

Summary for Input Data

Property Reference	Flat 2B	Issued on Date	01/02/2024
Assessment Reference	Be Green	Prop Type Ref	Conversion
Property			

SAP Rating	76 C	DER	5.90	TER	6.59
Environmental	95 A	% DER < TER			10.47
CO ₂ Emissions (t/year)	0.4	DFEE	54.03	TFEE	26.32
Compliance Check	See BREL	% DFEE < TFEE			-105.26
% DPER < TPER	-75.37	DPER	62.04	TPER	35.38

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	Top-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	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	0.00 m	0.00 m ²	0.00 m
Ground floor:	11.40 m	75.20 m ²	2.60 m
1st Storey:	0.00 m	0.00 m ²	0.00 m
2nd Storey:	0.00 m	0.00 m ²	0.00 m
3rd Storey:	0.00 m	0.00 m ²	0.00 m
4th Storey:	0.00 m	0.00 m ²	0.00 m
5th Storey:	0.00 m	0.00 m ²	0.00 m
6th Storey:	0.00 m	0.00 m ²	0.00 m
7th Storey:	0.00 m	0.00 m ²	0.00 m

8.0 Living Area	35.50	m ²
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9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
	Existing Ext Wall	Cavity Wall	Cavity wall : dense plaster, dense block, filled cavity, any outside structure	0.18	190.00	15.34	11.49	0.00	None	3.85	Enter Gross Area
	New Ext Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	14.30	8.09	0.00	None	6.21	Enter Gross Area

9.1 Party Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
	Party Wall	Filled Cavity with Edge Sealing	Steel frame	0.00	20.00	36.40	0.00	None
	Party Wall to Adjacent	Solid Wall	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	180.00	33.02	0.00	None

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Wall	Plasterboard on timber frame	9.00	153.66

Summary for Input Data

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.14	9.00	75.20	75.20	None	0.00	Calculate Wall Area	0.00

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor	Lowest occupied	Timber I-joists, carpeted	20.00	75.20

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

Summary for Input Data

Delayed Start Stat	Yes
HETAS approved System	No
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

26.0 Heat Networks

	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

Summary for Input Data

Insulation Type	Measured Loss	
Insulation Thickness	0	
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	-75.37		DPER	62.04	TPER	35.38
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	75.2000 (1b)	x 2.6000 (2b)	= 195.5200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 195.5200 (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) = 0.1534 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9034 (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) = 0.7679 (21)

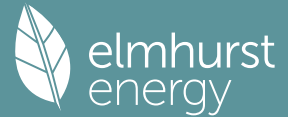
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9791	0.9599	0.9407	0.8447	0.8255	0.7295	0.7295	0.7103	0.7679	0.8255	0.8639	0.9023 (22b)
Effective ac	0.9793	0.9607	0.9425	0.8568	0.8407	0.7661	0.7661	0.7523	0.7949	0.8407	0.8732	0.9071 (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)
Existing Ext Wall	15.3400	3.8500	11.4900	0.1800	2.0682	190.0000	2183.1000 (29a)
New Ext Wall	14.3000	6.2100	8.0900	0.1800	1.4562	9.0000	72.8100 (29a)
Flat Roof	75.2000		75.2000	0.1400	10.5280	9.0000	676.8000 (30)
Total net area of external elements Aum(A, m ²)			104.8400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	25.2974		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Party Wall to Adjacent			33.0200	0.0000	0.0000	180.0000	5943.6000 (32)
Party Floor			75.2000			30.0000	2256.0000 (32d)
Internal Wall			153.6600			9.0000	1382.9400 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		13243.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							176.1070 (35)
Thermal bridges (Default value 0.200 * total exposed area)							20.9680 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		46.2654 (37)

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

Full SAP Calculation Printout



(38)m	Jan 63.1872	Feb 61.9863	Mar 60.8091	Apr 55.2802	May 54.2458	Jun 49.4302	Jul 49.4302	Aug 48.5385	Sep 51.2851	Oct 54.2458	Nov 56.3384	Dec 58.5262	(38)
Heat transfer coeff	109.4525	108.2516	107.0745	101.5456	100.5111	95.6956	95.6956	94.8038	97.5505	100.5111	102.6038	104.7916	(39)
Average = Sum(39)m / 12 =												101.5406	
HLP	Jan 1.4555	Feb 1.4395	Mar 1.4239	Apr 1.3503	May 1.3366	Jun 1.2725	Jul 1.2725	Aug 1.2607	Sep 1.2972	Oct 1.3366	Nov 1.3644	Dec 1.3935	(40)
HLP (average)												1.3503	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3655	(42)
Hot water usage for mixer showers	63.8811	62.9211	61.5222	58.8456	56.8704	54.6676	53.4155	54.8038	56.3257	58.6908	61.4249	63.6364	(42a)	
Hot water usage for baths	27.5942	27.1844	26.6073	25.5432	24.7464	23.8630	23.3857	23.9588	24.5828	25.5281	26.6141	27.5009	(42b)	
Hot water usage for other uses	38.8550	37.4420	36.0291	34.6162	33.2033	31.7904	31.7904	33.2033	34.6162	36.0291	37.4420	38.8550	(42c)	
Average daily hot water use (litres/day)												119.8031	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
130.3303	127.5475	124.1586	119.0051	114.8201	110.3210	108.5917	111.9660	115.5247	120.2481	125.4811	129.9922	(44)		
Energy conte	206.4113	181.6260	190.8272	162.9120	154.5700	135.6525	131.3322	138.6373	142.4535	163.1755	178.7708	203.5364	(45)	
Energy content (annual)										Total = Sum(45)m =		1989.9047		
Distribution loss (46)m = 0.15 x (45)m	30.9617	27.2439	28.6241	24.4368	23.1855	20.3479	19.6998	20.7956	21.3680	24.4763	26.8156	30.5305	(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744	(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2646.1747	(64)	
Electric shower(s)												2646	(64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)	
Heat gains from water heating, kWh/month	113.2222	100.6658	108.0404	97.3202	95.9849	88.2564	88.2584	90.6873	90.5178	98.8463	102.5933	112.2663	(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	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	116.1924	128.6416	116.1924	120.0655	116.1924	120.0655	116.1924	116.1924	120.0655	116.1924	120.0655	116.1924	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	209.1177	211.2877	205.8194	194.1780	179.4829	165.6715	156.4447	154.2747	159.7430	171.3844	186.0795	199.8908	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	(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)	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	(71)
Water heating gains (Table 5)	152.1803	149.8004	145.2156	135.1670	129.0120	122.5784	118.6268	121.8915	125.7192	132.8579	142.4907	150.8955	(72)
Total internal gains	535.9727	548.2119	525.7097	507.8928	483.1696	466.7978	449.7463	450.8410	464.0100	478.9170	507.1180	525.4611	(73)

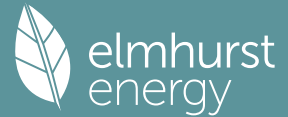
6. Solar gains

[Jan]														
	Area	Solar flux	g	FF	Access	Gains								
	m2	Table 6a	W/m2	Specific data	factor	W								
				or Table 6b	Table 6c									
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	606.6614	673.6605	710.7399	759.5912	785.5722	776.0218	744.1224	706.0123	671.9107	621.1736	592.7045	585.3620	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
33.6098	33.9827	34.3563	36.2269	36.5997	38.4415	38.4415	38.8031	37.7105	36.5997	35.8533	35.1047			
alpha	3.2407	3.2655	3.2904	3.4151	3.4400	3.5628	3.5628	3.5869	3.5140	3.4400	3.3902	3.3403		
util living area														
0.9811	0.9720	0.9570	0.9161	0.8369	0.6808	0.5309	0.5706	0.7792	0.9248	0.9696	0.9830	(86)		

Full SAP Calculation Printout



Living	18.8623	19.1064	19.4764	20.0539	20.5060	20.8480	20.9531	20.9397	20.7312	20.1614	19.4929	18.9162
Non living	17.2832	17.5992	18.0733	18.8249	19.3653	19.7604	19.8430	19.8445	19.6405	18.9732	18.1270	17.3801
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	19.9064	19.1064	19.4764	20.0539	20.5060	20.8480	20.9531	20.9397	20.7312	20.1614	19.4929	19.2077 (87)
Th 2	19.7211	19.7332	19.7451	19.8016	19.8123	19.8624	19.8624	19.8718	19.8430	19.8123	19.7907	19.7683 (88)
util rest of house	0.9764	0.9651	0.9458	0.8930	0.7890	0.5922	0.4083	0.4496	0.7031	0.8996	0.9610	0.9789 (89)
MIT 2	18.7492	17.5992	18.0733	18.8249	19.3653	19.7604	19.8430	19.8445	19.6405	18.9732	18.1270	17.8105 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	19.2955	18.3107	18.7357	19.4051	19.9038	20.2738	20.3670	20.3615	20.1554	19.5341	18.7718	18.4701 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2955	18.3107	18.7357	19.4051	19.9038	20.2738	20.3670	20.3615	20.1554	19.5341	18.7718	18.4701 (93)

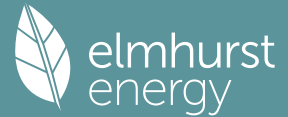
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9746	0.9546	0.9341	0.8838	0.7932	0.6264	0.4648	0.5046	0.7259	0.8923	0.9512	0.9730 (94)
Useful gains	591.2361	643.0797	663.8746	671.2934	623.0860	486.1373	345.9004	356.2277	487.7336	554.2485	563.8057	569.5643 (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	1641.2933	1451.7286	1310.1324	1066.7413	824.5728	542.9577	360.4878	375.5661	590.7046	897.9742	1197.5700	1495.3817 (97)
Space heating kWh	781.2425	543.4121	480.8158	284.7225	149.9062	0.0000	0.0000	0.0000	0.0000	255.7319	456.3103	688.8082 (98a)
Space heating requirement - total per year (kWh/year)												3640.9495
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	781.2425	543.4121	480.8158	284.7225	149.9062	0.0000	0.0000	0.0000	0.0000	255.7319	456.3103	688.8082 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3640.9495
Space heating per m2										(98c) / (4) =		48.4169 (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 %)												308.6795 (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	781.2425	543.4121	480.8158	284.7225	149.9062	0.0000	0.0000	0.0000	0.0000	255.7319	456.3103	688.8082 (98)
Space heating efficiency (main heating system 1)	308.6795	308.6795	308.6795	308.6795	308.6795	0.0000	0.0000	0.0000	0.0000	308.6795	308.6795	308.6795 (210)
Space heating fuel (main heating system)	253.0918	176.0441	155.7654	92.2389	48.5637	0.0000	0.0000	0.0000	0.0000	82.8471	147.8266	223.1467 (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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744 (64)
Efficiency of water heater (217)m	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620 (216)
Fuel for water heating, kWh/month	160.3732	141.9106	150.8394	132.6620	128.6586	115.9856	114.4426	118.9116	120.1463	133.9232	142.3638	158.6145 (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	28.0625	22.5128	20.2702	14.8509	11.4712	9.3721	10.4644	13.6021	17.6677	23.1810	26.1829	28.8424 (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												1179.5241 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.4620
Water heating fuel used												1618.8315 (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)												226.4803 (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												3024.8360 (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	1179.5241	0.1550	182.8156	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1618.8315	0.1409	228.0406	(264)
Space and water heating			410.8562	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	226.4803	0.1443	32.6881	(268)
Total CO2, kg/year			443.5443	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.9000	(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	1179.5241	1.5738	1856.3142	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1618.8315	1.5209	2462.0404	(278)
Space and water heating			4318.3546	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	226.4803	1.5338	347.3830	(282)
Total Primary energy kWh/year			4665.7375	(286)
Dwelling Primary energy Rate (DPER)			62.0400	(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	75.2000	(1b)	x	2.6000 (2b) = 195.5200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.2000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	195.5200 (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) = 0.1534	(8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4034	(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) = 0.3429	(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	0.4372	0.4287	0.4201	0.3772	0.3686	0.3258	0.3258	0.3172	0.3429	0.3686	0.3858	0.4029	(22b)
Effective ac	0.5956	0.5919	0.5882	0.5711	0.5679	0.5531	0.5531	0.5503	0.5588	0.5679	0.5744	0.5812	(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)
Existing Ext Wall	15.3400		11.4900	0.1800	2.0682			(29a)
New Ext Wall	14.3000	6.2100	8.0900	0.1800	1.4562			(29a)
Flat Roof	75.2000		75.2000	0.1100	8.2720			(30)
Total net area of external elements Aum (A, m2)			104.8400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.0414			(33)
Party Wall			36.4000	0.0000	0.0000			(32)
Party Wall to Adjacent			33.0200	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							176.1070	(35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.2420	(36)

$$(33) + (36) + (36a) = 28.2834 \quad (37)$$
[illegible]

