20.5844	20.4740	20.0709	19.5390	19.0783 (92)
MIT	19.0993	19.3109	19.6005	20.0171	20.3423	20.5398	20.5899	20.5844	20.4740	20.0709	19.5390	19.0783 (93)
Temperature adjustment												0.0000
adjusted MIT	19.0993	19.3109	19.6005	20.0171	20.3423	20.5398	20.5899	20.5844	20.4740	20.0709	19.5390	19.0783 (93)

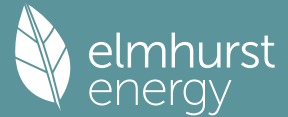
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9735	0.9590	0.9372	0.8801	0.7770	0.6028	0.4429	0.4852	0.7075	0.8923	0.9565	0.9767 (94)
Useful gains	523.1930	576.3331	591.0750	595.9285	542.7072	416.7349	293.4555	304.3422	423.1670	492.2101	503.2375	505.4003 (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	1156.2431	1122.2443	1016.9453	850.0147	658.9036	446.8257	300.1398	313.9851	481.9814	722.0766	953.8619	1147.7827 (97)
Space heating kWh	470.9893	366.8523	316.8474	182.9421	86.4501	0.0000	0.0000	0.0000	0.0000	171.0207	324.4495	477.9325 (98a)
Space heating requirement - total per year (kWh/year)												2397.4839
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	470.9893	366.8523	316.8474	182.9421	86.4501	0.0000	0.0000	0.0000	0.0000	171.0207	324.4495	477.9325 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2397.4839
Space heating per m2										(98c) / (4) =		28.1725 (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	707.1211	556.6698	570.2850	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8213	0.8871	0.8631	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	580.7321	493.8126	492.2151	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	741.6733	711.1143	672.7426	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	115.8776	161.6724	134.3125	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	28.9694	40.4181	33.5781	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												102.9656 (107)
Energy for space heating												28.1725 (99)
Energy for space cooling												1.2099 (108)
Total												29.3825 (109)
Fabric Energy Efficiency (TFEE)												29.4 (109)

Full SAP Calculation Printout



Property Reference	Flat 1B				Issued on Date	01/02/2024
Assessment Reference	Be Green		Prop Type Ref	Conversion		
Property						
SAP Rating	75 C	DER	5.94	TER	6.71	
Environmental	95 A	% DER < TER				11.48
CO ₂ Emissions (t/year)	0.46	DFEE	61.26	TFEE	29.38	
Compliance Check	See BREL	% DFEE < TFEE				-108.47
% DPER < TPER	-72.41	DPER	62.43	TPER	36.21	
Assessor Details	Mr. Matthew Ray				Assessor ID	T806-0001
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)
Ground floor	85.1000 (1b)	2.8000 (2b)	238.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1000		238.2800 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 238.2800 (5)

2. Ventilation rate

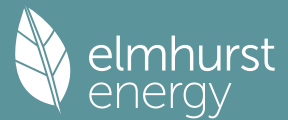
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1259 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8759 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7445 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9493	0.9306	0.9120	0.8190	0.8004	0.7073	0.7073	0.6887	0.7445	0.8004	0.8376	0.8748 (22b)
Effective ac	0.9505	0.9331	0.9159	0.8354	0.8203	0.7501	0.7501	0.7371	0.7772	0.8203	0.8508	0.8826 (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
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			3.8500	1.1450	4.4084		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.1000	0.2500	21.2750	20.0000	1702.0000 (28b)
Existing Ext Wall	16.5200	3.8500	12.6700	0.1800	2.2806	190.0000	2407.3000 (29a)
New Ext Wall	16.2400	6.2100	10.0300	0.1800	1.8054	9.0000	90.2700 (29a)
Total net area of external elements Aum(A, m ²)			117.8600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6060		(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Wall to Adjacent			19.6000	0.0000	0.0000	180.0000	3528.0000 (32)
Party Ceiling			85.1000			20.0000	1702.0000 (32b)
Internal Wall			145.0400			9.0000	1305.3600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11602.9300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							136.3447 (35)
Thermal bridges (Default value 0.200 * total exposed area)							23.5720 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	60.1780 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							

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(38)m	Jan 74.7437	Feb 73.3681	Mar 72.0196	Apr 65.6860	May 64.5010	Jun 58.9846	Jul 58.9846	Aug 57.9630	Sep 61.1094	Oct 64.5010	Nov 66.8982	Dec 69.4044	(38)
Heat transfer coeff	134.9217	133.5460	132.1976	125.8639	124.6789	119.1625	119.1625	118.1410	121.2873	124.6789	127.0762	129.5824	(39)
Average = Sum(39)m / 12 =												125.8582	
HLP	Jan 1.5854	Feb 1.5693	Mar 1.5534	Apr 1.4790	May 1.4651	Jun 1.4003	Jul 1.4003	Aug 1.3883	Sep 1.4252	Oct 1.4651	Nov 1.4933	Dec 1.5227	(40)
HLP (average)												1.4789	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5525	(42)
Hot water usage for mixer showers														
67.0175	66.0104	64.5428	61.7348	59.6625	57.3516	56.0381	57.4946	59.0912	61.5724	64.4407	66.7607	66.7607	(42a)	
Hot water usage for baths														
28.9429	28.5131	27.9078	26.7917	25.9560	25.0293	24.5288	25.1299	25.7843	26.7759	27.9150	28.8451	28.8451	(42b)	
Hot water usage for other uses														
40.7706	39.2880	37.8055	36.3229	34.8403	33.3578	33.3578	34.8403	36.3229	37.8055	39.2880	40.7706	40.7706	(42c)	
Average daily hot water use (litres/day)												125.6868	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
136.7311	133.8115	130.2560	124.8494	120.4589	115.7387	113.9246	117.4648	121.1984	126.1538	131.6437	136.3764	136.3764	(44)	
Energy conte	216.5486	190.5458	200.1987	170.9126	162.1608	142.3142	137.7820	145.4459	149.4497	171.1895	187.5506	213.5326	(45)	
Energy content (annual)										Total = Sum(45)m =		2087.6309		
Distribution loss (46)m = 0.15 x (45)m														
32.4823	28.5819	30.0298	25.6369	24.3241	21.3471	20.6673	21.8169	22.4175	25.6784	28.1326	32.0299	32.0299	(46)	
Water storage loss:														
Store volume												210.0000	(47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.9400	(48)	
Temperature factor from Table 2b												0.5400	(49)	
Enter (49) or (54) in (55)												1.0476	(55)	
Total storage loss														
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	(56)	
If cylinder contains dedicated solar storage														
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	(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														
272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	269.2706	(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														
272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	269.2706	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2743.9009	(64)	
Electric shower(s)												2744	(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	0.0000	(64a)	
												0.0000	(64a)	
Heat gains from water heating, kWh/month														
116.5928	103.6317	111.1565	99.9804	98.5089	90.4715	90.4029	92.9512	92.8440	101.5109	105.5126	115.5900	115.5900	(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	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	127.6272	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	131.1923	145.2486	131.1923	135.5654	131.1923	135.5654	131.1923	131.1923	135.5654	131.1923	135.5654	131.1923	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.7690	232.1533	226.1450	213.3540	197.2077	182.0324	171.8944	169.5101	175.5184	188.3094	204.4557	219.6310	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	35.7627	(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)	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	(71)
Water heating gains (Table 5)	156.7108	154.2138	149.4038	138.8617	132.4044	125.6548	121.5093	124.9344	128.9501	136.4394	146.5452	155.3629	(72)
Total internal gains	578.9602	592.9039	568.0293	549.0692	522.0925	504.5407	485.8841	486.9249	501.3220	517.2292	547.8545	567.4743	(73)

