

Summary for Input Data

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

SAP Rating	72 C	DER	6.80	TER	9.53
Environmental	94 A	% DER < TER			28.65
CO ₂ Emissions (t/year)	0.49	DFEE	78.63	TFEE	41.61
Compliance Check	See BREL	% DFEE < TFEE			-88.97
% DPER < TPER	-39.33	DPER	71.26	TPER	51.14

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

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

Orientation	Northwest	
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:	25.80 m	79.30 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	30.00	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	41.08	36.06	0.00	None	5.02	Enter Gross Area
	New Ext Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	26.00	16.82	0.00	None	9.18	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	27.30	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	136.24

10.0 External Roofs	
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Summary for Input Data



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	79.30	79.30	None	0.00	Calculate Wall Area	0.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Floor Over Commercial	Exposed Floor - Timber	Lowest occupied	Other	0.25	None	0.00	0.00	79.30

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	6 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
Bifold 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	0.70	0
Entrance Door	Entrance Door	New Ext Wall	North West	1.89	0
Patio Doors	Patio Doors	Existing Ext Wall	North West	4.32	0
Rear Elevation	Windows	New Ext Wall	South East	1.89	0
Bifolds	Bifold Doors	New Ext Wall	South East	5.40	0

14.0 Conservatory

None

15.0 Draught Proofing

100

 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Default

Y-value

0.20

 W/m²K

18.0 Pressure Testing

No

Designed AP₅₀

15.00

 m³/(h.m²) @ 50 Pa

Property Tested?

Yes

Test Method

Blower Door

As Built AP₅₀

15.00

 m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

No

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

No

22.0 Lighting

No Fixed Lighting

No

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

24.0 Main Heating 1

Database

Percentage of Heat

100.00

 %

Database Ref. No.

107010

Fuel Type

Electricity

SAP Code

0

In Winter

340.75

In Summer

160.04

Model Name

AE080RXYDEG

Manufacturer

Samsung Electronics Air Conditioner Europe B.V.

System Type

Heat Pump

Controls SAP Code

2207

Summary for Input Data

PCDF Controls	0
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

Summary for Input Data

Independent Time Control	Yes	
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

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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Compliance Check	See BREL		% DFEE < TFEE				-88.97
% DPER < TPER	-39.33		DPER	71.26		TPER	51.14
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	79.3000 (1b)	2.6000 (2b)	206.1800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000		206.1800 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	206.1800 (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	4 * 10 = 40.0000 (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)	40.0000 / (5) = 0.1940 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9440 (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) = 0.8024 (21)

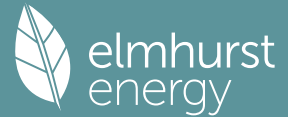
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.0231	1.0030	0.9829	0.8826	0.8626	0.7623	0.7623	0.7422	0.8024	0.8626	0.9027	0.9428 (22b)
Effective ac	1.0231	1.0030	0.9831	0.8895	0.8720	0.7905	0.7905	0.7754	0.8219	0.8720	0.9074	0.9445 (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)			2.5900	1.1450	2.9656		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.1800	6.4908	190.0000	6851.4000 (29a)
New Ext Wall	26.0000	9.1800	16.8200	0.1800	3.0276	9.0000	151.3800 (29a)
Flat Roof	79.3000		79.3000	0.1400	11.1020	9.0000	713.7000 (30)
Total net area of external elements Aum(A, m ²)			225.6800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.4308		(33)
Party Wall			27.3000	0.0000	0.0000	20.0000	546.0000 (32)
Internal Wall			136.2400			9.0000	1226.1600 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			9488.6400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							119.6550 (35)
Thermal bridges (Default value 0.200 * total exposed area)							45.1360 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	101.5668 (37)

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

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(39)m	Jan 69.6088	Feb 68.2439	Mar 66.8889	Apr 60.5232	May 59.3321	Jun 53.7878	Jul 53.7878	Aug 52.7610	Sep 55.9234	Oct 59.3321	Nov 61.7415	Dec 64.2605	(38)
Heat transfer coeff	171.1756	169.8107	168.4557	162.0900	160.8990	155.3546	155.3546	154.3279	157.4902	160.8990	163.3084	165.8273	(39)
Average = Sum(39)m / 12 =												162.0827	
HLP	Jan 2.1586	Feb 2.1414	Mar 2.1243	Apr 2.0440	May 2.0290	Jun 1.9591	Jul 1.9591	Aug 1.9461	Sep 1.9860	Oct 2.0290	Nov 2.0594	Dec 2.0911	(40)
HLP (average)												2.0439	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4494 (42)
Hot water usage for mixer showers	65.2888	64.3077	62.8779	60.1424	58.1236	55.8723	54.5926	56.0115	57.5669	59.9842	62.7785	65.0387 (42a)	
Hot water usage for baths	28.1996	27.7808	27.1910	26.1036	25.2893	24.3865	23.8988	24.4844	25.1221	26.0882	27.1980	28.1042 (42b)	
Hot water usage for other uses	39.7148	38.2706	36.8264	35.3822	33.9381	32.4939	32.4939	33.9381	35.3822	36.8264	38.2706	39.7148 (42c)	
Average daily hot water use (litres/day)												122.4439 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	133.2032	130.3590	126.8953	121.6282	117.3510	112.7526	110.9853	114.4340	118.0713	122.8988	128.2471	132.8577 (44)	
Energy content (annual)	210.9613	185.6295	195.0334	166.5029	157.9770	138.6425	134.2271	141.6932	145.5937	166.7725	182.7115	208.0230 (45)	
Distribution loss (46)m = 0.15 x (45)m	31.6442	27.8444	29.2550	24.9754	23.6965	20.7964	20.1341	21.2540	21.8391	25.0159	27.4067	31.2035 (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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610 (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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2690.0377 (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	114.7350	101.9970	109.4390	98.5142	97.1178	89.2506	89.2209	91.7034	91.5619	100.0423	103.9036	113.7581 (65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 122.4723	Feb 122.4723	Mar 122.4723	Apr 122.4723	May 122.4723	Jun 122.4723	Jul 122.4723	Aug 122.4723	Sep 122.4723	Oct 122.4723	Nov 122.4723	Dec 122.4723	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	112.5544	124.6138	112.5544	116.3062	112.5544	116.3062	112.5544	112.5544	116.3062	112.5544	116.3062	112.5544	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	217.9713	220.2332	214.5334	202.3991	187.0819	172.6858	163.0683	160.8064	166.5062	178.6405	193.9578	208.3539	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	(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)	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	(71)
Water heating gains (Table 5)	154.2137	151.7813	147.0954	136.8253	130.5346	123.9592	119.9206	123.2573	127.1693	134.4654	144.3105	152.9006	(72)
Total internal gains	544.4812	556.3700	533.9249	515.2724	489.9126	472.6929	455.2850	456.3598	469.7235	485.4020	514.3162	533.5506	(73)