4. Water heating energy requirements (kWh/year)

[illegible]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	130.3303	127.5475	124.1586	119.0051	114.8201	110.3210	108.5917	111.9660	115.5247	120.2481	125.4811	129.9922 (44)
Energy content (annual)	206.4113	181.6260	190.8272	162.9120	154.5700	135.6525	131.3322	138.6373	142.4535	163.1755	178.7708	203.5364 (45)
Distribution loss (46)m = 0.15 x (45)m	30.9617	27.2439	28.6241	24.4368	23.1855	20.3479	19.6998	20.7956	21.3680	24.4763	26.8156	30.5305 (46)
Water storage loss:												
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7016 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9188 (55)
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)
If cylinder contains dedicated solar storage	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	258.1579	228.3649	242.5738	212.9893	206.3165	185.7298	183.0788	190.3839	192.5309	214.9221	228.8481	255.2830 (62)
WWHRS	-29.2038	-25.8281	-27.0457	-22.3949	-20.8712	-17.8596	-16.7406	-17.8019	-18.4783	-21.7839	-24.6785	-28.6630 (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)
FGRHS	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	228.9541	202.5368	215.5281	190.5944	185.4453	167.8702	166.3382	172.5819	174.0526	193.1383	204.1697	226.6200 (64)
12Total per year (kWh/year)												2327.8297 (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	110.0290	97.7817	104.8473	94.2301	92.7918	85.1663	85.0652	87.4942	87.4277	95.6531	99.5032	109.0731 (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	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.6566	132.4770	119.6566	123.6452	119.6566	123.6452	119.6566	119.6566	123.6452	119.6566	123.6452	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	209.1177	211.2877	205.8194	194.1780	179.4829	165.6715	156.4447	154.2747	159.7430	171.3844	186.0795	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	(71)
Water heating gains (Table 5)	147.8885	145.5085	140.9238	130.8751	124.7201	118.2866	114.3350	117.5997	121.4273	128.5661	138.1988	(72)
Total internal gains	538.1451	550.7555	527.8821	510.1807	485.3420	466.0856	448.9187	450.0134	463.2979	481.0894	509.4059	(73)

6. Solar gains

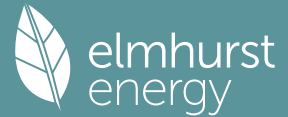
[Jan]						Area	Solar flux	g	FF			Access	Gains
						m2	Table 6a	Specific data	Specific data			factor	W
							W/m2	or Table 6b	or Table 6c			Table 6d	

Southeast						4.3200	36.7938	0.6300	0.7000			0.7700	48.5770
Northeast						3.8500	11.2829	0.6300	0.7000			0.7700	(77)
-----													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	599.9977	660.5230	689.7836	730.4168	749.9443	736.6566	706.4978	673.2883	645.2110	605.5639	584.2941	580.0468	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	55.1433	55.3419	55.5381	56.4782	56.6576	57.5081	57.5081	57.6685	57.1775	56.6576	56.2958	55.9224

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alpha	4.6762	4.6895	4.7025	4.7652	4.7772	4.8339	4.8339	4.8446	4.8118	4.7772	4.7531	4.7282
util living area	0.9737	0.9574	0.9300	0.8564	0.7271	0.5408	0.3956	0.4314	0.6480	0.8687	0.9524	0.9769 (86)
MIT	19.9487	20.1307	20.3661	20.6757	20.8832	20.9780	20.9960	20.9940	20.9483	20.7021	20.2987	19.9282 (87)
Th 2	20.1785	20.1812	20.1838	20.1964	20.1987	20.2097	20.2097	20.2117	20.2054	20.1987	20.1940	20.1890 (88)
util rest of house	0.9684	0.9491	0.9162	0.8296	0.6817	0.4793	0.3258	0.3595	0.5856	0.8386	0.9418	0.9722 (89)
MIT 2	18.9608	19.1904	19.4841	19.8640	20.0948	20.1948	20.2079	20.2088	20.1671	19.9031	19.4129	18.9430 (90)
Living area fraction	19.4272	19.6343	19.9005	20.2472	20.4670	20.5645	20.5799	20.5795	20.5359	20.2803	19.8311	19.4081 (92)
MIT	19.4272	19.6343	19.9005	20.2472	20.4670	20.5645	20.5799	20.5795	20.5359	20.2803	19.8311	19.4081 (93)
Temperature adjustment												0.0000
adjusted MIT	19.4272	19.6343	19.9005	20.2472	20.4670	20.5645	20.5799	20.5795	20.5359	20.2803	19.8311	19.4081 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9624	0.9426	0.9107	0.8314	0.6975	0.5073	0.3587	0.3933	0.6123	0.8419	0.9361	0.9666 (94)
Useful gains	577.4308	622.5810	628.1921	607.2605	523.1003	373.7243	253.4128	264.7913	395.0745	509.8385	546.9728	560.6717 (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	1009.1526	979.4144	887.6083	739.0922	569.2261	381.5395	254.5882	266.6101	414.0703	628.5253	831.9211	1000.4157 (97)
Space heating kWh	321.2011	239.7921	193.0057	94.9188	34.3176	0.0000	0.0000	0.0000	0.0000	88.3030	205.1628	327.1696 (98a)
Space heating requirement - total per year (kWh/year)												1503.8705
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	321.2011	239.7921	193.0057	94.9188	34.3176	0.0000	0.0000	0.0000	0.0000	88.3030	205.1628	327.1696 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1503.8705
Space heating per m2										(98c) / (4) =		19.9983 (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	321.2011	239.7921	193.0057	94.9188	34.3176	0.0000	0.0000	0.0000	0.0000	88.3030	205.1628	327.1696 (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)	347.9968	259.7964	209.1069	102.8373	37.1805	0.0000	0.0000	0.0000	0.0000	95.6695	222.2782	354.4632 (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	228.9541	202.5368	215.5281	190.5944	185.4453	167.8702	166.3382	172.5819	174.0526	193.1383	204.1697	226.6200 (64)
Efficiency of water heater (217)m	84.8190	84.4394	83.8131	82.5826	81.0833	79.8000	79.8000	79.8000	79.8000	82.4209	84.0707	79.8000 (216)
Fuel for water heating, kWh/month	269.9327	239.8605	257.1531	230.7926	228.7097	210.3636	208.4439	216.2681	218.1110	234.3316	242.8548	266.9809 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	24.8623	19.9455	17.9587	13.1573	10.1631	8.3033	9.2711	12.0509	15.6529	20.5375	23.1971	25.5533 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-58.3174	-76.7385	-103.0244	-107.9540	-110.1975	-100.7466	-99.5281	-96.9298	-91.5521	-83.8882	-62.1549	-51.0932 (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)	-51.7902	-106.0760	-205.7762	-302.0387	-392.8413	-392.3648	-387.6842	-331.0921	-246.5911	-149.1323	-68.2687	-41.1682 (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												1629.3289 (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												2823.8026 (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)												200.6529 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3716.9484 (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												1022.8359 (238)

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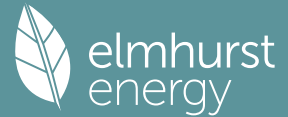
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1629.3289	0.2100	342.1591 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2823.8026	0.2100	592.9985 (264)
Space and water heating			935.1576 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	200.6529	0.1443	28.9604 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1042.1246	0.1361	-141.8152
PV Unit electricity exported	-2674.8239	0.1266	-338.6066
Total			-480.4218 (269)
Total CO2, kg/year			495.6255 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			6.5900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1629.3289	1.1300	1841.1416 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2823.8026	1.1300	3190.8969 (278)
Space and water heating			5032.0385 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	200.6529	1.5338	307.7681 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1042.1246	1.5030	-1566.3342
PV Unit electricity exported	-2674.8239	0.4647	-1243.0018
Total			-2809.3360 (283)
Total Primary energy kWh/year			2660.5714 (286)
Target Primary Energy Rate (TPER)			35.3800 (287)

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Property Reference	Flat 2B				Issued on Date	01/02/2024
Assessment Reference	Be Green		Prop Type Ref	Conversion		
Property						
SAP Rating	76 C	DER	5.90	TER	6.59	
Environmental	95 A	% DER < TER				10.47
CO ₂ Emissions (t/year)	0.4	DFEE	54.03	TFEE	26.32	
Compliance Check	See BREL	% DFEE < TFEE				-105.26
% DPER < TPER	-75.37	DPER	62.04	TPER	35.38	
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	75.2000 (1b)	x 2.6000 (2b)	= 195.5200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 195.5200 (5)