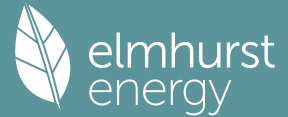
6. Solar gains

[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		
Northwest		3.8500		11.2829		0.6300		0.8000		0.7700		15.1721	(81)	
Southeast		4.3200		36.7938		0.6300		0.8000		0.7700		55.5166	(77)	
Solar gains	70.6887	125.4486	185.0302	251.6984	302.4026	309.2240	294.3762	255.1713	207.9007	142.2566	85.5865	59.9009	(83)	
Total gains	649.6489	718.3524	753.0595	800.7676	824.4951	813.7648	780.2602	742.0962	709.2227	659.4858	633.4410	627.3753	(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 23.8882	Feb 24.1343	Mar 24.3805	Apr 25.6073	May 25.8507	Jun 27.0474	Jul 27.0474	Aug 27.2813	Sep 26.5736	Oct 25.8507	Nov 25.3630	Dec 24.8725		
alpha	2.5925	2.6090	2.6254	2.7072	2.7234	2.8032	2.8032	2.8188	2.7716	2.7234	2.6909	2.6582		
util living area														
0.9714	0.9611	0.9459	0.9083	0.8412	0.7127	0.5792	0.6152	0.7924	0.9152	0.9584	0.9737	0.9737	(86)	

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Living	18.1617	18.4355	18.8752	19.5694	20.1592	20.6647	20.8671	20.8400	20.4986	19.7492	18.9232	18.2155
Non living	16.3900	16.7427	17.3051	18.2028	18.9223	19.5166	19.6994	19.6891	19.3399	18.4419	17.3950	16.4827
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.5480	18.4355	18.8752	19.5694	20.1592	20.6647	20.8671	20.8400	20.4986	19.7492	18.9232	18.6050 (87)
Th 2	19.6240	19.6359	19.6477	19.7033	19.7138	19.7631	19.7631	19.7723	19.7440	19.7138	19.6926	19.6705 (88)
util rest of house	0.9654	0.9530	0.9337	0.8859	0.7973	0.6274	0.4484	0.4894	0.7217	0.8902	0.9484	0.9682 (89)
MIT 2	18.3347	16.7427	17.3051	18.2028	18.9223	19.5166	19.6994	19.6891	19.3399	18.4419	17.3950	17.0572 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	18.9620	17.6179	18.1169	18.9094	19.5618	20.1102	20.3032	20.2841	19.9390	19.1178	18.1851	17.8574 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9620	17.6179	18.1169	18.9094	19.5618	20.1102	20.3032	20.2841	19.9390	19.1178	18.1851	17.8574 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9619	0.9360	0.9151	0.8687	0.7912	0.6538	0.5094	0.5459	0.7343	0.8753	0.9324	0.9581 (94)
Useful gains	624.8710	672.3833	689.1328	695.6024	652.3039	532.0439	397.4669	405.1270	520.8017	577.2443	590.6179	601.0660 (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	1978.2287	1698.4277	1535.7235	1259.8187	980.2011	656.6074	441.2771	458.8756	708.1989	1061.9899	1408.6548	1769.7645 (97)
Space heating kWh	1006.8982	689.5018	629.8635	406.2357	243.9555	0.0000	0.0000	0.0000	0.0000	360.6507	588.9866	869.5116 (98a)
Space heating requirement - total per year (kWh/year)												4795.6037
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	1006.8982	689.5018	629.8635	406.2357	243.9555	0.0000	0.0000	0.0000	0.0000	360.6507	588.9866	869.5116 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4795.6037
Space heating per m2										(98c) / (4) =		56.3526 (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 %)												324.7603 (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	1006.8982	689.5018	629.8635	406.2357	243.9555	0.0000	0.0000	0.0000	0.0000	360.6507	588.9866	869.5116 (98)
Space heating efficiency (main heating system 1)	324.7603	324.7603	324.7603	324.7603	324.7603	0.0000	0.0000	0.0000	0.0000	324.7603	324.7603	324.7603 (210)
Space heating fuel (main heating system)	310.0435	212.3110	193.9472	125.0879	75.1187	0.0000	0.0000	0.0000	0.0000	111.0514	181.3604	267.7395 (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	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706 (64)
Efficiency of water heater (217)m	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722 (216)
Fuel for water heating, kWh/month	168.8367	149.3685	158.6986	139.4243	135.1125	121.6913	119.9959	124.7481	126.1158	140.7109	149.7410	166.9665 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.6233	26.1716	23.5646	17.2645	13.3356	10.8953	12.1651	15.8127	20.5392	26.9485	30.4383	33.5300 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)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 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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												1476.6595 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												161.2722
Water heating fuel used												1701.4101 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												263.2885 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (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												3441.3582 (238)

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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	1476.6595	0.1545	228.1140	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1701.4101	0.1409	239.7163	(264)
Space and water heating			467.8302	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	263.2885	0.1443	38.0007	(268)
Total CO2, kg/year			505.8309	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.9400	(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	1476.6595	1.5719	2321.1312	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1701.4101	1.5210	2587.7935	(278)
Space and water heating			4908.9247	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	263.2885	1.5338	403.8407	(282)
Total Primary energy kWh/year			5312.7654	(286)
Dwelling Primary energy Rate (DPER)			62.4300	(287)

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)	
Ground floor	85.1000	(1b)	x 2.8000	(2b) = 238.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	238.2800 (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	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) =	0.1259 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3759	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3195 (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	0.4074	0.3994	0.3914	0.3515	0.3435	0.3035	0.3035	0.2956	0.3195	0.3435	0.3595	0.3754	(22b)
Effective ac	0.5830	0.5798	0.5766	0.5618	0.5590	0.5461	0.5461	0.5437	0.5510	0.5590	0.5646	0.5705	(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	
TER Opaque door			1.8900	1.0000	1.8900			(26)
TER Opening Type (Uw = 1.20)			8.1700	1.1450	9.3550			(27)
Floor Over Commercial			85.1000	0.1300	11.0630			(28b)
Existing Ext Wall	16.5200	3.8500	12.6700	0.1800	2.2806			(29a)
New Ext Wall	16.2400	6.2100	10.0300	0.1800	1.8054			(29a)
Total net area of external elements Aum (A, m2)			117.8600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.3940			(33)
Party Wall			43.4000	0.0000	0.0000			(32)
Party Wall to Adjacent			19.6000	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							146.3447	(35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.8930	(36)

$$(33) + (36) + (36a) = 32.2870 \quad (37)$$
[illegible]