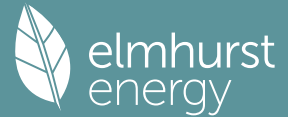
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast				1.8900	36.7938	0.6300	0.8000		0.7700		24.2885 (77)	
Northwest				0.7000	11.2829	0.6300	0.8000		0.7700		2.7586 (81)	
Northwest				4.3200	11.2829	0.6300	0.8000		0.7700		17.0243 (81)	
Southeast				5.4000	36.7938	0.6300	0.8000		0.7700		69.3957 (77)	
Solar gains	113.4671	199.8475	290.8940	389.6873	463.1853	471.5816	449.7669	393.1384	324.8239	225.5801	137.1041	96.3299 (83)
Total gains	657.9483	756.2175	824.8190	904.9597	953.0979	944.2745	905.0519	849.4982	794.5474	710.9821	651.4203	629.8804 (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 15.3978	Feb 15.5216	Mar 15.6464	Apr 16.2609	May 16.3813	Jun 16.9659	Jul 16.9659	Aug 17.0788	Sep 16.7359	Oct 16.3813	Nov 16.1396	Dec 15.8944		
alpha	2.0265	2.0348	2.0431	2.0841	2.0921	2.1311	2.1311	2.1386	2.1157	2.0921	2.0760	2.0596		
util living area														

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	0.9603	0.9460	0.9252	0.8817	0.8121	0.6980	0.5815	0.6185	0.7775	0.8967	0.9454	0.9634 (86)
Living	17.0992	17.4493	18.0336	18.9049	19.6945	20.3837	20.7108	20.6597	20.1436	19.1279	18.0323	17.1203
Non living	14.9322	15.3725	16.1062	17.2009	18.1522	18.9421	19.2412	19.2141	18.6991	17.4978	16.1272	14.9694
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	19.0048	17.4493	18.0336	18.9049	19.6945	20.3837	20.7108	20.6597	20.1436	19.1279	18.0323	17.6630 (87)
Th 2	19.2297	19.2408	19.2518	19.3042	19.3141	19.3608	19.3608	19.3695	19.3427	19.3141	19.2940	19.2733 (88)
util rest of house												
	0.9517	0.9343	0.9078	0.8516	0.7568	0.5946	0.4177	0.4619	0.6920	0.8643	0.9317	0.9556 (89)
MIT 2	17.5010	15.3725	16.1062	17.2009	18.1522	18.9421	19.2412	19.2141	18.6991	17.4978	16.1272	15.7404 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	18.0699	16.1581	16.8353	17.8455	18.7357	19.4875	19.7972	19.7610	19.2456	18.1145	16.8479	16.4678 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0699	16.1581	16.8353	17.8455	18.7357	19.4875	19.7972	19.7610	19.2456	18.1145	16.8479	16.4678 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9445	0.9026	0.8725	0.8164	0.7327	0.6040	0.4674	0.5055	0.6857	0.8318	0.9012	0.9365	(94)
Useful gains	621.4550	682.5525	719.6582	738.7772	698.3277	570.3701	423.0505	429.3796	544.8372	591.3747	587.0875	589.9003	(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	2357.0715	1911.7535	1741.0439	1449.9789	1132.0358	759.2918	496.6964	518.6961	810.3775	1209.0785	1591.9178	2034.3324	(97)
Space heating kWh	1291.2987	826.0231	759.9110	512.0652	322.6789	0.0000	0.0000	0.0000	0.0000	459.5716	723.4778	1074.6575	(98a)
Space heating requirement - total per year (kWh/year)												5969.6838	
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	1291.2987	826.0231	759.9110	512.0652	322.6789	0.0000	0.0000	0.0000	0.0000	459.5716	723.4778	1074.6575	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5969.6838	
Space heating per m2												75.2797	(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 %)													340.7520	(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	1291.2987	826.0231	759.9110	512.0652	322.6789	0.0000	0.0000	0.0000	0.0000	459.5716	723.4778	1074.6575	(98)	
Space heating efficiency (main heating system 1)	340.7520	340.7520	340.7520	340.7520	340.7520	0.0000	0.0000	0.0000	0.0000	340.7520	340.7520	340.7520	(210)	
Space heating fuel (main heating system)	378.9556	242.4118	223.0100	150.2750	94.6961	0.0000	0.0000	0.0000	0.0000	134.8698	212.3180	315.3782	(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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	(64)	
Efficiency of water heater (217)m	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	(216)	
Fuel for water heating, kWh/month	166.6462	147.4473	156.6937	137.7430	133.5391	120.3346	118.6991	123.3643	124.6780	139.0349	147.8709	164.8102	(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	27.5415	22.0948	19.8939	14.5752	11.2583	9.1981	10.2702	13.3496	17.3398	22.7507	25.6969	28.3070	(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												1751.9144	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												160.0392		
Water heating fuel used												1680.8613	(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)												222.2758	(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)	

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Total delivered energy for all uses

3655.0515 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1751.9144	0.1544	270.4743	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1680.8613	0.1409	236.7980	(264)
Space and water heating			507.2724	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	222.2758	0.1443	32.0813	(268)
Total CO2, kg/year			539.3536	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.8000	(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	1751.9144	1.5715	2753.1646	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1680.8613	1.5209	2556.4528	(278)
Space and water heating			5309.6174	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	222.2758	1.5338	340.9341	(282)
Total Primary energy kWh/year			5650.5515	(286)
Dwelling Primary energy Rate (DPER)			71.2600	(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	79.3000	(1b)	x 2.6000	(2b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000		= 206.1800	(1b) - (3b)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	206.1800 (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)

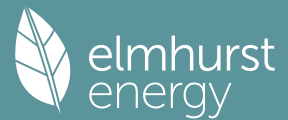
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1455 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3955	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3362 (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	0.4286	0.4202	0.4118	0.3698	0.3614	0.3194	0.3194	0.3110	0.3362	0.3614	0.3782	0.3950	(22b)
Effective ac	0.5919	0.5883	0.5848	0.5684	0.5653	0.5510	0.5510	0.5483	0.5565	0.5653	0.5715	0.5780	(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)			12.3100	1.1450	14.0954			(27)
Floor Over Commercial			79.3000	0.1300	10.3090			(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.1800	6.4908			(29a)
New Ext Wall	26.0000	9.1800	16.8200	0.1800	3.0276			(29a)
Flat Roof	79.3000		79.3000	0.1100	8.7230			(30)
Total net area of external elements Aum(A, m2)			225.6800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.5358			(33)
Party Wall			27.3000	0.0000	0.0000			(32)