2. Ventilation rate

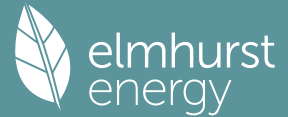
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1534 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9034 (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) = 0.7679 (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	0.9791	0.9599	0.9407	0.8447	0.8255	0.7295	0.7295	0.7103	0.7679	0.8255	0.8639	0.9023 (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	0.9793	0.9607	0.9425	0.8568	0.8407	0.7661	0.7661	0.7523	0.7949	0.8407	0.8732	0.9071 (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)
Existing Ext Wall	15.3400	3.8500	11.4900	0.1800	2.0682	190.0000	2183.1000 (29a)
New Ext Wall	14.3000	6.2100	8.0900	0.1800	1.4562	9.0000	72.8100 (29a)
Flat Roof	75.2000		75.2000	0.1400	10.5280	9.0000	676.8000 (30)
Total net area of external elements Aum(A, m ²)			104.8400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	25.2974		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Party Wall to Adjacent			33.0200	0.0000	0.0000	180.0000	5943.6000 (32)
Party Floor			75.2000			30.0000	2256.0000 (32d)
Internal Wall			153.6600			9.0000	1382.9400 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13243.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							176.1070 (35)
Thermal bridges (Default value 0.200 * total exposed area)							20.9680 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	46.2654 (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	63.1872	61.9863	60.8091	55.2802	54.2458	49.4302	49.4302	48.5385	51.2851	54.2458	56.3384	58.5262	(38)
Heat transfer coeff	109.4525	108.2516	107.0745	101.5456	100.5111	95.6956	95.6956	94.8038	97.5505	100.5111	102.6038	104.7916	(39)
Average = Sum(39)m / 12 =												101.5406	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.4555	1.4395	1.4239	1.3503	1.3366	1.2725	1.2725	1.2607	1.2972	1.3366	1.3644	1.3935	(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													2.3655 (42)
Hot water usage for mixer showers													(42a)
Hot water usage for baths													(42b)
Hot water usage for other uses													(42c)
Average daily hot water use (litres/day)													(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	66.4492	64.6264	62.6364	60.1594	57.9498	55.6534	55.1762	57.1621	59.1990	61.5573	64.0562	66.3559	(44)
Energy content (annual)	105.2392	92.0272	96.2698	82.3553	78.0115	68.4323	66.7308	70.7787	72.9983	83.5326	91.2598	103.8972	(45)
Distribution loss (46)m = 0.15 x (45)m													(46)
Water storage loss:													
Total storage loss													(56)
If cylinder contains dedicated solar storage													(57)
Primary loss													(59)
Combi loss													(61)
Total heat required for water heating calculated for each month													
WWHRS	89.4533	78.2231	81.8294	70.0020	66.3098	58.1675	56.7212	60.1619	62.0485	71.0027	77.5708	88.3127	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	89.4533	78.2231	81.8294	70.0020	66.3098	58.1675	56.7212	60.1619	62.0485	71.0027	77.5708	88.3127	(64)
12Total per year (kWh/year)													(64)
Electric shower(s)	51.1581	45.5823	49.7741	47.4989	48.3902	46.1595	47.6982	48.3902	47.4989	49.7741	48.8382	51.1581	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												581.9208	(64a)
Heat gains from water heating, kWh/month	35.1529	30.9514	32.9009	29.3752	28.6750	26.0817	26.1048	27.1380	27.3869	30.1942	31.6022	34.8677	(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	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.1924	128.6416	116.1924	120.0655	116.1924	120.0655	116.1924	116.1924	120.0655	116.1924	120.0655	116.1924	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	209.1177	211.2877	205.8194	194.1780	179.4829	165.6715	156.4447	154.2747	159.7430	171.3844	186.0795	199.8908	(68)
Pumps, fans	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	(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)	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	(71)
Total internal gains	47.2485	46.0586	44.2216	40.7989	38.5417	36.2246	35.0871	36.4758	38.0373	40.5836	43.8920	46.8652	(72)
	431.0409	444.4701	424.7157	413.5247	392.6993	380.4440	366.2066	365.4253	376.3281	386.6427	408.5193	421.4308	(73)

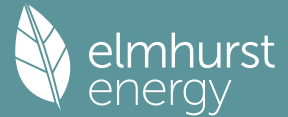
6. Solar gains

[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	501.7296	569.9187	609.7459	665.2231	695.1019	689.6680	660.5827	620.5966	584.2288	528.8994	494.1058	481.3317 (84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha	33.6098	33.9827	34.3563	36.2269	36.5997	38.4415	38.4415	38.8031	37.7105	36.5997	35.8533	35.1047	
util living area	3.2407	3.2655	3.2904	3.4151	3.4400	3.5628	3.5628	3.5869	3.5140	3.4400	3.3902	3.3403	
	0.9890	0.9824	0.9714	0.9396	0.8735	0.7323	0.5841	0.6292	0.8300	0.9502	0.9819	0.9904	(86)
MIT	18.6906	18.9412	19.3230	19.9281	20.4165	20.8059	20.9364	20.9173	20.6618	20.0332	19.3344	18.7426	(87)
Th 2	19.7211	19.7332	19.7451	19.8016	19.8123	19.8624	19.8624	19.8718	19.8430	19.8123	19.7907	19.7683	(88)

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util rest of house	0.9861	0.9778	0.9636	0.9216	0.8322	0.6458	0.4548	0.5033	0.7619	0.9319	0.9764	0.9880 (89)
MIT 2	17.6520	17.9085	18.2943	18.9246	19.3903	19.7573	19.8411	19.8413	19.6361	19.0409	18.3400	17.7359 (90)
Living area fraction									FLA = Living area / (4) =			0.4721 (91)
MIT	18.1423	18.3960	18.7799	19.3983	19.8748	20.2523	20.3582	20.3493	20.1203	19.5094	18.8094	18.2111 (92)
Temperature adjustment												0.0000
adjusted MIT	18.1423	18.3960	18.7799	19.3983	19.8748	20.2523	20.3582	20.3493	20.1203	19.5094	18.8094	18.2111 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9812	0.9713	0.9556	0.9142	0.8347	0.6780	0.5141	0.5600	0.7805	0.9260	0.9704	0.9837	(94)
Useful gains	492.3016	553.5524	582.6577	608.1399	580.2078	467.6238	339.6117	347.5127	455.9874	489.7347	479.5042	473.4708	(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	1515.0720	1460.9631	1314.8676	1066.0599	821.6543	540.8997	359.6389	374.4047	587.2840	895.4906	1201.4312	1468.2491	(97)
Space heating kWh	760.9411	609.7800	544.7642	329.7024	179.6362	0.0000	0.0000	0.0000	0.0000	301.8824	519.7874	740.1150	(98a)
Space heating requirement - total per year (kWh/year)												3986.6087	
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	760.9411	609.7800	544.7642	329.7024	179.6362	0.0000	0.0000	0.0000	0.0000	301.8824	519.7874	740.1150	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3986.6087	
Space heating per m2												53.0134	(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	899.5386	708.1474	720.5091	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7074	0.7886	0.7577	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	636.3559	558.4513	545.9270	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	753.9608	722.5160	678.1358	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	84.6755	122.0641	98.3634	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	21.1689	30.5160	24.5909	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												76.2758 (107)
Energy for space heating												53.0134 (99)
Energy for space cooling												1.0143 (108)
Total												54.0277 (109)
Fabric Energy Efficiency (DFEE)												54.0 (109)

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

1. Overall dwelling characteristics

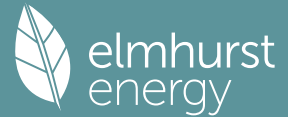
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	75.2000 (1b)	x 2.6000 (2b)	= 195.5200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 195.5200 (5)

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) = 0.1534 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4034 (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) = 0.3429 (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	0.4372	0.4287	0.4201	0.3772	0.3686	0.3258	0.3258	0.3172	0.3429	0.3686	0.3858	0.4029 (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	0.5956	0.5919	0.5882	0.5711	0.5679	0.5531	0.5531	0.5503	0.5588	0.5679	0.5744	0.5812 (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)
Existing Ext Wall	15.3400	3.8500	11.4900	0.1800	2.0682		(29a)
New Ext Wall	14.3000	6.2100	8.0900	0.1800	1.4562		(29a)
Flat Roof	75.2000		75.2000	0.1100	8.2720		(30)
Total net area of external elements Aum(A, m ²)			104.8400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.0414		(33)
Party Wall			36.4000	0.0000	0.0000		(32)
Party Wall to Adjacent			33.0200	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							176.1070 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.2420 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	28.2834 (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	38.4280	38.1885	37.9537	36.8512	36.6449	35.6846	35.6846	35.5068	36.0545	36.6449	37.0622	37.4985 (38)
Average = Sum(39)m / 12 =	66.7113	66.4718	66.2371	65.1346	64.9283	63.9680	63.9680	63.7902	64.3379	64.9283	65.3456	65.7819 (39)
												65.1336
HLP	0.8871	0.8839	0.8808	0.8662	0.8634	0.8506	0.8506	0.8483	0.8556	0.8634	0.8690	0.8748 (40)
HLP (average)												0.8661
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3655 (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	27.5942	27.1844	26.6073	25.5432	24.7464	23.8630	23.3857	23.9588	24.5828	25.5281	26.6141	27.5009 (42b)
Hot water usage for other uses	38.8550	37.4420	36.0291	34.6162	33.2033	31.7904	31.7904	33.2033	34.6162	36.0291	37.4420	38.8550 (42c)
Average daily hot water use (litres/day)												60.9069 (43)
Daily hot water use	66.4492	64.6264	62.6364	60.1594	57.9498	55.6534	55.1762	57.1621	59.1990	61.5573	64.0562	66.3559 (44)
Energy conte	105.2392	92.0272	96.2698	82.3553	78.0115	68.4323	66.7308	70.7787	72.9983	83.5326	91.2598	103.8972 (45)
Energy content (annual)										Total = Sum(45)m =		1011.5327
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	89.4533	78.2231	81.8294	70.0020	66.3098	58.1675	56.7212	60.1619	62.0485	71.0027	77.5708	88.3127 (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	89.4533	78.2231	81.8294	70.0020	66.3098	58.1675	56.7212	60.1619	62.0485	71.0027	77.5708	88.3127 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		859.8028 (64)
Electric shower(s)	51.1581	45.5823	49.7741	47.4989	48.3902	46.1595	47.6982	48.3902	47.4989	49.7741	48.8382	51.1581 (64a)
Heat gains from water heating, kWh/month	35.1529	30.9514	32.9009	29.3752	28.6750	26.0817	26.1048	27.1380	27.3869	30.1942	31.6022	34.8677 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.6566	132.4770	119.6566	123.6452	119.6566	123.6452	119.6566	119.6566	123.6452	119.6566	123.6452	119.6566 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	209.1177	211.2877	205.8194	194.1780	179.4829	165.6715	156.4447	154.2747	159.7430	171.3844	186.0795	199.8908 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274 (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)	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195 (71)
Water heating gains (Table 5)	47.2485	46.0586	44.2216	40.7989	38.5417	36.2246	35.0871	36.4758	38.0373	40.5836	43.8920	46.8652 (72)
Total internal gains	434.5051	448.3055	428.1799	417.1044	396.1635	384.0237	369.6708	368.8895	379.9078	390.1070	412.0990	424.8950 (73)