4. Water heating energy requirements (kWh/year)

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

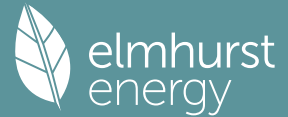
6. Solar gains

Solar gains	61.8526	109.7675	161.9014	220.2361	264.6023	270.5710	257.5791	223.2749	181.9131	124.4745	74.8882	52.4133 (83)
Total gains	643.2941	705.5569	732.4120	771.9124	789.1761	774.7188	742.9445	709.6811	682.8422	644.1850	625.3498	622.3689 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
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alpha	3.9519	3.9615	3.9710	4.0163	4.0250	4.0658	4.0658	4.0735	4.0500	4.0250	4.0075	3.9896
util living area	0.9680	0.9524	0.9281	0.8659	0.7560	0.5841	0.4361	0.4728	0.6825	0.8745	0.9476	0.9714 (86)
MIT	19.6363	19.8357	20.1070	20.4837	20.7737	20.9415	20.9859	20.9805	20.8876	20.5380	20.0489	19.6128 (87)
Th 2	20.1522	20.1547	20.1572	20.1688	20.1710	20.1811	20.1811	20.1830	20.1772	20.1710	20.1666	20.1620 (88)
util rest of house	0.9624	0.9442	0.9154	0.8421	0.7139	0.5204	0.3588	0.3942	0.6218	0.8476	0.9373	0.9664 (89)
MIT 2	18.5630	18.8149	19.1555	19.6228	19.9580	20.1379	20.1739	20.1724	20.0868	19.6965	19.0943	18.5403 (90)
Living area fraction	19.1180	19.3427	19.6475	20.0679	20.3798	20.5534	20.5938	20.5902	20.5009	20.1316	19.5879	19.0948 (92)
MIT												0.5170 (91)
Temperature adjustment												0.0000
adjusted MIT	19.1180	19.3427	19.6475	20.0679	20.3798	20.5534	20.5938	20.5902	20.5009	20.1316	19.5879	19.0948 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9539	0.9348	0.9064	0.8389	0.7250	0.5501	0.3983	0.4339	0.6467	0.8461	0.9287	0.9583 (94)
Useful gains	613.6473	659.5480	663.8566	647.5453	572.1917	426.1448	295.8780	307.9623	441.5800	545.0628	580.7357	596.4429 (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	1157.6994	1124.7206	1020.5910	853.8956	661.7588	447.8505	300.4326	314.4215	484.0135	726.7071	957.6094	1149.0565 (97)
Space heating kWh	404.7748	312.5960	265.4104	148.5722	66.6379	0.0000	0.0000	0.0000	0.0000	135.1433	271.3491	411.1445 (98a)
Space heating requirement - total per year (kWh/year)												2015.6282
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	404.7748	312.5960	265.4104	148.5722	66.6379	0.0000	0.0000	0.0000	0.0000	135.1433	271.3491	411.1445 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2015.6282
Space heating per m2										(98c) / (4) =		23.6854 (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	404.7748	312.5960	265.4104	148.5722	66.6379	0.0000	0.0000	0.0000	0.0000	135.1433	271.3491	411.1445 (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)	438.5425	338.6739	287.5519	160.9666	72.1970	0.0000	0.0000	0.0000	0.0000	146.4175	293.9860	445.4437 (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	237.6576	210.1885	223.5717	197.4955	192.0114	173.6551	171.9661	178.5166	180.1416	200.0827	211.7378	235.2089 (64)
Efficiency of water heater (217)m	85.2435	84.9481	84.4455	83.4302	81.9396	79.8000	79.8000	79.8000	79.8000	83.1994	84.6172	79.8000 (216)
Fuel for water heating, kWh/month	278.7985	247.4318	264.7527	236.7195	234.3329	217.6129	215.4963	223.7050	225.7413	240.4856	250.2304	85.2992 (217)
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	28.0431	22.4973	20.2563	14.8406	11.4633	9.3656	10.4572	13.5927	17.6556	23.1651	26.1649	28.8226 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-65.2726	-85.5354	-114.3379	-119.2407	-121.2287	-110.6229	-109.2623	-106.6503	-101.1323	-93.2035	-69.4268	-57.2296 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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)	-59.3305	-121.3465	-235.1159	-344.7270	-448.0345	-447.4061	-442.0911	-377.7203	-281.5270	-170.4939	-78.1669	-47.1778 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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												2183.7792 (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												2911.0527 (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)												226.3243 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-4206.2807 (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												1200.8754 (238)

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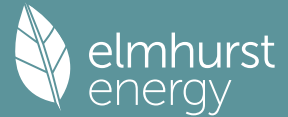
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2183.7792	0.2100	458.5936 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2911.0527	0.2100	611.3211 (264)
Space and water heating			1069.9147 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	226.3243	0.1443	32.6656 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1153.1431	0.1362	-157.0458
PV Unit electricity exported	-3053.1377	0.1266	-386.5954
Total			-543.6412 (269)
Total CO2, kg/year			570.8683 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			6.7100 (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	2183.7792	1.1300	2467.6705 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2911.0527	1.1300	3289.4895 (278)
Space and water heating			5757.1600 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	226.3243	1.5338	347.1437 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1153.1431	1.5034	-1733.6582
PV Unit electricity exported	-3053.1377	0.4648	-1419.1689
Total			-3152.8271 (283)
Total Primary energy kWh/year			3081.5774 (286)
Target Primary Energy Rate (TPER)			36.2100 (287)

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Property Reference	Flat 1B				Issued on Date	01/02/2024
Assessment Reference	Be Green		Prop Type Ref	Conversion		
Property						
SAP Rating	75 C	DER	5.94	TER	6.71	
Environmental	95 A	% DER < TER				11.48
CO ₂ Emissions (t/year)	0.46	DFEE	61.26	TFEE	29.38	
Compliance Check	See BREL	% DFEE < TFEE				-108.47
% DPER < TPER	-72.41	DPER	62.43	TPER	36.21	
Assessor Details	Mr. Matthew Ray				Assessor ID	T806-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	85.1000 (1b)	2.8000 (2b)	238.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	238.2800 (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) = 0.1259 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8759 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7445 (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	0.9493	0.9306	0.9120	0.8190	0.8004	0.7073	0.7073	0.6887	0.7445	0.8004	0.8376	0.8748 (22b)
Effective ac	0.9505	0.9331	0.9159	0.8354	0.8203	0.7501	0.7501	0.7371	0.7772	0.8203	0.8508	0.8826 (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
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			3.8500	1.1450	4.4084		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.1000	0.2500	21.2750	20.0000	1702.0000 (28b)
Existing Ext Wall	16.5200	3.8500	12.6700	0.1800	2.2806	190.0000	2407.3000 (29a)
New Ext Wall	16.2400	6.2100	10.0300	0.1800	1.8054	9.0000	90.2700 (29a)
Total net area of external elements Aum(A, m ²)			117.8600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6060		(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Wall to Adjacent			19.6000	0.0000	0.0000	180.0000	3528.0000 (32)
Party Ceiling			85.1000			30.0000	2553.0000 (32b)
Internal Wall			145.0400			9.0000	1305.3600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12453.9300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							146.3447 (35)
Thermal bridges (Default value 0.200 * total exposed area)							23.5720 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	60.1780 (37)

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

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(38)m	Jan 74.7437	Feb 73.3681	Mar 72.0196	Apr 65.6860	May 64.5010	Jun 58.9846	Jul 58.9846	Aug 57.9630	Sep 61.1094	Oct 64.5010	Nov 66.8982	Dec 69.4044	(38)
Heat transfer coeff	134.9217	133.5460	132.1976	125.8639	124.6789	119.1625	119.1625	118.1410	121.2873	124.6789	127.0762	129.5824	(39)
Average = Sum(39)m / 12 =												125.8582	
HLP	Jan 1.5854	Feb 1.5693	Mar 1.5534	Apr 1.4790	May 1.4651	Jun 1.4003	Jul 1.4003	Aug 1.3883	Sep 1.4252	Oct 1.4651	Nov 1.4933	Dec 1.5227	(40)
HLP (average)												1.4789	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5525	(42)
Hot water usage for mixer showers	67.0175	66.0104	64.5428	61.7348	59.6625	57.3516	56.0381	57.4946	59.0912	61.5724	64.4407	66.7607	(42a)	
Hot water usage for baths	28.9429	28.5131	27.9078	26.7917	25.9560	25.0293	24.5288	25.1299	25.7843	26.7759	27.9150	28.8451	(42b)	
Hot water usage for other uses	40.7706	39.2880	37.8055	36.3229	34.8403	33.3578	33.3578	34.8403	36.3229	37.8055	39.2880	40.7706	(42c)	
Average daily hot water use (litres/day)													125.6868	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	136.7311	133.8115	130.2560	124.8494	120.4589	115.7387	113.9246	117.4648	121.1984	126.1538	131.6437	136.3764	(44)	
Energy content (annual)	216.5486	190.5458	200.1987	170.9126	162.1608	142.3142	137.7820	145.4459	149.4497	171.1895	187.5506	213.5326	(45)	
Distribution loss (46)m = 0.15 x (45)m	32.4823	28.5819	30.0298	25.6369	24.3241	21.3471	20.6673	21.8169	22.4175	25.6784	28.1326	32.0299	(46)	
Water storage loss:														
Store volume													210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.9400	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													1.0476	(55)
Total storage loss	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(56)	
If cylinder contains dedicated solar storage	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(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	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	(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	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	(64)	
										Total per year (kWh/year) =	Sum(64)m =	2743.9009	(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	116.5928	103.6317	111.1565	99.9804	98.5089	90.4715	90.4029	92.9512	92.8440	101.5109	105.5126	115.5900	(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	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	37.2712	33.1040	26.9220	20.3816	15.2355	12.8625	13.8984	18.0656	24.2476	30.7879	35.9340	38.3071	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	342.9388	346.4975	337.5298	318.4388	294.3398	271.6901	256.5587	253.0001	261.9678	281.0588	305.1578	327.8075	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	(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)	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	(71)
Water heating gains (Table 5)	156.7108	154.2138	149.4038	138.8617	132.4044	125.6548	121.5093	124.9344	128.9501	136.4394	146.5452	155.3629	(72)
Total internal gains	640.8395	637.7339	617.7743	581.6009	545.8984	514.1261	495.8851	499.9188	519.0841	552.2048	591.5558	625.3961	(73)