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Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 119.6550 (35)
Thermal bridges (User defined value 0.050 * total exposed area) 11.2840 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 55.8198 (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 40.2698 40.0271 39.7893 38.6719 38.4628 37.4896 37.4896 37.3094 37.8645 38.4628 38.8857 39.3279 (38)
Heat transfer coeff 28.1996 27.7808 27.1910 26.1036 25.2893 24.3865 23.8988 24.4844 25.1221 26.0882 27.1980 28.1042 (42b)
Average = Sum(39)m / 12 = 96.0897 95.8470 95.6091 94.4917 94.2826 93.3094 93.3094 93.1292 93.6843 94.2826 94.7056 95.1477 (39)
94.4907 39.7148 38.2706 36.8264 35.3822 33.9381 32.4939 32.4939 33.9381 35.3822 36.8264 38.2706 39.7148 (42c)
122.4439 (43)

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
HLP (average) 1.2117 1.2087 1.2057 1.1916 1.1889 1.1767 1.1767 1.1744 1.1814 1.1889 1.1943 1.1998 (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 2.4494 (42)
Hot water usage for mixer showers 65.2888 64.3077 62.8779 60.1424 58.1236 55.8723 54.5926 56.0115 57.5669 59.9842 62.7785 65.0387 (42a)
Hot water usage for baths 28.1996 27.7808 27.1910 26.1036 25.2893 24.3865 23.8988 24.4844 25.1221 26.0882 27.1980 28.1042 (42b)
Hot water usage for other uses 39.7148 38.2706 36.8264 35.3822 33.9381 32.4939 32.4939 33.9381 35.3822 36.8264 38.2706 39.7148 (42c)
Average daily hot water use (litres/day) 122.4439 (43)

Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Energy conte 133.2032 130.3590 126.8953 121.6282 117.3510 112.7526 110.9853 114.4340 118.0713 122.8988 128.2471 132.8577 (44)
Energy content (annual) 210.9613 185.6295 195.0334 166.5029 157.9770 138.6425 134.2271 141.6932 145.5937 166.7725 182.7115 208.0230 (45)
Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 2033.7677
31.6442 27.8444 29.2550 24.9754 23.6965 20.7964 20.1341 21.2540 21.8391 25.0159 27.4067 31.2035 (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 262.7079 232.3684 246.7800 216.5803 209.7236 188.7199 185.9737 193.4398 195.6710 218.5191 232.7888 259.7696 (62)
WWHRS -29.8473 -26.3972 -27.6417 -22.8884 -21.3312 -18.2532 -17.1095 -18.1942 -18.8855 -22.2639 -25.2223 -29.2946 (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 232.8605 205.9712 219.1384 193.6919 188.3924 170.4666 168.8642 175.2456 176.7855 196.2552 207.5665 230.4750 (64)
Total per year (kWh/year) = Sum(64)m = 2365.7131 (64)
2366 (64)

12Total per year (kWh/year)
Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 111.5419 99.1129 106.2459 95.4241 93.9246 86.1605 86.0278 88.5103 88.4718 96.8491 100.8134 110.5649 (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 122.4723 122.4723 122.4723 122.4723 122.4723 122.4723 122.4723 122.4723 122.4723 122.4723 122.4723 122.4723 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 115.3977 127.7618 115.3977 119.2443 115.3977 119.2443 115.3977 115.3977 119.2443 115.3977 119.2443 115.3977 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 217.9713 220.2332 214.5334 202.3991 187.0819 172.6858 163.0683 160.8064 166.5062 178.6405 193.9578 208.3539 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 35.2472 35.2472 35.2472 35.2472 35.2472 35.2472 35.2472 35.2472 35.2472 35.2472 35.2472 35.2472 (69)

Pumps, fans 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 (70)

Losses e.g. evaporation (negative values) (Table 5) -97.9778 -97.9778 -97.9778 -97.9778 -97.9778 -97.9778 -97.9778 -97.9778 -97.9778 -97.9778 -97.9778 -97.9778 (71)

Water heating gains (Table 5) 149.9219 147.4894 142.8036 132.5335 126.2428 119.6674 115.6287 118.9654 122.8775 130.1736 140.0187 148.6088 (72)

Total internal gains 546.0326 558.2261 535.4764 516.9186 491.4640 471.3391 453.8364 454.9113 468.3697 486.9534 515.9624 535.1020 (73)

6. Solar gains

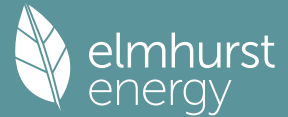
[Jan] Area Solar flux g FF Access Gains
m2 Table 6a Specific data or Table 6b Specific data or Table 6c factor Table 6d W
Southeast 7.2900 36.7938 0.6300 0.7000 0.7700 81.9737 (77)
Northwest 5.0200 11.2829 0.6300 0.7000 0.7700 17.3100 (81)

Solar gains 99.2837 174.8666 254.5323 340.9764 405.2872 412.6339 393.5461 343.9961 284.2209 197.3826 119.9661 84.2886 (83)
Total gains 645.3163 733.0926 790.0087 857.8950 896.7512 883.9730 847.3825 798.9073 752.5906 684.3360 635.9285 619.3907 (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)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	27.4299	27.4994	27.5678	27.8938	27.9557	28.2472	28.2472	28.3019	28.1342	27.9557	27.8308	27.7015
alpha	2.8287	2.8333	2.8379	2.8596	2.8637	2.8831	2.8831	2.8868	2.8756	2.8637	2.8554	2.8468
util living area	0.9531	0.9324	0.9014	0.8361	0.7328	0.5851	0.4516	0.4911	0.6832	0.8564	0.9311	0.9577 (86)
MIT	18.7669	19.0585	19.4759	20.0327	20.5008	20.8176	20.9364	20.9177	20.6988	20.1036	19.3569	18.7233 (87)
Th 2	19.9106	19.9131	19.9155	19.9267	19.9289	19.9387	19.9387	19.9405	19.9349	19.9289	19.9246	19.9201 (88)
util rest of house	0.9454	0.9215	0.8850	0.8080	0.6854	0.5108	0.3544	0.3933	0.6148	0.8257	0.9182	0.9507 (89)
MIT 2	17.3339	17.7006	18.2229	18.9107	19.4588	19.8022	19.9058	19.8950	19.6895	19.0120	18.0887	17.2848 (90)
Living area fraction	17.3339	17.7006	18.2229	18.9107	19.4588	19.8022	19.9058	19.8950	19.6895	19.0120	18.0887	0.3783 (91)
MIT	17.8760	18.2143	18.6969	19.3351	19.8530	20.1863	20.2957	20.2819	20.0714	19.4250	18.5685	17.8290 (92)
Temperature adjustment	17.8760	18.2143	18.6969	19.3351	19.8530	20.1863	20.2957	20.2819	20.0714	19.4250	18.5685	0.0000
adjusted MIT	17.8760	18.2143	18.6969	19.3351	19.8530	20.1863	20.2957	20.2819	20.0714	19.4250	18.5685	17.8290 (93)