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6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	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	52.4133 (83)
Total gains	496.3577	558.0730	590.0814	637.3405	660.7658	654.5947	627.2499	592.1644	514.5815	477.3083 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	55.1433	55.3419	55.5381	56.4782	56.6576	57.5081	57.5081	57.6685	57.1775	56.6576	56.2958	55.9224
alpha	4.6762	4.6895	4.7025	4.7652	4.7772	4.8339	4.8339	4.8446	4.8118	4.7772	4.7531	4.7282
util living area	0.9872	0.9768	0.9584	0.9015	0.7877	0.5995	0.4435	0.4871	0.7186	0.9180	0.9753	0.9892 (86)
MIT	19.7618	19.9574	20.2152	20.5740	20.8336	20.9660	20.9935	20.9899	20.9195	20.5950	20.1363	19.7401 (87)
Th 2	20.1785	20.1812	20.1838	20.1964	20.1987	20.2097	20.2097	20.2117	20.2054	20.1987	20.1940	20.1890 (88)
util rest of house	0.9844	0.9719	0.9492	0.8802	0.7451	0.5342	0.3663	0.4073	0.6562	0.8957	0.9692	0.9868 (89)
MIT 2	19.0463	19.2412	19.4957	19.8477	20.0800	20.1914	20.2073	20.2078	20.1572	19.8747	19.4293	19.0331 (90)
Living area fraction									fLA = Living area / (4) =			0.4721 (91)
MIT	19.3840	19.5793	19.8354	20.1905	20.4358	20.5571	20.5784	20.5770	20.5171	20.2147	19.7630	19.3669 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3840	19.5793	19.8354	20.1905	20.4358	20.5571	20.5784	20.5770	20.5171	20.2147	19.7630	19.3669 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9811	0.9675	0.9447	0.8800	0.7584	0.5636	0.4026	0.4447	0.6818	0.8962	0.9652	0.9838 (94)
Useful gains	486.9545	539.9279	557.4230	560.8536	501.1199	368.8971	252.5516	263.3645	383.0222	461.1682	470.0590	469.5714 (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	1006.2767	975.7602	883.2972	735.4041	567.1976	381.0611	254.4933	266.4543	412.8603	624.2689	827.4731	997.7047 (97)
Space heating kWh	386.3757	292.8793	242.4504	125.6763	49.1618	0.0000	0.0000	0.0000	0.0000	121.3470	257.3381	392.9312 (98a)
Space heating requirement - total per year (kWh/year)												1868.1599
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	386.3757	292.8793	242.4504	125.6763	49.1618	0.0000	0.0000	0.0000	0.0000	121.3470	257.3381	392.9312 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1868.1599
Space heating per m2										(98c) / (4) =		24.8426 (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	601.2991	473.3631	484.8052	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8891	0.9399	0.9218	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	534.6280	444.9351	446.9051	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	709.0851	679.8340	641.2800	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	125.6091	174.7648	144.6149	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	31.4023	43.6912	36.1537	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												111.2472 (107)
Energy for space heating												24.8426 (99)
Energy for space cooling												1.4794 (108)
Total												26.3219 (109)
Fabric Energy Efficiency (TFEE)												26.3 (109)

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Property Reference	Flat 2B			Issued on Date	01/02/2024	
Assessment Reference	Be Green		Prop Type Ref	Conversion		
Property						
SAP Rating	76 C		DER	5.90	TER	6.59
Environmental	95 A		% DER < TER			10.47
CO ₂ Emissions (t/year)	0.4		DFEE	54.03	TFEE	26.32
Compliance Check	See BREL		% DFEE < TFEE			-105.26
% DPER < TPER	-75.37		DPER	62.04	TPER	35.38
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	75.2000 (1b)	x 2.6000 (2b)	= 195.5200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 195.5200 (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) = 0.1534 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9034 (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) = 0.7679 (21)

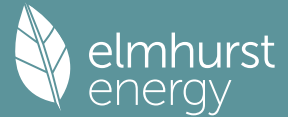
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9791	0.9599	0.9407	0.8447	0.8255	0.7295	0.7295	0.7103	0.7679	0.8255	0.8639	0.9023 (22b)
Effective ac	0.9793	0.9607	0.9425	0.8568	0.8407	0.7661	0.7661	0.7523	0.7949	0.8407	0.8732	0.9071 (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)
Existing Ext Wall	15.3400	3.8500	11.4900	0.1800	2.0682	190.0000	2183.1000 (29a)
New Ext Wall	14.3000	6.2100	8.0900	0.1800	1.4562	9.0000	72.8100 (29a)
Flat Roof	75.2000		75.2000	0.1400	10.5280	9.0000	676.8000 (30)
Total net area of external elements Aum(A, m ²)			104.8400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	25.2974		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Party Wall to Adjacent			33.0200	0.0000	0.0000	180.0000	5943.6000 (32)
Party Floor			75.2000			30.0000	2256.0000 (32d)
Internal Wall			153.6600			9.0000	1382.9400 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		13243.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							176.1070 (35)
Thermal bridges (Default value 0.200 * total exposed area)							20.9680 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		46.2654 (37)

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

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(38)m	Jan 63.1872	Feb 61.9863	Mar 60.8091	Apr 55.2802	May 54.2458	Jun 49.4302	Jul 49.4302	Aug 48.5385	Sep 51.2851	Oct 54.2458	Nov 56.3384	Dec 58.5262	(38)
Heat transfer coeff	109.4525	108.2516	107.0745	101.5456	100.5111	95.6956	95.6956	94.8038	97.5505	100.5111	102.6038	104.7916	(39)
Average = Sum(39)m / 12 =												101.5406	
HLP	Jan 1.4555	Feb 1.4395	Mar 1.4239	Apr 1.3503	May 1.3366	Jun 1.2725	Jul 1.2725	Aug 1.2607	Sep 1.2972	Oct 1.3366	Nov 1.3644	Dec 1.3935	(40)
HLP (average)												1.3503	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3655	(42)
Hot water usage for mixer showers	63.8811	62.9211	61.5222	58.8456	56.8704	54.6676	53.4155	54.8038	56.3257	58.6908	61.4249	63.6364	(42a)	
Hot water usage for baths	27.5942	27.1844	26.6073	25.5432	24.7464	23.8630	23.3857	23.9588	24.5828	25.5281	26.6141	27.5009	(42b)	
Hot water usage for other uses	38.8550	37.4420	36.0291	34.6162	33.2033	31.7904	31.7904	33.2033	34.6162	36.0291	37.4420	38.8550	(42c)	
Average daily hot water use (litres/day)												119.8031	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
130.3303	127.5475	124.1586	119.0051	114.8201	110.3210	108.5917	111.9660	115.5247	120.2481	125.4811	129.9922	(44)		
Energy conte	206.4113	181.6260	190.8272	162.9120	154.5700	135.6525	131.3322	138.6373	142.4535	163.1755	178.7708	203.5364	(45)	
Energy content (annual)										Total = Sum(45)m =		1989.9047		
Distribution loss (46)m = 0.15 x (45)m	30.9617	27.2439	28.6241	24.4368	23.1855	20.3479	19.6998	20.7956	21.3680	24.4763	26.8156	30.5305	(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744	(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2646.1747	(64)	
Electric shower(s)												2646	(64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)	
Heat gains from water heating, kWh/month	113.2222	100.6658	108.0404	97.3202	95.9849	88.2564	88.2584	90.6873	90.5178	98.8463	102.5933	112.2663	(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	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	116.1924	128.6416	116.1924	120.0655	116.1924	120.0655	116.1924	116.1924	120.0655	116.1924	120.0655	116.1924	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	209.1177	211.2877	205.8194	194.1780	179.4829	165.6715	156.4447	154.2747	159.7430	171.3844	186.0795	199.8908	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	(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)	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	(71)
Water heating gains (Table 5)	152.1803	149.8004	145.2156	135.1670	129.0120	122.5784	118.6268	121.8915	125.7192	132.8579	142.4907	150.8955	(72)
Total internal gains	535.9727	548.2119	525.7097	507.8928	483.1696	466.7978	449.7463	450.8410	464.0100	478.9170	507.1180	525.4611	(73)

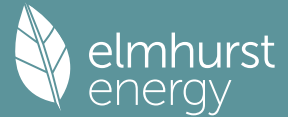
6. Solar gains

[Jan]														
			Area	Solar flux	g	FF		Access	Gains					
			m2	Table 6a	Specific data	Specific data		factor	W					
				W/m2	or Table 6b	or Table 6c		Table 6d						
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	606.6614	673.6605	710.7399	759.5912	785.5722	776.0218	744.1224	706.0123	671.9107	621.1736	592.7045	585.3620	(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	33.6098	33.9827	34.3563	36.2269	36.5997	38.4415	38.4415	38.8031	37.7105	36.5997	35.8533	35.1047	
alpha	3.2407	3.2655	3.2904	3.4151	3.4400	3.5628	3.5628	3.5869	3.5140	3.4400	3.3902	3.3403	
util living area													
	0.9811	0.9720	0.9570	0.9161	0.8369	0.6808	0.5309	0.5706	0.7792	0.9248	0.9696	0.9830	(86)

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Living	18.8623	19.1064	19.4764	20.0539	20.5060	20.8480	20.9531	20.9397	20.7312	20.1614	19.4929	18.9162
Non living	17.2832	17.5992	18.0733	18.8249	19.3653	19.7604	19.8430	19.8445	19.6405	18.9732	18.1270	17.3801
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	19.9064	19.1064	19.4764	20.0539	20.5060	20.8480	20.9531	20.9397	20.7312	20.1614	19.4929	19.2077 (87)
Th 2	19.7211	19.7332	19.7451	19.8016	19.8123	19.8624	19.8624	19.8718	19.8430	19.8123	19.7907	19.7683 (88)
util rest of house	0.9764	0.9651	0.9458	0.8930	0.7890	0.5922	0.4083	0.4496	0.7031	0.8996	0.9610	0.9789 (89)
MIT 2	18.7492	17.5992	18.0733	18.8249	19.3653	19.7604	19.8430	19.8445	19.6405	18.9732	18.1270	17.8105 (90)
Living area fraction									FLA = Living area / (4) =			0.4721 (91)
MIT	19.2955	18.3107	18.7357	19.4051	19.9038	20.2738	20.3670	20.3615	20.1554	19.5341	18.7718	18.4701 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2955	18.3107	18.7357	19.4051	19.9038	20.2738	20.3670	20.3615	20.1554	19.5341	18.7718	18.4701 (93)

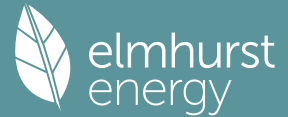
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9746	0.9546	0.9341	0.8838	0.7932	0.6264	0.4648	0.5046	0.7259	0.8923	0.9512	0.9730 (94)
Useful gains	591.2361	643.0797	663.8746	671.2934	623.0860	486.1373	345.9004	356.2277	487.7336	554.2485	563.8057	569.5643 (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	1641.2933	1451.7286	1310.1324	1066.7413	824.5728	542.9577	360.4878	375.5661	590.7046	897.9742	1197.5700	1495.3817 (97)
Space heating kWh	781.2425	543.4121	480.8158	284.7225	149.9062	0.0000	0.0000	0.0000	0.0000	255.7319	456.3103	688.8082 (98a)
Space heating requirement - total per year (kWh/year)												3640.9495
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	781.2425	543.4121	480.8158	284.7225	149.9062	0.0000	0.0000	0.0000	0.0000	255.7319	456.3103	688.8082 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3640.9495
Space heating per m2										(98c) / (4) =		48.4169 (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 %)												308.6795 (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	781.2425	543.4121	480.8158	284.7225	149.9062	0.0000	0.0000	0.0000	0.0000	255.7319	456.3103	688.8082 (98)
Space heating efficiency (main heating system 1)	308.6795	308.6795	308.6795	308.6795	308.6795	0.0000	0.0000	0.0000	0.0000	308.6795	308.6795	308.6795 (210)
Space heating fuel (main heating system)	253.0918	176.0441	155.7654	92.2389	48.5637	0.0000	0.0000	0.0000	0.0000	82.8471	147.8266	223.1467 (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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744 (64)
Efficiency of water heater (217)m	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620 (216)
Fuel for water heating, kWh/month	160.3732	141.9106	150.8394	132.6620	128.6586	115.9856	114.4426	118.9116	120.1463	133.9232	142.3638	158.6145 (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	28.0625	22.5128	20.2702	14.8509	11.4712	9.3721	10.4644	13.6021	17.6677	23.1810	26.1829	28.8424 (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												1179.5241 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.4620
Water heating fuel used												1618.8315 (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)												226.4803 (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												3024.8360 (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	1179.5241	0.1550	182.8156	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1618.8315	0.1409	228.0406	(264)
Space and water heating			410.8562	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	226.4803	0.1443	32.6881	(268)
Total CO2, kg/year			443.5443	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.9000	(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	1179.5241	1.5738	1856.3142	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1618.8315	1.5209	2462.0404	(278)
Space and water heating			4318.3546	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	226.4803	1.5338	347.3830	(282)
Total Primary energy kWh/year			4665.7375	(286)
Dwelling Primary energy Rate (DPER)			62.0400	(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	75.2000	(1b)	x	2.6000 (2b) = 195.5200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.2000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	195.5200 (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) =	0.1534 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4034	(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) =		0.3429 (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	0.4372	0.4287	0.4201	0.3772	0.3686	0.3258	0.3258	0.3172	0.3429	0.3686	0.3858	0.4029	(22b)
Effective ac	0.5956	0.5919	0.5882	0.5711	0.5679	0.5531	0.5531	0.5503	0.5588	0.5679	0.5744	0.5812	(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)
Existing Ext Wall	15.3400		11.4900	0.1800	2.0682			(29a)
New Ext Wall	14.3000	6.2100	8.0900	0.1800	1.4562			(29a)
Flat Roof	75.2000		75.2000	0.1100	8.2720			(30)
Total net area of external elements Aum (A, m2)			104.8400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.0414			(33)
Party Wall			36.4000	0.0000	0.0000			(32)
Party Wall to Adjacent			33.0200	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							176.1070	(35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.2420	(36)