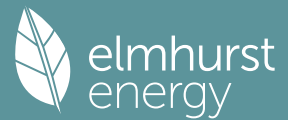
6. Solar gains

[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
Northwest				3.8500	11.2829		0.6300		0.8000		0.7700		15.1721 (81)
Southeast				4.3200	36.7938		0.6300		0.8000		0.7700		55.5166 (77)
Solar gains	70.6887	125.4486	185.0302	251.6984	302.4026	309.2240	294.3762	255.1713	207.9007	142.2566	85.5865	59.9009	(83)
Total gains	711.5282	763.1825	802.8045	833.2993	848.3010	823.3502	790.2612	755.0901	726.9848	694.4614	677.1423	685.2971	(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	25.6402	25.9044	26.1686	27.4854	27.7467	29.0312	29.0312	29.2822	28.5226	27.7467	27.2232	26.6967
alpha	2.7093	2.7270	2.7446	2.8324	2.8498	2.9354	2.9354	2.9521	2.9015	2.8498	2.8149	2.7798
util living area	0.9695	0.9609	0.9445	0.9089	0.8426	0.7167	0.5799	0.6147	0.7935	0.9139	0.9574	0.9721 (86)
Living	18.3796	18.6160	19.0429	19.6828	20.2322	20.6972	20.8841	20.8604	20.5465	19.8570	19.0832	18.4286

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Non living	16.6507	16.9561	17.5014	18.3309	18.9989	19.5449	19.7097	19.7024	19.3850	18.5619	17.5826	16.7382
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.6595	18.6160	19.0429	19.6828	20.2322	20.6972	20.8841	20.8604	20.5465	19.8570	19.0832	18.7883 (87)
Th 2	19.6240	19.6359	19.6477	19.7033	19.7138	19.7631	19.7631	19.7723	19.7440	19.7138	19.6926	19.6705 (88)
util rest of house												
	0.9628	0.9524	0.9316	0.8858	0.7974	0.6296	0.4469	0.4866	0.7209	0.8875	0.9467	0.9661 (89)
MIT 2	18.4387	16.9561	17.5014	18.3309	18.9989	19.5449	19.7097	19.7024	19.3850	18.5619	17.5826	17.2666 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	19.0699	17.8144	18.2984	19.0299	19.6365	20.1407	20.3169	20.3011	19.9856	19.2315	18.3584	18.0534 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0699	17.8144	18.2984	19.0299	19.6365	20.1407	20.3169	20.3011	19.9856	19.2315	18.3584	18.0534 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9596	0.9366	0.9145	0.8708	0.7942	0.6588	0.5103	0.5458	0.7369	0.8751	0.9319	0.9563 (94)
Useful gains	682.8076	714.8060	734.1480	725.6591	673.7529	542.4007	403.2746	412.1466	535.6911	607.6998	631.0558	655.3724 (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	1992.7771	1724.6619	1559.7205	1274.9902	989.5178	660.2401	442.9147	460.8824	713.8438	1076.1706	1430.6798	1795.1552 (97)
Space heating kWh	974.6173	678.6232	614.2259	395.5184	234.9291	0.0000	0.0000	0.0000	0.0000	348.5423	575.7292	847.9985 (98a)
Space heating requirement - total per year (kWh/year)												4670.1838
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	974.6173	678.6232	614.2259	395.5184	234.9291	0.0000	0.0000	0.0000	0.0000	348.5423	575.7292	847.9985 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4670.1838
Space heating per m2										(98c) / (4) =		54.8788 (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 %)												324.7603 (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	974.6173	678.6232	614.2259	395.5184	234.9291	0.0000	0.0000	0.0000	0.0000	348.5423	575.7292	847.9985 (98)
Space heating efficiency (main heating system 1)	324.7603	324.7603	324.7603	324.7603	324.7603	0.0000	0.0000	0.0000	0.0000	324.7603	324.7603	324.7603 (210)
Space heating fuel (main heating system)	300.1036	208.9613	189.1321	121.7878	72.3392	0.0000	0.0000	0.0000	0.0000	107.3229	177.2782	261.1152 (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	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706 (64)
Efficiency of water heater (217)m	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722 (216)
Fuel for water heating, kWh/month	168.8367	149.3685	158.6986	139.4243	135.1125	121.6913	119.9959	124.7481	126.1158	140.7109	149.7410	166.9665 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.6233	26.1716	23.5646	17.2645	13.3356	10.8953	12.1651	15.8127	20.5392	26.9485	30.4383	33.5300 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)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 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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												1438.0403 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												161.2722
Water heating fuel used												1701.4101 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												263.2885 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (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												3402.7390 (238)

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10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1438.0403	16.4900	237.1328 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1701.4101	16.4900	280.5625 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	263.2885	16.4900	43.4163 (250)
Additional standing charges			0.0000 (251)
Total energy cost			561.1117 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.5527 (257)
SAP value		74.8315
SAP rating (Section 12)		75 (258)
SAP band		C

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	1438.0403	0.1545	222.1790 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1701.4101	0.1409	239.7163 (264)
Space and water heating			461.8953 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	263.2885	0.1443	38.0007 (268)
Total CO2, kg/year			499.8960 (272)
CO2 emissions per m2			5.8700 (273)
EI value			94.8512
EI rating			95 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	85.1000 (1b)	x 2.8000 (2b)	= 238.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	238.2800 (5)

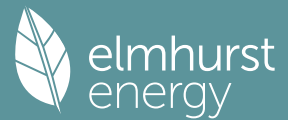
2. Ventilation rate

	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	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) = 0.1259 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8759 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7445 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate	0.7817	0.7445	0.7445	0.6887	0.6887	0.6142	0.6328	0.5956	0.6142	0.6515	0.6515	0.7073 (22b)
Effective ac	0.8056	0.7772	0.7772	0.7371	0.7371	0.6886	0.7002	0.6774	0.6886	0.7122	0.7122	0.7501 (25)