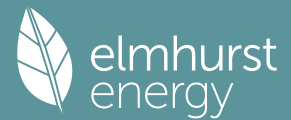
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9260	0.8995	0.8623	0.7900	0.6817	0.5291	0.3883	0.4262	0.6243	0.8086	0.8970	0.9323 (94)
Useful gains	597.5565	659.4276	681.2088	677.7632	611.3042	467.7269	329.0547	340.4905	469.8612	553.3700	570.4490	577.4636 (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	1304.5134	1276.1340	1166.1370	986.0341	768.6857	521.2586	344.8457	361.5174	559.4217	832.0397	1086.1300	1296.7687 (97)
Space heating kWh	525.9760	414.4267	360.7866	221.9550	117.0919	0.0000	0.0000	0.0000	0.0000	207.3303	371.2903	535.1630 (98a)
Space heating requirement - total per year (kWh/year)												2754.0197
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	525.9760	414.4267	360.7866	221.9550	117.0919	0.0000	0.0000	0.0000	0.0000	207.3303	371.2903	535.1630 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2754.0197
Space heating per m2										(98c) / (4) =		34.7291 (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	525.9760	414.4267	360.7866	221.9550	117.0919	0.0000	0.0000	0.0000	0.0000	207.3303	371.2903	535.1630 (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)	569.8548	448.9997	390.8847	240.4713	126.8601	0.0000	0.0000	0.0000	0.0000	224.6265	402.2647	579.8082 (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	232.8605	205.9712	219.1384	193.6919	188.3924	170.4666	168.8642	175.2456	176.7855	196.2552	207.5665	230.4750 (64)
Efficiency of water heater (217)m	85.8295	85.5950	85.1703	84.3660	83.0254	79.8000	79.8000	79.8000	79.8000	84.1831	85.3484	79.8000 (216)
Fuel for water heating, kWh/month	271.3058	240.6345	257.2944	229.5852	226.9095	213.6173	211.6093	219.6060	221.5358	233.1289	243.1991	268.3555 (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	23.9774	19.2355	17.3195	12.6890	9.8013	8.0078	8.9411	11.6220	15.0958	19.8065	22.3714	24.6438 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-61.0739	-80.1895	-107.4482	-112.3797	-114.5554	-104.6639	-103.3505	-100.6763	-95.1977	-87.4631	-65.0000	-53.5255 (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)	-55.0369	-112.5924	-218.1886	-319.9663	-415.9097	-415.3325	-410.4253	-350.6819	-261.3815	-158.2619	-72.5344	-43.7661 (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												2983.7700 (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												2836.7814 (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)												193.5111 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3919.6012 (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												2180.4613 (238)

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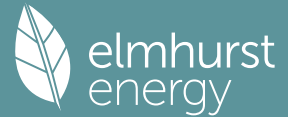
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2983.7700	0.2100	626.5917 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2836.7814	0.2100	595.7241 (264)
Space and water heating			1222.3158 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	193.5111	0.1443	27.9296 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1085.5238	0.1361	-147.7726
PV Unit electricity exported	-2834.0774	0.1266	-358.8401
Total			-506.6127 (269)
Total CO2, kg/year			755.5619 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.5300 (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	2983.7700	1.1300	3371.6601 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2836.7814	1.1300	3205.5630 (278)
Space and water heating			6577.2230 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	193.5111	1.5338	296.8138 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1085.5238	1.5032	-1631.7574
PV Unit electricity exported	-2834.0774	0.4648	-1317.2802
Total			-2949.0377 (283)
Total Primary energy kWh/year			4055.1000 (286)
Target Primary Energy Rate (TPER)			51.1400 (287)

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Property Reference	Flat 1C				Issued on Date	01/02/2024
Assessment Reference	Be Green		Prop Type Ref	Conversion		
Property						
SAP Rating	72 C	DER	6.80	TER	9.53	
Environmental	94 A	% DER < TER				28.65
CO ₂ Emissions (t/year)	0.49	DFEE	78.63	TFEE	41.61	
Compliance Check	See BREL	% DFEE < TFEE				-88.97
% DPER < TPER	-39.33	DPER	71.26	TPER	51.14	
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	79.3000 (1b)	2.6000 (2b)	206.1800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000		206.1800 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	206.1800 (5)