$$(33) + (36) + (36a) = 28.2834 \quad (37)$$
[illegible]

4. Water heating energy requirements (kWh/year)

[illegible]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	130.3303	127.5475	124.1586	119.0051	114.8201	110.3210	108.5917	111.9660	115.5247	120.2481	125.4811	129.9922 (44)
Energy content (annual)	206.4113	181.6260	190.8272	162.9120	154.5700	135.6525	131.3322	138.6373	142.4535	163.1755	178.7708	203.5364 (45)
Distribution loss (46)m = 0.15 x (45)m	30.9617	27.2439	28.6241	24.4368	23.1855	20.3479	19.6998	20.7956	21.3680	24.4763	26.8156	30.5305 (46)
Water storage loss:												
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7016 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9188 (55)
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)
If cylinder contains dedicated solar storage	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	258.1579	228.3649	242.5738	212.9893	206.3165	185.7298	183.0788	190.3839	192.5309	214.9221	228.8481	255.2830 (62)
WWHRS	-29.2038	-25.8281	-27.0457	-22.3949	-20.8712	-17.8596	-16.7406	-17.8019	-18.4783	-21.7839	-24.6785	-28.6630 (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	228.9541	202.5368	215.5281	190.5944	185.4453	167.8702	166.3382	172.5819	174.0526	193.1383	204.1697	226.6200 (64)
12Total per year (kWh/year)												2327.8297 (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	110.0290	97.7817	104.8473	94.2301	92.7918	85.1663	85.0652	87.4942	87.4277	95.6531	99.5032	109.0731 (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	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	118.2744	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.6566	132.4770	119.6566	123.6452	119.6566	123.6452	119.6566	119.6566	123.6452	119.6566	123.6452	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	209.1177	211.2877	205.8194	194.1780	179.4829	165.6715	156.4447	154.2747	159.7430	171.3844	186.0795	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	34.8274	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	(71)
Water heating gains (Table 5)	147.8885	145.5085	140.9238	130.8751	124.7201	118.2866	114.3350	117.5997	121.4273	128.5661	138.1988	(72)
Total internal gains	538.1451	550.7555	527.8821	510.1807	485.3420	466.0856	448.9187	450.0134	463.2979	481.0894	509.4059	(73)

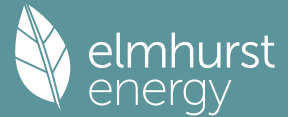
6. Solar gains

[Jan]					Area	Solar flux		g		FF	Access		Gains	
					m2	Table 6a	Table 6b	Table 6c	Table 6d		factor	W		
						W/m2								
Southeast					4.3200	36.7938	0.6300	0.7000	0.7700				48.5770	(77)
Southwest					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	599.9977	660.5230	689.7836	730.4168	749.9443	736.6566	706.4978	673.2883	645.2110	605.5639	584.2941	580.0468	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	55.1433	55.3419	55.5381	56.4782	56.6576	57.5081	57.5081	57.6685	57.1775	56.6576	56.2958	55.9224

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alpha	4.6762	4.6895	4.7025	4.7652	4.7772	4.8339	4.8339	4.8446	4.8118	4.7772	4.7531	4.7282
util living area	0.9737	0.9574	0.9300	0.8564	0.7271	0.5408	0.3956	0.4314	0.6480	0.8687	0.9524	0.9769 (86)
MIT	19.9487	20.1307	20.3661	20.6757	20.8832	20.9780	20.9960	20.9940	20.9483	20.7021	20.2987	19.9282 (87)
Th 2	20.1785	20.1812	20.1838	20.1964	20.1987	20.2097	20.2097	20.2117	20.2054	20.1987	20.1940	20.1890 (88)
util rest of house	0.9684	0.9491	0.9162	0.8296	0.6817	0.4793	0.3258	0.3595	0.5856	0.8386	0.9418	0.9722 (89)
MIT 2	18.9608	19.1904	19.4841	19.8640	20.0948	20.1948	20.2079	20.2088	20.1671	19.9031	19.4129	18.9430 (90)
Living area fraction	19.4272	19.6343	19.9005	20.2472	20.4670	20.5645	20.5799	20.5795	20.5359	20.2803	19.8311	19.4081 (92)
MIT	19.4272	19.6343	19.9005	20.2472	20.4670	20.5645	20.5799	20.5795	20.5359	20.2803	19.8311	19.4081 (93)
Temperature adjustment												0.0000
adjusted MIT	19.4272	19.6343	19.9005	20.2472	20.4670	20.5645	20.5799	20.5795	20.5359	20.2803	19.8311	19.4081 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9624	0.9426	0.9107	0.8314	0.6975	0.5073	0.3587	0.3933	0.6123	0.8419	0.9361	0.9666 (94)
Useful gains	577.4308	622.5810	628.1921	607.2605	523.1003	373.7243	253.4128	264.7913	395.0745	509.8385	546.9728	560.6717 (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	1009.1526	979.4144	887.6083	739.0922	569.2261	381.5395	254.5882	266.6101	414.0703	628.5253	831.9211	1000.4157 (97)
Space heating kWh	321.2011	239.7921	193.0057	94.9188	34.3176	0.0000	0.0000	0.0000	0.0000	88.3030	205.1628	327.1696 (98a)
Space heating requirement - total per year (kWh/year)												1503.8705
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	321.2011	239.7921	193.0057	94.9188	34.3176	0.0000	0.0000	0.0000	0.0000	88.3030	205.1628	327.1696 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1503.8705
Space heating per m2										(98c) / (4) =		19.9983 (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	321.2011	239.7921	193.0057	94.9188	34.3176	0.0000	0.0000	0.0000	0.0000	88.3030	205.1628	327.1696 (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)	347.9968	259.7964	209.1069	102.8373	37.1805	0.0000	0.0000	0.0000	0.0000	95.6695	222.2782	354.4632 (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	228.9541	202.5368	215.5281	190.5944	185.4453	167.8702	166.3382	172.5819	174.0526	193.1383	204.1697	226.6200 (64)
Efficiency of water heater (217)m	84.8190	84.4394	83.8131	82.5826	81.0833	79.8000	79.8000	79.8000	79.8000	82.4209	84.0707	79.8000 (216)
Fuel for water heating, kWh/month	269.9327	239.8605	257.1531	230.7926	228.7097	210.3636	208.4439	216.2681	218.1110	234.3316	242.8548	266.9809 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	24.8623	19.9455	17.9587	13.1573	10.1631	8.3033	9.2711	12.0509	15.6529	20.5375	23.1971	25.5533 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-58.3174	-76.7385	-103.0244	-107.9540	-110.1975	-100.7466	-99.5281	-96.9298	-91.5521	-83.8882	-62.1549	-51.0932 (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)	-51.7902	-106.0760	-205.7762	-302.0387	-392.8413	-392.3648	-387.6842	-331.0921	-246.5911	-149.1323	-68.2687	-41.1682 (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												1629.3289 (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												2823.8026 (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)												200.6529 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3716.9484 (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												1022.8359 (238)

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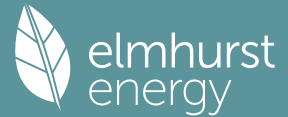
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1629.3289	0.2100	342.1591 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2823.8026	0.2100	592.9985 (264)
Space and water heating			935.1576 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	200.6529	0.1443	28.9604 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1042.1246	0.1361	-141.8152
PV Unit electricity exported	-2674.8239	0.1266	-338.6066
Total			-480.4218 (269)
Total CO2, kg/year			495.6255 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			6.5900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1629.3289	1.1300	1841.1416 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2823.8026	1.1300	3190.8969 (278)
Space and water heating			5032.0385 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	200.6529	1.5338	307.7681 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1042.1246	1.5030	-1566.3342
PV Unit electricity exported	-2674.8239	0.4647	-1243.0018
Total			-2809.3360 (283)
Total Primary energy kWh/year			2660.5714 (286)
Target Primary Energy Rate (TPER)			35.3800 (287)

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Property Reference	Flat 2B				Issued on Date	01/02/2024
Assessment Reference	Be Green		Prop Type Ref	Conversion		
Property						
SAP Rating	76 C	DER	5.90	TER	6.59	
Environmental	95 A	% DER < TER				10.47
CO ₂ Emissions (t/year)	0.4	DFEE	54.03	TFEE	26.32	
Compliance Check	See BREL	% DFEE < TFEE				-105.26
% DPER < TPER	-75.37	DPER	62.04	TPER	35.38	
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	75.2000 (1b)	x 2.6000 (2b)	= 195.5200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 195.5200 (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) = 0.1534 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9034 (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) = 0.7679 (21)

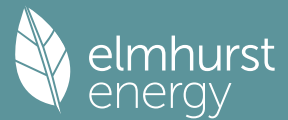
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9791	0.9599	0.9407	0.8447	0.8255	0.7295	0.7295	0.7103	0.7679	0.8255	0.8639	0.9023 (22b)
Effective ac	0.9793	0.9607	0.9425	0.8568	0.8407	0.7661	0.7661	0.7523	0.7949	0.8407	0.8732	0.9071 (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)
Existing Ext Wall	15.3400	3.8500	11.4900	0.1800	2.0682	190.0000	2183.1000 (29a)
New Ext Wall	14.3000	6.2100	8.0900	0.1800	1.4562	9.0000	72.8100 (29a)
Flat Roof	75.2000		75.2000	0.1400	10.5280	9.0000	676.8000 (30)
Total net area of external elements Aum(A, m ²)			104.8400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	25.2974		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Party Wall to Adjacent			33.0200	0.0000	0.0000	180.0000	5943.6000 (32)
Party Floor			75.2000			30.0000	2256.0000 (32d)
Internal Wall			153.6600			9.0000	1382.9400 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		13243.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							176.1070 (35)
Thermal bridges (Default value 0.200 * total exposed area)							20.9680 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		46.2654 (37)