3. Heat losses and heat loss parameter

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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	
Entrance Door			1.8900	1.0000	1.8900			(26)
Windows (Uw = 1.20)			3.8500	1.1450	4.4084			(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466			(27)
Floor Over Commercial			85.1000	0.2500	21.2750	20.0000	1702.0000	(28b)
Existing Ext Wall	16.5200	3.8500	12.6700	0.1800	2.2806	190.0000	2407.3000	(29a)
New Ext Wall	16.2400	6.2100	10.0300	0.1800	1.8054	9.0000	90.2700	(29a)
Total net area of external elements Aum(A, m2)			117.8600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		36.6060			(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000	(32)
Party Wall to Adjacent			19.6000	0.0000	0.0000	180.0000	3528.0000	(32)
Party Ceiling			85.1000			30.0000	2553.0000	(32b)
Internal Wall			145.0400			9.0000	1305.3600	(32c)
Heat capacity Cm = Sum(A x k)						(28)... (30) + (32) + (32a)... (32e) =	12453.9300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							146.3447	(35)
Thermal bridges (Default value 0.200 * total exposed area)							23.5720	(36)
Point Thermal bridges							0.0000	(36a)
Total fabric heat loss						(33) + (36) + (36a) =	60.1780	(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	63.3432	61.1094	61.1094	57.9630	57.9630	54.1492	55.0618	53.2638	54.1492	56.0016	56.0016	58.9846 (38)
Average = Sum(39)m / 12 =	123.5211	121.2873	121.2873	118.1410	118.1410	114.3271	115.2397	113.4418	114.3271	116.1796	116.1796	119.1625 (39)
												117.6029
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4515	1.4252	1.4252	1.3883	1.3883	1.3434	1.3542	1.3330	1.3434	1.3652	1.3652	1.4003 (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													2.5525	(42)
Hot water usage for mixer showers													66.7607	(42a)
Hot water usage for baths													28.8451	(42b)
Hot water usage for other uses													40.7706	(42c)
Average daily hot water use (litres/day)													125.6868	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	136.7311	133.8115	130.2560	124.8494	120.4589	115.7387	113.9246	117.4648	121.1984	126.1538	131.6437	136.3764	(44)	
Energy content (annual)	216.5486	190.5458	200.1987	170.9126	162.1608	142.3142	137.7820	145.4459	149.4497	171.1895	187.5506	213.5326	(45)	
Distribution loss (46)m = 0.15 x (45)m													2087.6309	
Water storage loss:														
Store volume													210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.9400	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													1.0476	(55)
Total storage loss														
If cylinder contains dedicated solar storage														
Primary loss	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(56)	
Combi loss	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(57)	
Total heat required for water heating calculated for each month	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)	
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	(61)	
PV diverter	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	(62)	
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	(63a)	
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	(63b)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
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	(63d)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													2743.9009	(64)
Heat gains from water heating, kWh/month														
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
	116.5928	103.6317	111.1565	99.9804	98.5089	90.4715	90.4029	92.9512	92.8440	101.5109	105.5126	115.5900	(64a)	

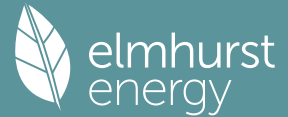
5. Internal gains (see Table 5 and 5a)

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	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	37.2712	33.1040	26.9220	20.3816	15.2355	12.8625	13.8984	18.0656	24.2476	30.7879	35.9340	38.3071	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	342.9388	346.4975	337.5298	318.4388	294.3398	271.6901	256.5587	253.0001	261.9678	281.0588	305.1578	327.8075	(68)	
Pumps, fans	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	(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)	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	(71)	
Total internal gains	156.7108	154.2138	149.4038	138.8617	132.4044	125.6548	121.5093	124.9344	128.9501	136.4394	146.5452	155.3629	(72)	
	640.8395	637.7339	617.7743	581.6009	545.8984	514.1261	495.8851	499.9188	519.0841	552.2048	591.5558	625.3961	(73)	

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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Northwest	3.8500	12.9236	0.6300	0.8000	0.7700	17.3783 (81)
Southeast	4.3200	40.4699	0.6300	0.8000	0.7700	61.0632 (77)

Solar gains	78.4415	125.5683	183.8260	259.1488	304.3742	333.4394	313.8624	277.5417	224.4048	152.2795	97.3568	65.7944 (83)
Total gains	719.2810	763.3022	801.6004	840.7496	850.2726	847.5656	809.7475	777.4605	743.4889	704.4843	688.9125	691.1906 (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	28.0067	28.5226	28.5226	29.2822	29.2822	30.2590	30.0194	30.4952	30.2590	29.7765	29.7765	29.0312
alpha	2.8671	2.9015	2.9015	2.9521	2.9521	3.0173	3.0013	3.0330	3.0173	2.9851	2.9851	2.9354
util living area	0.9637	0.9545	0.9326	0.8832	0.7850	0.5902	0.4192	0.4410	0.7066	0.8839	0.9454	0.9665 (86)
Living	18.7985	19.0134	19.4272	19.9988	20.5113	20.8729	20.9684	20.9640	20.7547	20.1688	19.4790	18.8473
Non living	17.2369	17.5189	18.0385	18.7590	19.3553	19.7374	19.7914	19.8060	19.6415	18.9862	18.1363	17.3215
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.8738	19.0134	19.4272	19.9988	20.5113	20.8729	20.9684	20.9640	20.7547	20.1688	19.4790	19.1485 (87)
Th 2	19.7241	19.7440	19.7440	19.7723	19.7723	19.8070	19.7986	19.8150	19.8070	19.7901	19.7901	19.7631 (88)
util rest of house	0.9558	0.9447	0.9169	0.8536	0.7238	0.4776	0.2663	0.2889	0.6110	0.8484	0.9317	0.9592 (89)
MIT 2	18.7325	17.5189	18.0385	18.7590	19.3553	19.7374	19.7914	19.8060	19.6415	18.9862	18.1363	17.7615 (90)
Living area fraction									fLA = Living area / (4) =			0.5170 (91)
MIT	19.3226	18.2916	18.7565	19.4000	19.9530	20.3245	20.4000	20.4047	20.2171	19.5977	18.8305	18.4786 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3226	18.2916	18.7565	19.4000	19.9530	20.3245	20.4000	20.4047	20.2171	19.5977	18.8305	18.4786 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9529	0.9296	0.9011	0.8429	0.7339	0.5293	0.3453	0.3673	0.6470	0.8416	0.9176	0.9494 (94)
Useful gains	685.3806	709.5461	722.3462	708.6751	624.0520	448.6486	279.6131	285.5434	481.0301	592.9062	632.1434	656.2085 (95)
Ext temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000 (96)
Heat loss rate W	1756.7912	1539.3335	1377.4054	1122.3450	821.4312	494.4095	288.0963	295.4849	573.5908	929.1645	1258.2821	1594.2271 (97)
Space heating kWh	797.1294	557.6171	487.3640	297.8423	146.8501	0.0000	0.0000	0.0000	0.0000	250.1762	450.8198	697.8858 (98a)
Space heating requirement - total per year (kWh/year)												3685.6848
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	797.1294	557.6171	487.3640	297.8423	146.8501	0.0000	0.0000	0.0000	0.0000	250.1762	450.8198	697.8858 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3685.6848
Space heating per m2										(98c) / (4) =		43.3100 (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 %)												319.5042 (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	797.1294	557.6171	487.3640	297.8423	146.8501	0.0000	0.0000	0.0000	0.0000	250.1762	450.8198	697.8858 (98)
Space heating efficiency (main heating system 1)	319.5042	319.5042	319.5042	319.5042	319.5042	0.0000	0.0000	0.0000	0.0000	319.5042	319.5042	319.5042 (210)
Space heating fuel (main heating system)	249.4895	174.5257	152.5376	93.2201	45.9619	0.0000	0.0000	0.0000	0.0000	78.3014	141.0998	218.4277 (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	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706 (64)
Efficiency of water heater (217)m	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770 (216)
Fuel for water heating, kWh/month	168.1020	148.7185	158.0080	138.8176	134.5245	121.1618	119.4737	124.2052	125.5670	140.0986	149.0894	166.2400 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.6233	26.1716	23.5646	17.2645	13.3356	10.8953	12.1651	15.8127	20.5392	26.9485	30.4383	33.5300 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)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 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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												