2. Ventilation rate

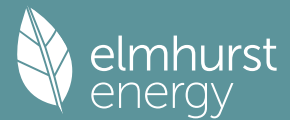
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1455 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8955 (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) = 0.7612 (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	0.9705	0.9515	0.9324	0.8373	0.8183	0.7231	0.7231	0.7041	0.7612	0.8183	0.8563	0.8944 (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	0.9709	0.9527	0.9347	0.8505	0.8348	0.7615	0.7615	0.7479	0.7897	0.8348	0.8666	0.9000 (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)			2.5900	1.1450	2.9656		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.1800	6.4908	190.0000	6851.4000 (29a)
New Ext Wall	26.0000	9.1800	16.8200	0.1800	3.0276	9.0000	151.3800 (29a)
Flat Roof	79.3000		79.3000	0.1400	11.1020	9.0000	713.7000 (30)
Total net area of external elements Aum(A, m ²)			225.6800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.4308		(33)
Party Wall			27.3000	0.0000	0.0000	20.0000	546.0000 (32)
Internal Wall			136.2400			9.0000	1226.1600 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			9488.6400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							119.6550 (35)
Thermal bridges (Default value 0.200 * total exposed area)							45.1360 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	101.5668 (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	66.0620	64.8178	63.5982	57.8697	56.7979	51.8087	51.8087	50.8847	53.7305	56.7979	58.9661	61.2329	(38)
Heat transfer coeff	167.6288	166.3846	165.1650	159.4365	158.3648	153.3755	153.3755	152.4515	155.2973	158.3648	160.5329	162.7997	(39)
Average = Sum(39)m / 12 =												159.4314	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.1139	2.0982	2.0828	2.0105	1.9970	1.9341	1.9341	1.9225	1.9584	1.9970	2.0244	2.0530	(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													2.4494 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	28.1996	27.7808	27.1910	26.1036	25.2893	24.3865	23.8988	24.4844	25.1221	26.0882	27.1980	28.1042	(42b)
Hot water usage for other uses	39.7148	38.2706	36.8264	35.3822	33.9381	32.4939	32.4939	33.9381	35.3822	36.8264	38.2706	39.7148	(42c)
Average daily hot water use (litres/day)												62.2498	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	67.9143	66.0514	64.0174	61.4858	59.2274	56.8804	56.3927	58.4225	60.5043	62.9146	65.4686	67.8190	(44)
Energy content (annual)	107.5597	94.0562	98.3924	84.1710	79.7315	69.9411	68.2021	72.3393	74.6079	85.3745	93.2720	106.1882	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	91.4257	79.9478	83.6335	71.5454	67.7718	59.4499	57.9718	61.4884	63.4167	72.5683	79.2812	90.2599	(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	91.4257	79.9478	83.6335	71.5454	67.7718	59.4499	57.9718	61.4884	63.4167	72.5683	79.2812	90.2599	(64)
12Total per year (kWh/year)												878.7604	(64)
Electric shower(s)	52.2855	46.5868	50.8710	48.5456	49.4565	47.1767	48.7493	49.4565	48.5456	50.8710	49.9144	52.2855	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												594.7443	(64a)
Heat gains from water heating, kWh/month	35.9278	31.6337	33.6261	30.0227	29.3071	26.6567	26.6803	27.7362	27.9906	30.8598	32.2989	35.6364	(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	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	112.5544	124.6138	112.5544	116.3062	112.5544	116.3062	112.5544	112.5544	116.3062	112.5544	116.3062	112.5544	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	217.9713	220.2332	214.5334	202.3991	187.0819	172.6858	163.0683	160.8064	166.5062	178.6405	193.9578	208.3539	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	(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)	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	(71)
Water heating gains (Table 5)	48.2901	47.0739	45.1964	41.6982	39.3912	37.0231	35.8606	37.2799	38.8758	41.4783	44.8596	47.8983	(72)
Total internal gains	438.5575	451.6626	432.0259	420.1453	398.7692	385.7568	371.2250	370.3824	381.4300	392.4149	414.8653	428.5483	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast				1.8900	36.7938	0.6300	0.8000		0.7700		24.2885 (77)	
Northwest				0.7000	11.2829	0.6300	0.8000		0.7700		2.7586 (81)	
Northwest				4.3200	11.2829	0.6300	0.8000		0.7700		17.0243 (81)	
Southeast				5.4000	36.7938	0.6300	0.8000		0.7700		69.3957 (77)	
Solar gains	113.4671	199.8475	290.8940	389.6873	463.1853	471.5816	449.7669	393.1384	324.8239	225.5801	137.1041	96.3299 (83)
Total gains	552.0246	651.5101	722.9199	809.8326	861.9545	857.3384	820.9919	763.5208	706.2539	617.9950	551.9693	524.8781 (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	15.7236	15.8412	15.9582	16.5316	16.6434	17.1848	17.1848	17.2890	16.9722	16.6434	16.4186	16.1900	
alpha	2.0482	2.0561	2.0639	2.1021	2.1096	2.1457	2.1457	2.1526	2.1315	2.1096	2.0946	2.0793	
util living area	0.9709	0.9581	0.9395	0.8996	0.8348	0.7269	0.6132	0.6533	0.8077	0.9171	0.9591	0.9737	(86)

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MIT	16.9921	17.3482	17.9392	18.8202	19.6280	20.3369	20.6829	20.6244	20.0784	19.0323	17.9204	17.0038 (87)
Th 2	19.2585	19.2687	19.2787	19.3263	19.3353	19.3776	19.3776	19.3855	19.3612	19.3353	19.3171	19.2983 (88)
util rest of house	0.9645	0.9488	0.9252	0.8733	0.7840	0.6272	0.4489	0.4978	0.7287	0.8899	0.9485	0.9680 (89)
MIT 2	15.7613	16.1181	16.7066	17.5923	18.3637	19.0167	19.2713	19.2463	18.8051	17.8172	16.7157	15.7945 (90)
Living area fraction	16.2269	16.5834	17.1729	18.0568	18.8420	19.5162	19.8053	19.7676	19.2868	18.2769	17.1714	16.2520 (92)
Temperature adjustment	16.2269	16.5834	17.1729	18.0568	18.8420	19.5162	19.8053	19.7676	19.2868	18.2769	17.1714	0.0000
adjusted MIT	16.2269	16.5834	17.1729	18.0568	18.8420	19.5162	19.8053	19.7676	19.2868	18.2769	17.1714	16.2520 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9471	0.9272	0.8997	0.8463	0.7649	0.6374	0.4990	0.5411	0.7242	0.8656	0.9281	0.9520	(94)
Useful gains	522.8162	604.0694	650.4462	685.3449	659.2688	546.4392	409.6541	413.1334	511.4483	534.9646	512.2673	499.6624	(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	1999.2965	1943.9446	1762.7869	1459.9305	1131.0394	754.0237	491.6195	513.3967	805.5007	1215.7488	1616.7986	1962.0586	(97)
Space heating kWh	1098.5013	900.3961	827.5815	557.7017	350.9973	0.0000	0.0000	0.0000	0.0000	506.5035	795.2625	1088.0228	(98a)
Space heating requirement - total per year (kWh/year)												6124.9668	(98a)
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	(98b)
Space heating kWh	1098.5013	900.3961	827.5815	557.7017	350.9973	0.0000	0.0000	0.0000	0.0000	506.5035	795.2625	1088.0228	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6124.9668	(98c)
Space heating per m2												77.2379	(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	1441.7295	1134.9785	1158.6317	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5359	0.6069	0.5735	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	772.6225	688.8407	664.4198	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	956.9454	916.7239	851.7687	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	132.7125	169.5451	139.3876	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	33.1781	42.3863	34.8469	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												110.4113	(107)
Energy for space heating												77.2379	(99)
Energy for space cooling												1.3923	(108)
Total												78.6302	(109)
Fabric Energy Efficiency (DFEE)												78.6	(109)

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

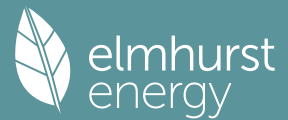
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	79.3000 (1b)	x	2.6000 (2b)	= 206.1800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		= 206.1800 (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) = 0.1455 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3955 (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) =	0.3362 (21)

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Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4286	0.4202	0.4118	0.3698	0.3614	0.3194	0.3194	0.3110	0.3362	0.3614	0.3782	0.3950 (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	0.5919	0.5883	0.5848	0.5684	0.5653	0.5510	0.5510	0.5483	0.5565	0.5653	0.5715	0.5780 (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)			12.3100	1.1450	14.0954		(27)
Floor Over Commercial			79.3000	0.1300	10.3090		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.1800	6.4908		(29a)
New Ext Wall	26.0000	9.1800	16.8200	0.1800	3.0276		(29a)
Flat Roof	79.3000		79.3000	0.1100	8.7230		(30)
Total net area of external elements Aum(A, m ²)			225.6800				(31)
Fabric heat loss, W/K = Sum (A x U)							(32)
Party Wall			27.3000	0.0000	0.0000		(32)
(26)...(30) + (32) =							44.5358
							0.0000
							(33) + (36) + (36a) =
							55.8198 (37)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							119.6550 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							11.2840 (36)
Point Thermal bridges							0.0000
Total fabric heat loss							(33) + (36) + (36a) =
							55.8198 (37)