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

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(38)m	Jan 63.1872	Feb 61.9863	Mar 60.8091	Apr 55.2802	May 54.2458	Jun 49.4302	Jul 49.4302	Aug 48.5385	Sep 51.2851	Oct 54.2458	Nov 56.3384	Dec 58.5262	(38)
Heat transfer coeff	109.4525	108.2516	107.0745	101.5456	100.5111	95.6956	95.6956	94.8038	97.5505	100.5111	102.6038	104.7916	(39)
Average = Sum(39)m / 12 =												101.5406	

HLP	Jan 1.4555	Feb 1.4395	Mar 1.4239	Apr 1.3503	May 1.3366	Jun 1.2725	Jul 1.2725	Aug 1.2607	Sep 1.2972	Oct 1.3366	Nov 1.3644	Dec 1.3935	(40)
HLP (average)												1.3503	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3655	(42)
Hot water usage for mixer showers														
63.8811	62.9211	61.5222	58.8456	56.8704	54.6676	53.4155	54.8038	56.3257	58.6908	61.4249	63.6364	(42a)		
Hot water usage for baths														
27.5942	27.1844	26.6073	25.5432	24.7464	23.8630	23.3857	23.9588	24.5828	25.5281	26.6141	27.5009	(42b)		
Hot water usage for other uses														
38.8550	37.4420	36.0291	34.6162	33.2033	31.7904	31.7904	33.2033	34.6162	36.0291	37.4420	38.8550	(42c)		
Average daily hot water use (litres/day)												119.8031	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
130.3303	127.5475	124.1586	119.0051	114.8201	110.3210	108.5917	111.9660	115.5247	120.2481	125.4811	129.9922	(44)		
Energy content	206.4113	181.6260	190.8272	162.9120	154.5700	135.6525	131.3322	138.6373	142.4535	163.1755	178.7708	203.5364	(45)	
Energy content (annual)														
Distribution loss (46)m = 0.15 x (45)m														
30.9617	27.2439	28.6241	24.4368	23.1855	20.3479	19.6998	20.7956	21.3680	24.4763	26.8156	30.5305	(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														
262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744	(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744	(64)	
												2646.1747	(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	0.0000	(64a)	
												0.0000	(64a)	
Heat gains from water heating, kWh/month														
113.2222	100.6658	108.0404	97.3202	95.9849	88.2564	88.2584	90.6873	90.5178	98.8463	102.5933	112.2663	(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	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	32.0606	28.4760	23.1582	17.5323	13.1056	11.0643	11.9553	15.5400	20.8578	26.4837	30.9104	32.9517	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	312.1159	315.3547	307.1931	289.8179	267.8849	247.2709	233.4996	230.2608	238.4224	255.7976	277.7306	298.3445	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	(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)	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	(71)
Water heating gains (Table 5)	152.1803	149.8004	145.2156	135.1670	129.0120	122.5784	118.6268	121.8915	125.7192	132.8579	142.4907	150.8955	(72)
Total internal gains	595.2250	592.4992	574.4351	541.3853	508.8706	479.7818	462.9499	466.5604	483.8675	514.0073	549.9998	581.0599	(73)

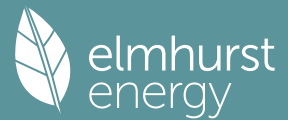
6. Solar gains

[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	665.9137	717.9478	759.4653	793.0837	811.2732	789.0058	757.3260	721.7318	691.7682	656.2639	635.5863	640.9608	(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			
33.6098	33.9827	34.3563	36.2269	36.5997	38.4415	38.4415	38.8031	37.7105	36.5997	35.8533	35.1047			
alpha	3.2407	3.2655	3.2904	3.4151	3.4400	3.5628	3.5628	3.5869	3.5140	3.4400	3.3902	3.3403		
util living area	0.9756	0.9668	0.9491	0.9071	0.8262	0.6734	0.5232	0.5607	0.7677	0.9141	0.9631	0.9780	(86)	
Living	18.9567	19.1747	19.5473	20.0956	20.5289	20.8534	20.9552	20.9430	20.7447	20.2066	19.5592	19.0066		

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Non living	17.4019	17.6845	18.1601	18.8735	19.3889	19.7644	19.8440	19.8461	19.6523	19.0252	18.2091	17.4941
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	19.9547	19.1747	19.5473	20.0956	20.5289	20.8534	20.9552	20.9430	20.7447	20.2066	19.5592	19.2854 (87)
Th 2	19.7211	19.7332	19.7451	19.8016	19.8123	19.8624	19.8624	19.8718	19.8430	19.8123	19.7907	19.7683 (88)
util rest of house	0.9697	0.9588	0.9361	0.8822	0.7767	0.5847	0.4017	0.4408	0.6903	0.8862	0.9530	0.9727 (89)
MIT 2	18.7965	17.6845	18.1601	18.8735	19.3889	19.7644	19.8440	19.8461	19.6523	19.0252	18.2091	17.9039 (90)
Living area fraction	19.3433	18.3880	18.8150	19.4504	19.9271	20.2785	20.3685	20.3639	FLA = Living area / (4) =			0.4721 (91)
MIT									20.1680	19.5829	18.8464	18.5561 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3433	18.3880	18.8150	19.4504	19.9271	20.2785	20.3685	20.3639	20.1680	19.5829	18.8464	18.5561 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9676	0.9474	0.9238	0.8735	0.7821	0.6193	0.4578	0.4954	0.7143	0.8797	0.9425	0.9660 (94)
Useful gains	644.3497	680.1875	701.6222	692.7296	634.5076	488.6144	346.7268	357.5454	494.1455	577.2860	599.0628	619.1412 (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	1646.5244	1460.0966	1318.6172	1071.3483	826.9143	543.4077	360.6332	375.7970	591.9395	902.8854	1205.2288	1504.3976 (97)
Space heating kWh	745.6179	524.0989	459.0442	272.6054	143.1506	0.0000	0.0000	0.0000	0.0000	242.2460	436.4395	658.6308 (98a)
Space heating requirement - total per year (kWh/year)												3481.8334
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	745.6179	524.0989	459.0442	272.6054	143.1506	0.0000	0.0000	0.0000	0.0000	242.2460	436.4395	658.6308 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3481.8334
Space heating per m2										(98c) / (4) =		46.3010 (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 %)												308.6795 (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	745.6179	524.0989	459.0442	272.6054	143.1506	0.0000	0.0000	0.0000	0.0000	242.2460	436.4395	658.6308 (98)
Space heating efficiency (main heating system 1)	308.6795	308.6795	308.6795	308.6795	308.6795	0.0000	0.0000	0.0000	0.0000	308.6795	308.6795	308.6795 (210)
Space heating fuel (main heating system)	241.5508	169.7874	148.7122	88.3134	46.3752	0.0000	0.0000	0.0000	0.0000	78.4782	141.3892	213.3704 (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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744 (64)
Efficiency of water heater (217)m	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620 (216)
Fuel for water heating, kWh/month	160.3732	141.9106	150.8394	132.6620	128.6586	115.9856	114.4426	118.9116	120.1463	133.9232	142.3638	158.6145 (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	28.0625	22.5128	20.2702	14.8509	11.4712	9.3721	10.4644	13.6021	17.6677	23.1810	26.1829	28.8424 (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												1127.9768 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.4620
Water heating fuel used												1618.8315 (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)												226.4803 (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												2973.2886 (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	1127.9768	16.4900	186.0034 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1618.8315	16.4900	266.9453 (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	226.4803	16.4900	37.3466 (250)
Additional standing charges			0.0000 (251)
Total energy cost			490.2953 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.4684 (257)
SAP value		76.1966
SAP rating (Section 12)		76 (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	1127.9768	0.1550	174.8443 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1618.8315	0.1409	228.0406 (264)
Space and water heating			402.8848 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	226.4803	0.1443	32.6881 (268)
Total CO2, kg/year			435.5729 (272)
CO2 emissions per m2			5.7900 (273)
EI value			95.1442
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	75.2000 (1b)	x 2.6000 (2b)	= 195.5200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 195.5200 (5)

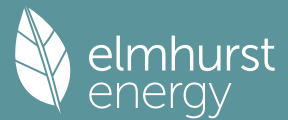
2. Ventilation rate

	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) = 0.1534 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9034 (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) = 0.7679 (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	0.8063	0.7679	0.7679	0.7103	0.7103	0.6335	0.6527	0.6143	0.6335	0.6719	0.6719	0.7295 (22b)
Effective ac	0.8251	0.7949	0.7949	0.7523	0.7523	0.7007	0.7130	0.6887	0.7007	0.7257	0.7257	0.7661 (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)
Existing Ext Wall	15.3400	3.8500	11.4900	0.1800	2.0682	190.0000	2183.1000	(29a)
New Ext Wall	14.3000	6.2100	8.0900	0.1800	1.4562	9.0000	72.8100	(29a)
Flat Roof	75.2000		75.2000	0.1400	10.5280	9.0000	676.8000	(30)
Total net area of external elements Aum(A, m2)			104.8400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.2974			(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000	(32)
Party Wall to Adjacent			33.0200	0.0000	0.0000	180.0000	5943.6000	(32)
Party Floor			75.2000			30.0000	2256.0000	(32d)
Internal Wall			153.6600			9.0000	1382.9400	(32c)
Heat capacity Cm = Sum(A x k)								(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								(35)
Thermal bridges (Default value 0.200 * total exposed area)								(36)
Point Thermal bridges								(36a)
Total fabric heat loss								(33) + (36) + (36a) =

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	53.2351	51.2851	51.2851	48.5385	48.5385	45.2092	46.0059	44.4364	45.2092	46.8263	46.8263	49.4302	(38)
Average = Sum(39)m / 12 =	99.5005	97.5505	97.5505	94.8038	94.8038	91.4746	92.2712	90.7017	91.4746	93.0916	93.0916	95.6956	(39)
													94.3342
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3231	1.2972	1.2972	1.2607	1.2607	1.2164	1.2270	1.2061	1.2164	1.2379	1.2379	1.2725	(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													2.3655	(42)
Hot water usage for mixer showers														
Hot water usage for baths	63.8811	62.9211	61.5222	58.8456	56.8704	54.6676	53.4155	54.8038	56.3257	58.6908	61.4249	63.6364		(42a)
Hot water usage for other uses	27.5942	27.1844	26.6073	25.5432	24.7464	23.8630	23.3857	23.9588	24.5828	25.5281	26.6141	27.5009		(42b)
Hot water usage for other uses	38.8550	37.4420	36.0291	34.6162	33.2033	31.7904	31.7904	33.2033	34.6162	36.0291	37.4420	38.8550		(42c)
Average daily hot water use (litres/day)													119.8031	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	130.3303	127.5475	124.1586	119.0051	114.8201	110.3210	108.5917	111.9660	115.5247	120.2481	125.4811	129.9922		(44)
Energy conte	206.4113	181.6260	190.8272	162.9120	154.5700	135.6525	131.3322	138.6373	142.4535	163.1755	178.7708	203.5364		(45)
Energy content (annual)													1989.9047	
Distribution loss (46)m = 0.15 x (45)m	30.9617	27.2439	28.6241	24.4368	23.1855	20.3479	19.6998	20.7956	21.3680	24.4763	26.8156	30.5305		(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744		(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744		(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(64a)
Heat gains from water heating, kWh/month	113.2222	100.6658	108.0404	97.3202	95.9849	88.2564	88.2584	90.6873	90.5178	98.8463	102.5933	112.2663		(65)