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Space heating fuel - main system 1	1153.5637	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	161.9770	
Water heating fuel used	1694.0064	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	263.2885	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(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	3110.8587	(238)

10a. Fuel costs - using BEDF prices (535)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1153.5637	25.1600	290.2366 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1694.0064	25.1600	426.2120 (247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	263.2885	25.1600	66.2434 (250)
Additional standing charges			0.0000 (251)
Total energy cost			782.6920 (255)

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	1153.5637	0.1551	178.8854 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1694.0064	0.1409	238.6732 (264)
Space and water heating			417.5585 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	263.2885	0.1443	38.0007 (268)
Total CO2, kg/year			455.5592 (272)

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	1153.5637	1.5741	1815.8095 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1694.0064	1.5210	2576.5327 (278)
Space and water heating			4392.3422 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	263.2885	1.5338	403.8407 (282)
Total Primary energy kWh/year			4796.1830 (286)

SAP 10 EPC IMPROVEMENTS

Be Green

Current energy efficiency rating:	C 75
Current environmental impact rating:	A 95

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

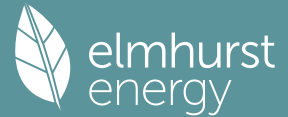
Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating:	C 75
Potential environmental impact rating:	A 95

Fuel prices for cost data on this page from database revision number 535 TEST (04 Jan 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):			
	Current	Potential	Saving
Electricity	£783	£783	£0
Space heating	£290	£290	£0
Water heating	£426	£426	£0
Lighting	£66	£66	£0
Total cost of fuels	£783	£783	£0
Total cost of uses	£782	£782	£0

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Delivered energy	37 kWh/m ²	37 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.5 tonnes	0.5 tonnes	0.0 tonnes
CO2 emissions per m ²	5 kg/m ²	5 kg/m ²	0 kg/m ²
Primary energy	56 kWh/m ²	56 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	85.1000 (1b)	x 2.8000 (2b)	= 238.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.2800 (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) =	Air changes per hour 30.0000 / (5) = 0.1259 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8759 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7445 (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	0.9493	0.9306	0.9120	0.8190	0.8004	0.7073	0.7073	0.6887	0.7445	0.8004	0.8376	0.8748 (22b)
Effective ac	0.9505	0.9331	0.9159	0.8354	0.8203	0.7501	0.7501	0.7371	0.7772	0.8203	0.8508	0.8826 (25)

3. Heat losses and heat loss parameter

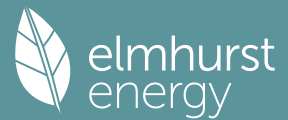
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			3.8500	1.1450	4.4084		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.1000	0.2500	21.2750	20.0000	1702.0000 (28b)
Existing Ext Wall	16.5200	3.8500	12.6700	0.1800	2.2806	190.0000	2407.3000 (29a)
New Ext Wall	16.2400	6.2100	10.0300	0.1800	1.8054	9.0000	90.2700 (29a)
Total net area of external elements Aum(A, m ²)			117.8600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6060		(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Wall to Adjacent			19.6000	0.0000	0.0000	180.0000	3528.0000 (32)
Party Ceiling			85.1000			30.0000	2553.0000 (32b)
Internal Wall			145.0400			9.0000	1305.3600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12453.9300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							146.3447 (35)
Thermal bridges (Default value 0.200 * total exposed area)							23.5720 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	60.1780 (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	74.7437	73.3681	72.0196	65.6860	64.5010	58.9846	58.9846	57.9630	61.1094	64.5010	66.8982	69.4044 (38)
Average = Sum(39)m / 12 =	134.9217	133.5460	132.1976	125.8639	124.6789	119.1625	119.1625	118.1410	121.2873	124.6789	127.0762	129.5824 (39)
												125.8582
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.5854	1.5693	1.5534	1.4790	1.4651	1.4003	1.4003	1.3883	1.4252	1.4651	1.4933	1.5227 (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	2.5525 (42)
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Hot water usage for mixer showers	67.0175	66.0104	64.5428	61.7348	59.6625	57.3516	56.0381	57.4946	59.0912	61.5724	64.4407	66.7607 (42a)
Hot water usage for baths	28.9429	28.5131	27.9078	26.7917	25.9560	25.0293	24.5288	25.1299	25.7843	26.7759	27.9150	28.8451 (42b)
Hot water usage for other uses	40.7706	39.2880	37.8055	36.3229	34.8403	33.3578	33.3578	34.8403	36.3229	37.8055	39.2880	40.7706 (42c)
Average daily hot water use (litres/day)												125.6868 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content	136.7311	133.8115	130.2560	124.8494	120.4589	115.7387	113.9246	117.4648	121.1984	126.1538	131.6437	136.3764 (44)
Energy content (annual)	216.5486	190.5458	200.1987	170.9126	162.1608	142.3142	137.7820	145.4459	149.4497	171.1895	187.5506	213.5326 (45)
Distribution loss (46)m = 0.15 x (45)m	32.4823	28.5819	30.0298	25.6369	24.3241	21.3471	20.6673	21.8169	22.4175	25.6784	28.1326	32.0299 (46)
Water storage loss:												
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.9400 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.0476 (55)
Total storage loss	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756 (56)
If cylinder contains dedicated solar storage	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756 (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	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706 (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	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706 (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	116.5928	103.6317	111.1565	99.9804	98.5089	90.4715	90.4029	92.9512	92.8440	101.5109	105.5126	115.5900 (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	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	37.2712	33.1040	26.9220	20.3816	15.2355	12.8625	13.8984	18.0656	24.2476	30.7879	35.9340	38.3071 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	342.9388	346.4975	337.5298	318.4388	294.3398	271.6901	256.5587	253.0001	261.9678	281.0588	305.1578	327.8075 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678 (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)	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018 (71)
Water heating gains (Table 5)	156.7108	154.2138	149.4038	138.8617	132.4044	125.6548	121.5093	124.9344	128.9501	136.4394	146.5452	155.3629 (72)
Total internal gains	640.8395	637.7339	617.7743	581.6009	545.8984	514.1261	495.8851	499.9188	519.0841	552.2048	591.5558	625.3961 (73)

6. Solar gains

[Jan]												Gains
	Area				Solar flux		g		FF		Access	W
	m2				Table 6a		Specific data		Specific data		factor	
					W/m2		or Table 6b		or Table 6c		Table 6d	
Northwest	3.8500				11.2829		0.6300		0.8000		0.7700	15.1721
Southeast	4.3200				36.7938		0.6300		0.8000		0.7700	55.5166 (81)
Solar gains	70.6887	125.4486	185.0302	251.6984	302.4026	309.2240	294.3762	255.1713	207.9007	142.2566	85.5865	59.9009 (83)
Total gains	711.5282	763.1825	802.8045	833.2993	848.3010	823.3502	790.2612	755.0901	726.9848	694.4614	677.1423	685.2971 (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	25.6402	25.9044	26.1686	27.4854	27.7467	29.0312	29.0312	29.2822	28.5226	27.7467	27.2232	26.6967
alpha	2.7093	2.7270	2.7446	2.8324	2.8498	2.9354	2.9354	2.9521	2.9015	2.8498	2.8149	2.7798
util living area	0.9695	0.9609	0.9445	0.9089	0.8426	0.7167	0.5799	0.6147	0.7935	0.9139	0.9574	0.9721 (86)
Living	18.3796	18.6160	19.0429	19.6828	20.2322	20.6972	20.8841	20.8604	20.5465	19.8570	19.0832	18.4286
Non living	16.6507	16.9561	17.5014	18.3309	18.9989	19.5449	19.7097	19.7024	19.3850	18.5619	17.5826	16.7382
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.6595	18.6160	19.0429	19.6828	20.2322	20.6972	20.8841	20.8604	20.5465	19.8570	19.0832	18.7883 (87)
Th 2	19.6240	19.6359	19.6477	19.7033	19.7138	19.7631	19.7631	19.7723	19.7440	19.7138	19.6926	19.6705 (88)
util rest of house	0.9628	0.9524	0.9316	0.8858	0.7974	0.6296	0.4469	0.4866	0.7209	0.8875	0.9467	0.9661 (89)
MIT 2	18.4387	16.9561	17.5014	18.3309	18.9989	19.5449	19.7097	19.7024	19.3850	18.5619	17.5826	17.2666 (90)
Living area fraction									fLA = Living area / (4) =			0.5170 (91)
MIT	19.0699	17.8144	18.2984	19.0299	19.6365	20.1407	20.3169	20.3011	19.9856	19.2315	18.3584	18.0534 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0699	17.8144	18.2984	19.0299	19.6365	20.1407	20.3169	20.3011	19.9856	19.2315	18.3584	18.0534 (93)