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

(38)m	Jan 40.2698	Feb 40.0271	Mar 39.7893	Apr 38.6719	May 38.4628	Jun 37.4896	Jul 37.4896	Aug 37.3094	Sep 37.8645	Oct 38.4628	Nov 38.8857	Dec 39.3279 (38)
Heat transfer coeff	96.0897	95.8470	95.6091	94.4917	94.2826	93.3094	93.3094	93.1292	93.6843	94.2826	94.7056	95.1477 (39)
Average = Sum(39)m / 12 =												94.4907
HLP	Jan 1.2117	Feb 1.2087	Mar 1.2057	Apr 1.1916	May 1.1889	Jun 1.1767	Jul 1.1767	Aug 1.1744	Sep 1.1814	Oct 1.1889	Nov 1.1943	Dec 1.1998 (40)
HLP (average)												1.1916
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.4494 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	28.1996	27.7808	27.1910	26.1036	25.2893	24.3865	23.8988	24.4844	25.1221	26.0882	27.1980	28.1042 (42b)
Hot water usage for other uses	39.7148	38.2706	36.8264	35.3822	33.9381	32.4939	32.4939	33.9381	35.3822	36.8264	38.2706	39.7148 (42c)
Average daily hot water use (litres/day)												62.2498 (43)
Daily hot water use	Jan 67.9143	Feb 66.0514	Mar 64.0174	Apr 61.4858	May 59.2274	Jun 56.8804	Jul 56.3927	Aug 58.4225	Sep 60.5043	Oct 62.9146	Nov 65.4686	Dec 67.8190 (44)
Energy conte	107.5597	94.0562	98.3924	84.1710	79.7315	69.9411	68.2021	72.3393	74.6079	85.3745	93.2720	106.1882 (45)
Energy content (annual)												Total = Sum(45)m =
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	91.4257	79.9478	83.6335	71.5454	67.7718	59.4499	57.9718	61.4884	63.4167	72.5683	79.2812	90.2599 (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	91.4257	79.9478	83.6335	71.5454	67.7718	59.4499	57.9718	61.4884	63.4167	72.5683	79.2812	90.2599 (64)
												878.7604 (64)
												879 (64)
12Total per year (kWh/year)												
Electric shower(s)	52.2855	46.5868	50.8710	48.5456	49.4565	47.1767	48.7493	49.4565	48.5456	50.8710	49.9144	52.2855 (64a)
												594.7443 (64a)
Heat gains from water heating, kWh/month												
	35.9278	31.6337	33.6261	30.0227	29.3071	26.6567	26.6803	27.7362	27.9906	30.8598	32.2989	35.6364 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan 122.4723	Feb 122.4723	Mar 122.4723	Apr 122.4723	May 122.4723	Jun 122.4723	Jul 122.4723	Aug 122.4723	Sep 122.4723	Oct 122.4723	Nov 122.4723	Dec 122.4723 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.3977	127.7618	115.3977	119.2443	115.3977	119.2443	115.3977	115.3977	119.2443	115.3977	119.2443	115.3977 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	217.9713	220.2332	214.5334	202.3991	187.0819	172.6858	163.0683	160.8064	166.5062	178.6405	193.9578	208.3539 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472 (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)	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778 (71)
Water heating gains (Table 5)	48.2901	47.0739	45.1964	41.6982	39.3912	37.0231	35.8606	37.2799	38.8758	41.4783	44.8596	47.8983 (72)
Total internal gains	441.4008	454.8105	434.8692	423.0834	401.6125	388.6949	374.0683	373.2257	384.3680	395.2581	417.8033	431.3916 (73)

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6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Southeast				7.2900	36.7938	0.6300		0.7000	0.7000	0.7700	81.9737 (77)
Northwest				5.0200	11.2829	0.6300		0.7000	0.7000	0.7700	17.3100 (81)
Solar gains	99.2837	174.8666	254.5323	340.9764	405.2872	412.6339	393.5461	343.9961	284.2209	197.3826	84.2886 (83)
Total gains	540.6845	629.6771	689.4015	764.0598	806.8996	801.3288	767.6143	717.2218	668.5889	592.6407	515.6802 (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	27.4299	27.4994	27.5678	27.8938	27.9557	28.2472	28.2472	28.3019	28.1342	27.9557	27.8308
alpha	2.8287	2.8333	2.8379	2.8596	2.8637	2.8831	2.8831	2.8868	2.8756	2.8637	2.8554
util living area	0.9690	0.9517	0.9257	0.8672	0.7711	0.6258	0.4899	0.5345	0.7293	0.8909	0.9526
											0.9726 (86)
MIT	18.5612	18.8683	19.3087	19.9085	20.4215	20.7817	20.9214	20.8972	20.6384	19.9716	19.1758
Th 2	19.9106	19.9131	19.9155	19.9267	19.9289	19.9387	19.9387	19.9405	19.9349	19.9289	19.9246
util rest of house	0.9636	0.9435	0.9125	0.8426	0.7265	0.5507	0.3874	0.4320	0.6634	0.8654	0.9431
MIT 2	17.7015	18.0049	18.4380	19.0228	19.4979	19.8091	19.9064	19.8952	19.7000	19.0957	18.3199
Living area fraction	18.0267	18.3315	18.7674	19.3579	19.8473	20.1770	20.2904	20.2743	20.0550	19.4271	18.6437
MIT	18.0267	18.3315	18.7674	19.3579	19.8473	20.1770	20.2904	20.2743	20.0550	19.4271	18.6437
Temperature adjustment											0.0000
adjusted MIT	18.0267	18.3315	18.7674	19.3579	19.8473	20.1770	20.2904	20.2743	20.0550	19.4271	18.6437
											17.9857 (93)

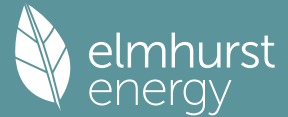
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9510	0.9280	0.8951	0.8273	0.7227	0.5687	0.4229	0.4661	0.6716	0.8510	0.9283	0.9562 (94)
Useful gains	514.2092	584.3452	617.0894	632.1222	583.1265	455.7440	324.6461	334.2985	449.0214	504.3274	499.2339	493.1174 (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	1318.9971	1287.3729	1172.8726	988.1851	768.1506	520.3880	344.3459	360.8062	557.8912	832.2406	1093.2523	1311.6769 (97)
Space heating kWh	598.7622	472.4346	413.5027	256.3653	137.6579	0.0000	0.0000	0.0000	0.0000	243.9674	427.6933	609.0083 (98a)
Space heating requirement - total per year (kWh/year)												3159.3917
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	598.7622	472.4346	413.5027	256.3653	137.6579	0.0000	0.0000	0.0000	0.0000	243.9674	427.6933	609.0083 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3159.3917
Space heating per m2										(98c) / (4) =		39.8410 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	877.1086	690.4897	707.7819	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.7472	0.8144	0.7840	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	655.3427	562.3121	554.9201	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	888.2943	851.2800	794.6791	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	167.7251	214.9921	178.3807	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)	fc = cooled area / (4) =											1.0000 (105)
Space cooling kWh	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)
	0.0000	0.0000	0.0000	0.0000	0.0000	41.9313	53.7480	44.5952	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												140.2745 (107)
Energy for space heating												39.8410 (99)
Energy for space cooling												1.7689 (108)
Total												41.6099 (109)
Fabric Energy Efficiency (TFEE)												41.6 (109)