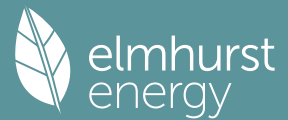
5. Internal gains (see Table 5 and 5a)

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	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292		(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	32.0606	28.4760	23.1582	17.5323	13.1056	11.0643	11.9553	15.5400	20.8578	26.4837	30.9104	32.9517		(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	312.1159	315.3547	307.1931	289.8179	267.8849	247.2709	233.4996	230.2608	238.4224	255.7976	277.7306	298.3445		(68)
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)	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195		(71)
Water heating gains (Table 5)	152.1803	149.8004	145.2156	135.1670	129.0120	122.5784	118.6268	121.8915	125.7192	132.8579	142.4907	150.8955		(72)
Total internal gains	595.2250	592.4992	574.4351	541.3853	508.8706	479.7818	462.9499	466.5604	483.8675	514.0073	549.9998	581.0599		(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	673.6665	718.0674	758.2611	800.5341	813.2448	813.2212	776.8123	744.1021	708.2723	666.2868	647.3566	646.8543 (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	36.9715	37.7105	37.7105	38.8031	38.8031	40.2153	39.8681	40.5580	40.2153	39.5168	39.5168	38.4415	
alpha	3.4648	3.5140	3.5140	3.5869	3.5869	3.6810	3.6579	3.7039	3.6810	3.6345	3.6345	3.5628	
util living area	0.9695	0.9595	0.9348	0.8745	0.7539	0.5307	0.3621	0.3827	0.6615	0.8765	0.9493	0.9721 (86)	
Living	19.3404	19.5384	19.8895	20.3615	20.7366	20.9527	20.9914	20.9899	20.8865	20.4696	19.9147	19.3864	
Non living	17.9504	18.2119	18.6497	19.2405	19.6587	19.8836	19.8967	19.9129	19.8365	19.3906	18.7179	18.0344	
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	20.1510	19.5384	19.8895	20.3615	20.7366	20.9527	20.9914	20.9899	20.8865	20.4696	19.9147	19.6121 (87)	
Th 2	19.8227	19.8430	19.8430	19.8718	19.8718	19.9069	19.8985	19.9151	19.9069	19.8898	19.8898	19.8624 (88)	
util rest of house	0.9622	0.9499	0.9184	0.8419	0.6884	0.4273	0.2364	0.2566	0.5656	0.8378	0.9355	0.9655 (89)	
MIT 2	19.0763	18.2119	18.6497	19.2405	19.6587	19.8836	19.8967	19.9129	19.8365	19.3906	18.7179	18.3638 (90)	
Living area fraction	fLA = Living area / (4) =											0.4721 (91)	
MIT	19.5836	18.8381	19.2350	19.7697	20.1676	20.3883	20.4135	20.4213	20.3322	19.9000	19.2829	18.9531 (92)	
Temperature adjustment	0.0000												
adjusted MIT	19.5836	18.8381	19.2350	19.7697	20.1676	20.3883	20.4135	20.4213	20.3322	19.9000	19.2829	18.9531 (93)	

8. Space heating requirement													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9605	0.9393	0.9078	0.8385	0.7071	0.4743	0.2960	0.3163	0.6052	0.8382	0.9261	Dec 0.9587 (94)	
Useful gains	647.0381	674.4503	688.3838	671.2426	575.0131	385.7261	229.9611	235.3836	428.6791	558.4741	599.5027	620.1481 (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	1441.1288	1291.3809	1154.5091	935.6879	679.5128	401.4179	231.9227	237.7590	469.4650	772.6593	1050.3444	1325.6800 (97)	
Space heating kWh	590.8035	414.5774	346.7973	190.4006	77.7478	0.0000	0.0000	0.0000	0.0000	159.3538	324.6061	524.9157 (98a)	
Space heating requirement - total per year (kWh/year)	2629.2021												
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	590.8035	414.5774	346.7973	190.4006	77.7478	0.0000	0.0000	0.0000	0.0000	159.3538	324.6061	524.9157 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	2629.2021												
Space heating per m2	(98c) / (4) = 34.9628 (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 %)													301.7573 (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	590.8035	414.5774	346.7973	190.4006	77.7478	0.0000	0.0000	0.0000	0.0000	159.3538	324.6061	524.9157 (98)	
Space heating efficiency (main heating system 1)	301.7573	301.7573	301.7573	301.7573	301.7573	0.0000	0.0000	0.0000	0.0000	301.7573	301.7573	301.7573 (210)	
Space heating fuel (main heating system)	195.7876	137.3877	114.9259	63.0973	25.7650	0.0000	0.0000	0.0000	0.0000	52.8086	107.5719	173.9530 (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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744 (64)	
Efficiency of water heater (217)m	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066 (216)	
Fuel for water heating, kWh/month	159.8407	141.4394	150.3385	132.2215	128.2314	115.6005	114.0626	118.5167	119.7473	133.4785	141.8911	158.0878 (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	28.0625	22.5128	20.2702	14.8509	11.4712	9.3721	10.4644	13.6021	17.6677	23.1810	26.1829	28.8424 (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	871.2969 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	164.0066
Water heating fuel used	1613.4558 (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)	226.4803 (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	2711.2330 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	871.2969	25.1600	219.2183 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1613.4558	25.1600	405.9455 (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	226.4803	25.1600	56.9824 (250)
Additional standing charges			0.0000 (251)
Total energy cost			682.1462 (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	871.2969	0.1557	135.6826 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1613.4558	0.1409	227.2833 (264)
Space and water heating			362.9659 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	226.4803	0.1443	32.6881 (268)
Total CO2, kg/year			395.6540 (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	871.2969	1.5765	1373.6073 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1613.4558	1.5209	2453.8645 (278)
Space and water heating			3827.4718 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	226.4803	1.5338	347.3830 (282)
Total Primary energy kWh/year			4174.8548 (286)

SAP 10 EPC IMPROVEMENTS

Be Green

Current energy efficiency rating:	C 76
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)			

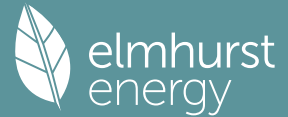
Recommended measures	Typical annual savings		Energy efficiency	Environmental impact
(none)	Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating:	C 76
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	£682	£682	£0
Space heating	£219	£219	£0
Water heating	£406	£406	£0
Lighting	£57	£57	£0
Total cost of fuels	£682	£682	£0
Total cost of uses	£682	£682	£0

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Delivered energy	36 kWh/m ²	36 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.4 tonnes	0.4 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	75.2000 (1b)	x 2.6000 (2b)	= 195.5200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 195.5200 (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) = 0.1534 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9034 (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) = 0.7679 (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	0.9791	0.9599	0.9407	0.8447	0.8255	0.7295	0.7295	0.7103	0.7679	0.8255	0.8639	0.9023 (22b)
Effective ac	0.9793	0.9607	0.9425	0.8568	0.8407	0.7661	0.7661	0.7523	0.7949	0.8407	0.8732	0.9071 (25)

3. Heat losses and heat loss parameter

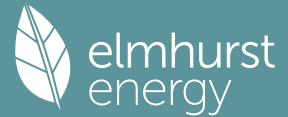
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			3.8500	1.1450	4.4084		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Existing Ext Wall	15.3400	3.8500	11.4900	0.1800	2.0682	190.0000	2183.1000 (29a)
New Ext Wall	14.3000	6.2100	8.0900	0.1800	1.4562	9.0000	72.8100 (29a)
Flat Roof	75.2000		75.2000	0.1400	10.5280	9.0000	676.8000 (30)
Total net area of external elements Aum(A, m ²)			104.8400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	25.2974		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Party Wall to Adjacent			33.0200	0.0000	0.0000	180.0000	5943.6000 (32)
Party Floor			75.2000			30.0000	2256.0000 (32d)
Internal Wall			153.6600			9.0000	1382.9400 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13243.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							176.1070 (35)
Thermal bridges (Default value 0.200 * total exposed area)							20.9680 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	46.2654 (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	63.1872	61.9863	60.8091	55.2802	54.2458	49.4302	49.4302	48.5385	51.2851	54.2458	56.3384	58.5262 (38)
Average = Sum(39)m / 12 =	109.4525	108.2516	107.0745	101.5456	100.5111	95.6956	95.6956	94.8038	97.5505	100.5111	102.6038	104.7916 (39)
												101.5406
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4555	1.4395	1.4239	1.3503	1.3366	1.2725	1.2725	1.2607	1.2972	1.3366	1.3644	1.3935 (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	2.3655 (42)
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Hot water usage for mixer showers	63.8811	62.9211	61.5222	58.8456	56.8704	54.6676	53.4155	54.8038	56.3257	58.6908	61.4249	63.6364 (42a)
Hot water usage for baths	27.5942	27.1844	26.6073	25.5432	24.7464	23.8630	23.3857	23.9588	24.5828	25.5281	26.6141	27.5009 (42b)
Hot water usage for other uses	38.8550	37.4420	36.0291	34.6162	33.2033	31.7904	31.7904	33.2033	34.6162	36.0291	37.4420	38.8550 (42c)
Average daily hot water use (litres/day)												119.8031 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	130.3303	127.5475	124.1586	119.0051	114.8201	110.3210	108.5917	111.9660	115.5247	120.2481	125.4811	129.9922	(44)
Energy content (annual)	206.4113	181.6260	190.8272	162.9120	154.5700	135.6525	131.3322	138.6373	142.4535	163.1755	178.7708	203.5364	(45)
Distribution loss (46)m = 0.15 x (45)m	30.9617	27.2439	28.6241	24.4368	23.1855	20.3479	19.6998	20.7956	21.3680	24.4763	26.8156	30.5305	(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744	(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744	(64)
										</			

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	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292	141.9292 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	32.0606	28.4760	23.1582	17.5323	13.1056	11.0643	11.9553	15.5400	20.8578	26.4837	30.9104	32.9517 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	312.1159	315.3547	307.1931	289.8179	267.8849	247.2709	233.4996	230.2608	238.4224	255.7976	277.7306	298.3445 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584	51.5584 (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)	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195	-94.6195 (71)
Water heating gains (Table 5)	152.1803	149.8004	145.2156	135.1670	129.0120	122.5784	118.6268	121.8915	125.7192	132.8579	142.4907	150.8955 (72)
Total internal gains	595.2250	592.4992	574.4351	541.3853	508.8706	479.7818	462.9499	466.5604	483.8675	514.0073	549.9998	581.0599 (73)