8. Space heating requirement

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9596	0.9366	0.9145	0.8708	0.7942	0.6588	0.5103	0.5458	0.7369	0.8751	0.9319	0.9563	(94)
Useful gains	682.8076	714.8060	734.1480	725.6591	673.7529	542.4007	403.2746	412.1466	535.6911	607.6998	631.0558	655.3724	(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	1992.7771	1724.6619	1559.7205	1274.9902	989.5178	660.2401	442.9147	460.8824	713.8438	1076.1706	1430.6798	1795.1552	(97)
Space heating kWh	974.6173	678.6232	614.2259	395.5184	234.9291	0.0000	0.0000	0.0000	0.0000	348.5423	575.7292	847.9985	(98a)
Space heating requirement - total per year (kWh/year)												4670.1838	
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	974.6173	678.6232	614.2259	395.5184	234.9291	0.0000	0.0000	0.0000	0.0000	348.5423	575.7292	847.9985	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4670.1838	
Space heating per m2											(98c) / (4) =	54.8788	(99)

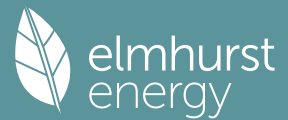
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %)												324.7603	(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	974.6173	678.6232	614.2259	395.5184	234.9291	0.0000	0.0000	0.0000	0.0000	348.5423	575.7292	847.9985	(98)
Space heating efficiency (main heating system 1)	324.7603	324.7603	324.7603	324.7603	324.7603	0.0000	0.0000	0.0000	0.0000	324.7603	324.7603	324.7603	(210)
Space heating fuel (main heating system)	300.1036	208.9613	189.1321	121.7878	72.3392	0.0000	0.0000	0.0000	0.0000	107.3229	177.2782	261.1152	(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	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	(64)
Efficiency of water heater	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	161.2722	(216)
Fuel for water heating, kWh/month	168.8367	149.3685	158.6986	139.4243	135.1125	121.6913	119.9959	124.7481	126.1158	140.7109	149.7410	166.9665	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	32.6233	26.1716	23.5646	17.2645	13.3356	10.8953	12.1651	15.8127	20.5392	26.9485	30.4383	33.5300	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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												1438.0403	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												161.2722	
Water heating fuel used												1701.4101	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												263.2885	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(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												3402.7390	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1438.0403	16.4900	237.1328	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1701.4101	16.4900	280.5625	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	263.2885	16.4900	43.4163	(250)
Additional standing charges			0.0000	(251)
Total energy cost			561.1117	(255)

Full SAP Calculation Printout



11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):

Energy cost factor (ECF)

SAP value

SAP rating (Section 12)

SAP band

$$\begin{aligned} & [(255) \times (256)] / [(4) + 45.0] = 0.3600 \quad (256) \\ & 1.5527 \quad (257) \\ & 74.8315 \\ & 75 \quad (258) \\ & C \end{aligned}$$

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	1438.0403	0.1545	222.1790 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	1701.4101	0.1409	239.7163 (264)
Space and water heating			461.8953 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	263.2885	0.1443	38.0007 (268)
Total CO ₂ , kg/year			499.8960 (272)
CO ₂ emissions per m ²			5.8700 (273)
EI value			94.8512
EI rating			95 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	85.1000 (1b)	x 2.8000 (2b)	= 238.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.2800 (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) = 0.1259 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8759 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7445 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate	0.7817	0.7445	0.7445	0.6887	0.6887	0.6142	0.6328	0.5956	0.6142	0.6515	0.6515	0.7073 (22b)
Effective ac	0.8056	0.7772	0.7772	0.7371	0.7371	0.6886	0.7002	0.6774	0.6886	0.7122	0.7122	0.7501 (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
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			3.8500	1.1450	4.4084		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.1000	0.2500	21.2750	20.0000	1702.0000 (28b)
Existing Ext Wall	16.5200		12.6700	0.1800	2.2806	190.0000	2407.3000 (29a)
New Ext Wall	16.2400	6.2100	10.0300	0.1800	1.8054	9.0000	90.2700 (29a)
Total net area of external elements Aum(A, m ²)			117.8600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.6060		(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Wall to Adjacent			19.6000	0.0000	0.0000	180.0000	3528.0000 (32)
Party Ceiling			85.1000			30.0000	2553.0000 (32b)
Internal Wall			145.0400			9.0000	1305.3600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12453.9300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							146.3447 (35)
Thermal bridges (Default value 0.200 * total exposed area)							23.5720 (36)

$$\begin{aligned} & (36a) = 0.0000 \\ (33) + (36) + (36a) &= 60.1780 \quad (37) \end{aligned}$$
[illegible]

4. Water heating energy requirements (kWh/year)

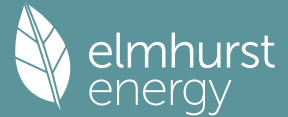
assumed occupancy													2.5525 (42)
Hot water usage for mixer showers													
67.0175	66.0104	64.5428	61.7348	59.6625	57.3516	56.0381	57.4946	59.0912	61.5724	64.4407	66.7607	(42a)	
Hot water usage for baths													
28.9429	28.5131	27.9078	26.7917	25.9560	25.0293	24.5288	25.1299	25.7843	26.7759	27.9150	28.8451	(42b)	
Hot water usage for other uses													
40.7706	39.2880	37.8055	36.3229	34.8403	33.3578	33.3578	34.8403	36.3229	37.8055	39.2880	40.7706	(42c)	
Average daily hot water use (litres/day)												125.6868 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
136.7311	133.8115	130.2560	124.8494	120.4589	115.7387	113.9246	117.4648	121.1984	126.1538	131.6437	136.3764	(44)	
Energy content (annual)	216.5486	190.5458	200.1987	170.9126	162.1608	142.3142	137.7820	145.4459	149.4497	171.1895	187.5506	213.5326 (45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2087.6309	
32.4823	28.5819	30.0298	25.6369	24.3241	21.3471	20.6673	21.8169	22.4175	25.6784	28.1326	32.0299	(46)	
Water storage loss:												210.0000 (47)	
Store volume												1.9400 (48)	
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)	
Temperature factor from Table 2b												1.0476 (55)	
Enter (49) or (54) in (55)													
Total storage loss													
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(56)	
If cylinder contains dedicated solar storage													
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(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													
272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h													
272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	(64)	
												2743.9009 (64)	
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
												0.0000 (64a)	
Heat gains from water heating, kWh/month			</										