Full SAP Calculation Printout



Property Reference	Flat 1C				Issued on Date	01/02/2024
Assessment Reference	Be Green		Prop Type Ref	Conversion		
Property						
SAP Rating	72 C	DER	6.80	TER	9.53	
Environmental	94 A	% DER < TER				28.65
CO ₂ Emissions (t/year)	0.49	DFEE	78.63	TFEE	41.61	
Compliance Check	See BREL	% DFEE < TFEE				-88.97
% DPER < TPER	-39.33	DPER	71.26	TPER	51.14	
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	79.3000 (1b)	2.6000 (2b)	206.1800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000		206.1800 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 206.1800 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1940 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9440 (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) = 0.8024 (21)

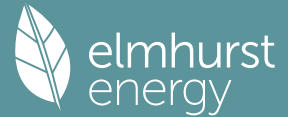
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.0231	1.0030	0.9829	0.8826	0.8626	0.7623	0.7623	0.7422	0.8024	0.8626	0.9027	0.9428 (22b)
Effective ac	1.0231	1.0030	0.9831	0.8895	0.8720	0.7905	0.7905	0.7754	0.8219	0.8720	0.9074	0.9445 (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)			2.5900	1.1450	2.9656		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.1800	6.4908	190.0000	6851.4000 (29a)
New Ext Wall	26.0000	9.1800	16.8200	0.1800	3.0276	9.0000	151.3800 (29a)
Flat Roof	79.3000		79.3000	0.1400	11.1020	9.0000	713.7000 (30)
Total net area of external elements Aum(A, m ²)			225.6800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.4308		(33)
Party Wall			27.3000	0.0000	0.0000	20.0000	546.0000 (32)
Internal Wall			136.2400			9.0000	1226.1600 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			9488.6400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							119.6550 (35)
Thermal bridges (Default value 0.200 * total exposed area)							45.1360 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss				(33) + (36) + (36a) =			101.5668 (37)

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

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(39)m	Jan 69.6088	Feb 68.2439	Mar 66.8889	Apr 60.5232	May 59.3321	Jun 53.7878	Jul 53.7878	Aug 52.7610	Sep 55.9234	Oct 59.3321	Nov 61.7415	Dec 64.2605	(38)
Heat transfer coeff	171.1756	169.8107	168.4557	162.0900	160.8990	155.3546	155.3546	154.3279	157.4902	160.8990	163.3084	165.8273	(39)
Average = Sum(39)m / 12 =												162.0827	
HLP	Jan 2.1586	Feb 2.1414	Mar 2.1243	Apr 2.0440	May 2.0290	Jun 1.9591	Jul 1.9591	Aug 1.9461	Sep 1.9860	Oct 2.0290	Nov 2.0594	Dec 2.0911	(40)
HLP (average)												2.0439	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4494	(42)
Hot water usage for mixer showers	65.2888	64.3077	62.8779	60.1424	58.1236	55.8723	54.5926	56.0115	57.5669	59.9842	62.7785	65.0387	(42a)	
Hot water usage for baths	28.1996	27.7808	27.1910	26.1036	25.2893	24.3865	23.8988	24.4844	25.1221	26.0882	27.1980	28.1042	(42b)	
Hot water usage for other uses	39.7148	38.2706	36.8264	35.3822	33.9381	32.4939	32.4939	33.9381	35.3822	36.8264	38.2706	39.7148	(42c)	
Average daily hot water use (litres/day)												122.4439	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	133.2032	130.3590	126.8953	121.6282	117.3510	112.7526	110.9853	114.4340	118.0713	122.8988	128.2471	132.8577	(44)	
Distribution loss (46)m = 0.15 x (45)m	210.9613	185.6295	195.0334	166.5029	157.9770	138.6425	134.2271	141.6932	145.5937	166.7725	182.7115	208.0230	(45)	
										Total = Sum(45)m =		2033.7677		
Water storage loss:	31.6442	27.8444	29.2550	24.9754	23.6965	20.7964	20.1341	21.2540	21.8391	25.0159	27.4067	31.2035	(46)	
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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	(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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2690.0377	(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	114.7350	101.9970	109.4390	98.5142	97.1178	89.2506	89.2209	91.7034	91.5619	100.0423	103.9036	113.7581	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 122.4723	Feb 122.4723	Mar 122.4723	Apr 122.4723	May 122.4723	Jun 122.4723	Jul 122.4723	Aug 122.4723	Sep 122.4723	Oct 122.4723	Nov 122.4723	Dec 122.4723	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	112.5544	124.6138	112.5544	116.3062	112.5544	116.3062	112.5544	112.5544	116.3062	112.5544	116.3062	112.5544	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	217.9713	220.2332	214.5334	202.3991	187.0819	172.6858	163.0683	160.8064	166.5062	178.6405	193.9578	208.3539	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	(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)	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	(71)
Water heating gains (Table 5)	154.2137	151.7813	147.0954	136.8253	130.5346	123.9592	119.9206	123.2573	127.1693	134.4654	144.3105	152.9006	(72)
Total internal gains	544.4812	556.3700	533.9249	515.2724	489.9126	472.6929	455.2850	456.3598	469.7235	485.4020	514.3162	533.5506	(73)

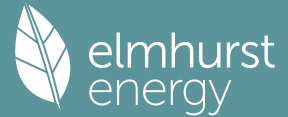
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast				1.8900	36.7938	0.6300	0.8000		0.7700		24.2885 (77)	
Northwest				0.7000	11.2829	0.6300	0.8000		0.7700		2.7586 (81)	
Northwest				4.3200	11.2829	0.6300	0.8000		0.7700		17.0243 (81)	
Southeast				5.4000	36.7938	0.6300	0.8000		0.7700		69.3957 (77)	
Solar gains	113.4671	199.8475	290.8940	389.6873	463.1853	471.5816	449.7669	393.1384	324.8239	225.5801	137.1041	96.3299 (83)
Total gains	657.9483	756.2175	824.8190	904.9597	953.0979	944.2745	905.0519	849.4982	794.5474	710.9821	651.4203	629.8804 (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 15.3978	Feb 15.5216	Mar 15.6464	Apr 16.2609	May 16.3813	Jun 16.9659	Jul 16.9659	Aug 17.0788	Sep 16.7359	Oct 16.3813	Nov 16.1396	Dec 15.8944		
alpha	2.0265	2.0348	2.0431	2.0841	2.0921	2.1311	2.1311	2.1386	2.1157	2.0921	2.0760	2.0596		
util living area														