6. Solar gains

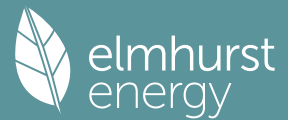
[Jan]												Gains
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		W	
Northwest					3.8500	11.2829	0.6300	0.8000	0.7700		15.1721 (81)	
Southeast					4.3200	36.7938	0.6300	0.8000	0.7700		55.5166 (77)	
Solar gains	70.6887	125.4486	185.0302	251.6984	302.4026	309.2240	294.3762	255.1713	207.9007	142.2566	85.5865	59.9009 (83)
Total gains	665.9137	717.9478	759.4653	793.0837	811.2732	789.0058	757.3260	721.7318	691.7682	656.2639	635.5863	640.9608 (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	33.6098	33.9827	34.3563	36.2269	36.5997	38.4415	38.4415	38.8031	37.7105	36.5997	35.8533	35.1047
alpha	3.2407	3.2655	3.2904	3.4151	3.4400	3.5628	3.5628	3.5869	3.5140	3.4400	3.3902	3.3403
util living area												
	0.9756	0.9668	0.9491	0.9071	0.8262	0.6734	0.5232	0.5607	0.7677	0.9141	0.9631	0.9780 (86)
Living	18.9567	19.1747	19.5473	20.0956	20.5289	20.8534	20.9552	20.9430	20.7447	20.2066	19.5592	19.0066
Non living	17.4019	17.6845	18.1601	18.8735	19.3889	19.7644	19.8440	19.8461	19.6523	19.0252	18.2091	17.4941
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	19.9547	19.1747	19.5473	20.0956	20.5289	20.8534	20.9552	20.9430	20.7447	20.2066	19.5592	19.2854 (87)
Th 2	19.7211	19.7332	19.7451	19.8016	19.8123	19.8624	19.8624	19.8718	19.8430	19.8123	19.7907	19.7683 (88)
util rest of house												
	0.9697	0.9588	0.9361	0.8822	0.7767	0.5847	0.4017	0.4408	0.6903	0.8862	0.9530	0.9727 (89)
MIT 2	18.7965	17.6845	18.1601	18.8735	19.3889	19.7644	19.8440	19.8461	19.6523	19.0252	18.2091	17.9039 (90)
Living area fraction									fLA = Living area /	(4) =		0.4721 (91)
MIT	19.3433	18.3880	18.8150	19.4504	19.9271	20.2785	20.3685	20.3639	20.1680	19.5829	18.8464	18.5561 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3433	18.3880	18.8150	19.4504	19.9271	20.2785	20.3685	20.3639	20.1680	19.5829	18.8464	18.5561 (93)

8. Space heating requirement

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9676	0.9474	0.9238	0.8735	0.7821	0.6193	0.4578	0.4954	0.7143	0.8797	0.9425	0.9660	(94)
Useful gains	644.3497	680.1875	701.6222	692.7296	634.5076	488.6144	346.7268	357.5454	494.1455	577.2860	599.0628	619.1412	(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	1646.5244	1460.0966	1318.6172	1071.3483	826.9143	543.4077	360.6332	375.7970	591.9395	902.8854	1205.2288	1504.3976	(97)
Space heating kWh	745.6179	524.0989	459.0442	272.6054	143.1506	0.0000	0.0000	0.0000	0.0000	242.2460	436.4395	658.6308	(98a)
Space heating requirement - total per year (kWh/year)												3481.8334	
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	745.6179	524.0989	459.0442	272.6054	143.1506	0.0000	0.0000	0.0000	0.0000	242.2460	436.4395	658.6308	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3481.8334	
Space heating per m2										(98c) / (4) =		46.3010	(99)

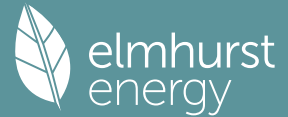
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %)												308.6795	(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	745.6179	524.0989	459.0442	272.6054	143.1506	0.0000	0.0000	0.0000	0.0000	242.2460	436.4395	658.6308	(98)
Space heating efficiency (main heating system 1)	308.6795	308.6795	308.6795	308.6795	308.6795	0.0000	0.0000	0.0000	0.0000	308.6795	308.6795	308.6795	(210)
Space heating fuel (main heating system)	241.5508	169.7874	148.7122	88.3134	46.3752	0.0000	0.0000	0.0000	0.0000	78.4782	141.3892	213.3704	(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744	(64)
Efficiency of water heater (217)m	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	163.4620	(216)
Fuel for water heating, kWh/month	160.3732	141.9106	150.8394	132.6620	128.6586	115.9856	114.4426	118.9116	120.1463	133.9232	142.3638	158.6145	(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	28.0625	22.5128	20.2702	14.8509	11.4712	9.3721	10.4644	13.6021	17.6677	23.1810	26.1829	28.8424	(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												1127.9768	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												163.4620	
Water heating fuel used												1618.8315	(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)												226.4803	(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												2973.2886	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1127.9768	16.4900	186.0034	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1618.8315	16.4900	266.9453	(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	226.4803	16.4900	37.3466	(250)
Additional standing charges			0.0000	(251)
Total energy cost			490.2953	(255)

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11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):

Energy cost factor (ECF)

SAP value

SAP rating (Section 12)

SAP band

$$\begin{aligned} & [(255) \times (256)] / [(4) + 45.0] = 0.3600 \quad (256) \\ & 1.4684 \quad (257) \\ & 76.1966 \\ & 76 \quad (258) \\ & C \end{aligned}$$

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	1127.9768	0.1550	174.8443 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	1618.8315	0.1409	228.0406 (264)
Space and water heating			402.8848 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	226.4803	0.1443	32.6881 (268)
Total CO ₂ , kg/year			435.5729 (272)
CO ₂ emissions per m ²			5.7900 (273)
EI value			95.1442
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	75.2000 (1b)	x 2.6000 (2b)	= 195.5200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 195.5200 (5)

2. Ventilation rate

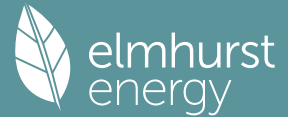
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1534 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9034 (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) = 0.7679 (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	0.8063	0.7679	0.7679	0.7103	0.7103	0.6335	0.6527	0.6143	0.6335	0.6719	0.6719	0.7295 (22b)
Effective ac	0.8251	0.7949	0.7949	0.7523	0.7523	0.7007	0.7130	0.6887	0.7007	0.7257	0.7257	0.7661 (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)
Existing Ext Wall	15.3400	3.8500	11.4900	0.1800	2.0682	190.0000	2183.1000 (29a)
New Ext Wall	14.3000	6.2100	8.0900	0.1800	1.4562	9.0000	72.8100 (29a)
Flat Roof	75.2000		75.2000	0.1400	10.5280	9.0000	676.8000 (30)
Total net area of external elements Aum(A, m ²)			104.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.2974		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Party Wall to Adjacent			33.0200	0.0000	0.0000	180.0000	5943.6000 (32)
Party Floor			75.2000			30.0000	2256.0000 (32d)
Internal Wall			153.6600			9.0000	1382.9400 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13243.2500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							176.1070 (35)
Thermal bridges (Default value 0.200 * total exposed area)							20.9680 (36)

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util living area	0.9695	0.9595	0.9348	0.8745	0.7539	0.5307	0.3621	0.3827	0.6615	0.8765	0.9493	0.9721 (86)
Living	19.3404	19.5384	19.8895	20.3615	20.7366	20.9527	20.9914	20.9899	20.8865	20.4696	19.9147	19.3864
Non living	17.9504	18.2119	18.6497	19.2405	19.6587	19.8836	19.8967	19.9129	19.8365	19.3906	18.7179	18.0344
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	20.1510	19.5384	19.8895	20.3615	20.7366	20.9527	20.9914	20.9899	20.8865	20.4696	19.9147	19.6121 (87)
Th 2	19.8227	19.8430	19.8430	19.8718	19.8718	19.9069	19.8985	19.9151	19.9069	19.8898	19.8898	19.8624 (88)
util rest of house												
MIT	0.9622	0.9499	0.9184	0.8419	0.6884	0.4273	0.2364	0.2566	0.5656	0.8378	0.9355	0.9655 (89)
MIT 2	19.0763	18.2119	18.6497	19.2405	19.6587	19.8836	19.8967	19.9129	19.8365	19.3906	18.7179	18.3638 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.5836	18.8381	19.2350	19.7697	20.1676	20.3883	20.4135	20.4213	20.3322	19.9000	19.2829	18.9531 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5836	18.8381	19.2350	19.7697	20.1676	20.3883	20.4135	20.4213	20.3322	19.9000	19.2829	18.9531 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9605	0.9393	0.9078	0.8385	0.7071	0.4743	0.2960	0.3163	0.6052	0.8382	0.9261	0.9587	(94)
Useful gains	647.0381	674.4503	688.3838	671.2426	575.0131	385.7261	229.9611	235.3836	428.6791	558.4741	599.5027	620.1481	(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	1441.1288	1291.3809	1154.5091	935.6879	679.5128	401.4179	231.9227	237.7590	469.4650	772.6593	1050.3444	1325.6800	(97)
Space heating kWh	590.8035	414.5774	346.7973	190.4006	77.7478	0.0000	0.0000	0.0000	0.0000	159.3538	324.6061	524.9157	(98a)
Space heating requirement - total per year (kWh/year)												2629.2021	
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	590.8035	414.5774	346.7973	190.4006	77.7478	0.0000	0.0000	0.0000	0.0000	159.3538	324.6061	524.9157	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2629.2021	
Space heating per m2										(98c) / (4) =		34.9628	(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 %)													301.7573 (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	590.8035	414.5774	346.7973	190.4006	77.7478	0.0000	0.0000	0.0000	0.0000	159.3538	324.6061	524.9157	(98)
Space heating efficiency (main heating system 1)	301.7573	301.7573	301.7573	301.7573	301.7573	0.0000	0.0000	0.0000	0.0000	301.7573	301.7573	301.7573	(210)
Space heating fuel (main heating system)	195.7876	137.3877	114.9259	63.0973	25.7650	0.0000	0.0000	0.0000	0.0000	52.8086	107.5719	173.9530	(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	262.1493	231.9700	246.5652	216.8520	210.3080	189.5925	187.0702	194.3753	196.3935	218.9135	232.7108	259.2744	(64)
Efficiency of water heater (217)m	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	164.0066	(216)
Fuel for water heating, kWh/month	159.8407	141.4394	150.3385	132.2215	128.2314	115.6005	114.0626	118.5167	119.7473	133.4785	141.8911	158.0878	(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	28.0625	22.5128	20.2702	14.8509	11.4712	9.3721	10.4644	13.6021	17.6677	23.1810	26.1829	28.8424	(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												871.2969	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												164.0066	
Water heating fuel used												1613.4558	(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)												226.4803	(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	2711.2330 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	871.2969	25.1600	219.2183 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1613.4558	25.1600	405.9455 (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	226.4803	25.1600	56.9824 (250)
Additional standing charges			0.0000 (251)
Total energy cost			682.1462 (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	871.2969	0.1557	135.6826 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1613.4558	0.1409	227.2833 (264)
Space and water heating			362.9659 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	226.4803	0.1443	32.6881 (268)
Total CO2, kg/year			395.6540 (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	871.2969	1.5765	1373.6073 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1613.4558	1.5209	2453.8645 (278)
Space and water heating			3827.4718 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	226.4803	1.5338	347.3830 (282)
Total Primary energy kWh/year			4174.8548 (286)

Overview Report

Dwelling Address	
Report Date	01/02/2024
Property Type	Flat, Semi-Detached
Floor Area [m ²]	75

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

76

76

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
Roof	Average thermal transmittance 0.14 W/m ² K	Very 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: **0.4** 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

£682

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	26/01/2024
Date of certificate	26/01/2024
Type of assessment	SAP, new dwelling