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527	153.1527 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	37.2712	33.1040	26.9220	20.3816	15.2355	12.8625	13.8984	18.0656	24.2476	30.7879	35.9340	38.3071 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	342.9388	346.4975	337.5298	318.4388	294.3398	271.6901	256.5587	253.0001	261.9678	281.0588	305.1578	327.8075 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678	52.8678 (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)	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018	-102.1018 (71)
Water heating gains (Table 5)	156.7108	154.2138	149.4038	138.8617	132.4044	125.6548	121.5093	124.9344	128.9501	136.4394	146.5452	155.3629 (72)
Total internal gains	640.8395	637.7339	617.7743	581.6009	545.8984	514.1261	495.8851	499.9188	519.0841	552.2048	591.5558	625.3961 (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				
Northwest				3.8500	12.9236	0.6300	0.8000		0.7700	17.3783	(77)			
Southeast				4.3200	40.4699	0.6300	0.8000		0.7700	61.0632	(81)			
Solar gains	78.4415	125.5683	183.8260	259.1488	304.3742	333.4394	313.8624	277.5417	224.4048	152.2795	97.3568	65.7944 (83)		
Total gains	719.2810	763.3022	801.6004	840.7496	850.2726	847.5656	809.7475	777.4605	743.4889	704.4843	688.9125	691.1906 (84)		

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	28.0067	28.5226	28.5226	29.2822	29.2822	30.2590	30.0194	30.4952	30.2590	29.7765	29.7765	29.0312
alpha	2.8671	2.9015	2.9015	2.9521	2.9521	3.0173	3.0013	3.0330	3.0173	2.9851	2.9851	2.9354

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util living area	0.9637	0.9545	0.9326	0.8832	0.7850	0.5902	0.4192	0.4410	0.7066	0.8839	0.9454	0.9665 (86)
Living	18.7985	19.0134	19.4272	19.9988	20.5113	20.8729	20.9684	20.9640	20.7547	20.1688	19.4790	18.8473
Non living	17.2369	17.5189	18.0385	18.7590	19.3553	19.7374	19.7914	19.8060	19.6415	18.9862	18.1363	17.3215
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.8738	19.0134	19.4272	19.9988	20.5113	20.8729	20.9684	20.9640	20.7547	20.1688	19.4790	19.1485 (87)
Th 2	19.7241	19.7440	19.7440	19.7723	19.7723	19.8070	19.7986	19.8150	19.8070	19.7901	19.7901	19.7631 (88)
util rest of house												
MIT	0.9558	0.9447	0.9169	0.8536	0.7238	0.4776	0.2663	0.2889	0.6110	0.8484	0.9317	0.9592 (89)
MIT 2	18.7325	17.5189	18.0385	18.7590	19.3553	19.7374	19.7914	19.8060	19.6415	18.9862	18.1363	17.7615 (90)
Living area fraction									fLA = Living area / (4) =			0.5170 (91)
MIT	19.3226	18.2916	18.7565	19.4000	19.9530	20.3245	20.4000	20.4047	20.2171	19.5977	18.8305	18.4786 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3226	18.2916	18.7565	19.4000	19.9530	20.3245	20.4000	20.4047	20.2171	19.5977	18.8305	18.4786 (93)

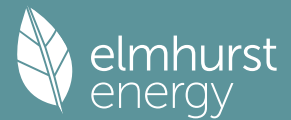
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9529	0.9296	0.9011	0.8429	0.7339	0.5293	0.3453	0.3673	0.6470	0.8416	0.9176	0.9494	(94)
Useful gains	685.3806	709.5461	722.3462	708.6751	624.0520	448.6486	279.6131	285.5434	481.0301	592.9062	632.1434	656.2085	(95)
Ext temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000	(96)
Heat loss rate W	1756.7912	1539.3335	1377.4054	1122.3450	821.4312	494.4095	288.0963	295.4849	573.5908	929.1645	1258.2821	1594.2271	(97)
Space heating kWh	797.1294	557.6171	487.3640	297.8423	146.8501	0.0000	0.0000	0.0000	0.0000	250.1762	450.8198	697.8858	(98a)
Space heating requirement - total per year (kWh/year)												3685.6848	
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	797.1294	557.6171	487.3640	297.8423	146.8501	0.0000	0.0000	0.0000	0.0000	250.1762	450.8198	697.8858	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3685.6848	
Space heating per m2										(98c) / (4) =		43.3100	(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 %)													319.5042 (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	797.1294	557.6171	487.3640	297.8423	146.8501	0.0000	0.0000	0.0000	0.0000	250.1762	450.8198	697.8858	(98)
Space heating efficiency (main heating system 1)	319.5042	319.5042	319.5042	319.5042	319.5042	0.0000	0.0000	0.0000	0.0000	319.5042	319.5042	319.5042	(210)
Space heating fuel (main heating system)	249.4895	174.5257	152.5376	93.2201	45.9619	0.0000	0.0000	0.0000	0.0000	78.3014	141.0998	218.4277	(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	272.2866	240.8898	255.9367	224.8526	217.8988	196.2542	193.5200	201.1839	203.3897	226.9275	241.4906	269.2706	(64)
Efficiency of water heater (217)m	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	161.9770	(216)
Fuel for water heating, kWh/month	168.1020	148.7185	158.0080	138.8176	134.5245	121.1618	119.4737	124.2052	125.5670	140.0986	149.0894	166.2400	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	32.6233	26.1716	23.5646	17.2645	13.3356	10.8953	12.1651	15.8127	20.5392	26.9485	30.4383	33.5300	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)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	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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												1153.5637	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												161.9770	
Water heating fuel used												1694.0064	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												263.2885	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(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)

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Energy used	0.0000 (237)
Total delivered energy for all uses	3110.8587 (238)

----- 10a. Fuel costs - using BEDF prices (535) -----

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1153.5637	25.1600	290.2366 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1694.0064	25.1600	426.2120 (247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	263.2885	25.1600	66.2434 (250)
Additional standing charges			0.0000 (251)
Total energy cost			782.6920 (255)

----- 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	1153.5637	0.1551	178.8854 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1694.0064	0.1409	238.6732 (264)
Space and water heating			417.5585 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	263.2885	0.1443	38.0007 (268)
Total CO2, kg/year			455.5592 (272)

----- 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	1153.5637	1.5741	1815.8095 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1694.0064	1.5210	2576.5327 (278)
Space and water heating			4392.3422 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	263.2885	1.5338	403.8407 (282)
Total Primary energy kWh/year			4796.1830 (286)

Overview Report

Dwelling Address	
Report Date	01/02/2024
Property Type	Flat, Semi-Detached
Floor Area [m ²]	85

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.

Most energy efficient - lower running costs

CURRENT

POTENTIAL

(92 plus)

A

(81-91)

B

(69-80)

C

(55-68)

D

(39-54)

E

(21-38)

F

(1-20)

G

75

75

Least energy efficient - higher running costs

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good
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Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.18 W/m ² K	Very Good
Floor	Average thermal transmittance 0.25 W/m ² K	Good
Windows	High performance glazing	Very Good
Main heating	Air source heat pump, underfloor, electric	Very Good
Main heating controls	Time and temperature zone control	Very Good
Secondary heating	None	
Hot water	From main system	Poor
Lighting	Good lighting efficiency	Good
Air tightness	(not tested)	

Primary Energy use

The primary energy use for this property per year is 56 kilowatt hour (kWh) per square metre

Estimated CO₂ emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.5** per year

With the recommended measures the potential CO emissions could be: **0** per year

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling. To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed. Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating
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Estimated energy use and potential savings

Estimated energy cost for this property over a year

£783

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Matthew Ray
Assessor's accreditation number	EES/024957
Email Address	matt@buildenergy.co.uk

Accreditation scheme contact details

Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0330 055 3405
Email Address	matt@buildenergy.co.uk

Assessment details

Related party disclosure	No related party
Date of assessment	31/01/2024
Date of certificate	31/01/2024
Type of assessment	SAP, new dwelling