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	0.9603	0.9460	0.9252	0.8817	0.8121	0.6980	0.5815	0.6185	0.7775	0.8967	0.9454	0.9634 (86)
Living	17.0992	17.4493	18.0336	18.9049	19.6945	20.3837	20.7108	20.6597	20.1436	19.1279	18.0323	17.1203
Non living	14.9322	15.3725	16.1062	17.2009	18.1522	18.9421	19.2412	19.2141	18.6991	17.4978	16.1272	14.9694
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	19.0048	17.4493	18.0336	18.9049	19.6945	20.3837	20.7108	20.6597	20.1436	19.1279	18.0323	17.6630 (87)
Th 2	19.2297	19.2408	19.2518	19.3042	19.3141	19.3608	19.3608	19.3695	19.3427	19.3141	19.2940	19.2733 (88)
util rest of house												
	0.9517	0.9343	0.9078	0.8516	0.7568	0.5946	0.4177	0.4619	0.6920	0.8643	0.9317	0.9556 (89)
MIT 2	17.5010	15.3725	16.1062	17.2009	18.1522	18.9421	19.2412	19.2141	18.6991	17.4978	16.1272	15.7404 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	18.0699	16.1581	16.8353	17.8455	18.7357	19.4875	19.7972	19.7610	19.2456	18.1145	16.8479	16.4678 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0699	16.1581	16.8353	17.8455	18.7357	19.4875	19.7972	19.7610	19.2456	18.1145	16.8479	16.4678 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9445	0.9026	0.8725	0.8164	0.7327	0.6040	0.4674	0.5055	0.6857	0.8318	0.9012	0.9365	(94)
Useful gains	621.4550	682.5525	719.6582	738.7772	698.3277	570.3701	423.0505	429.3796	544.8372	591.3747	587.0875	589.9003	(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	2357.0715	1911.7535	1741.0439	1449.9789	1132.0358	759.2918	496.6964	518.6961	810.3775	1209.0785	1591.9178	2034.3324	(97)
Space heating kWh	1291.2987	826.0231	759.9110	512.0652	322.6789	0.0000	0.0000	0.0000	0.0000	459.5716	723.4778	1074.6575	(98a)
Space heating requirement - total per year (kWh/year)												5969.6838	
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	1291.2987	826.0231	759.9110	512.0652	322.6789	0.0000	0.0000	0.0000	0.0000	459.5716	723.4778	1074.6575	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5969.6838	
Space heating per m2											(98c) / (4) =	75.2797	(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 %)													340.7520 (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	1291.2987	826.0231	759.9110	512.0652	322.6789	0.0000	0.0000	0.0000	0.0000	459.5716	723.4778	1074.6575	(98)
Space heating efficiency (main heating system 1)	340.7520	340.7520	340.7520	340.7520	340.7520	0.0000	0.0000	0.0000	0.0000	340.7520	340.7520	340.7520	(210)
Space heating fuel (main heating system)	378.9556	242.4118	223.0100	150.2750	94.6961	0.0000	0.0000	0.0000	0.0000	134.8698	212.3180	315.3782	(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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	(64)
Efficiency of water heater	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	(216)
(217)m	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	(217)
Fuel for water heating, kWh/month	166.6462	147.4473	156.6937	137.7430	133.5391	120.3346	118.6991	123.3643	124.6780	139.0349	147.8709	164.8102	(219)
Space cooling fuel requirement	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)
(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	27.5415	22.0948	19.8939	14.5752	11.2583	9.1981	10.2702	13.3496	17.3398	22.7507	25.6969	28.3070	(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)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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													1751.9144 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													160.0392
Water heating fuel used													1680.8613 (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)													222.2758 (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)

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Total delivered energy for all uses

3655.0515 (238)

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	1751.9144	0.1544	270.4743	(261)
Total CO ₂ associated with community systems			0.0000	(373)
Water heating (other fuel)	1680.8613	0.1409	236.7980	(264)
Space and water heating			507.2724	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	222.2758	0.1443	32.0813	(268)
Total CO ₂ , kg/year			539.3536	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.8000	(273)

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

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year	
Space heating - main system 1	1751.9144	1.5715	2753.1646	(275)
Total CO ₂ associated with community systems			0.0000	(473)
Water heating (other fuel)	1680.8613	1.5209	2556.4528	(278)
Space and water heating			5309.6174	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	222.2758	1.5338	340.9341	(282)
Total Primary energy kWh/year			5650.5515	(286)
Dwelling Primary energy Rate (DPER)			71.2600	(287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Ground floor	79.3000	(1b)	x 2.6000 (2b)	= 206.1800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	206.1800 (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)

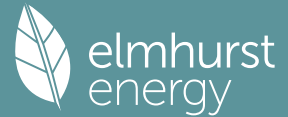
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1455 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3955	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3362 (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	0.4286	0.4202	0.4118	0.3698	0.3614	0.3194	0.3194	0.3110	0.3362	0.3614	0.3782	0.3950	(22b)
Effective ac	0.5919	0.5883	0.5848	0.5684	0.5653	0.5510	0.5510	0.5483	0.5565	0.5653	0.5715	0.5780	(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 (U _w = 1.20)			12.3100	1.1450	14.0954			(27)
Floor Over Commercial			79.3000	0.1300	10.3090			(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.1800	6.4908			(29a)
New Ext Wall	26.0000	9.1800	16.8200	0.1800	3.0276			(29a)
Flat Roof	79.3000		79.3000	0.1100	8.7230			(30)
Total net area of external elements A _{um} (A, m ²)			225.6800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.5358			(33)
Party Wall			27.3000	0.0000	0.0000			(32)

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Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 119.6550 (35)
Thermal bridges (User defined value 0.050 * total exposed area) 11.2840 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 55.8198 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	40.2698	40.0271	39.7893	38.6719	38.4628	37.4896	37.4896	37.3094	37.8645	38.4628	38.8857	39.3279
Heat transfer coeff	28.1996	27.7808	27.1910	26.1036	25.2893	24.3865	23.8988	24.4844	25.1221	26.0882	27.1980	28.1042
Average = Sum(39)m / 12 =	96.0897	95.8470	95.6091	94.4917	94.2826	93.3094	93.3094	93.1292	93.6843	94.2826	94.7056	95.1477
	94.4907											
HLP	1.2117	1.2087	1.2057	1.1916	1.1889	1.1767	1.1767	1.1744	1.1814	1.1889	1.1943	1.1998
HLP (average)												1.1916
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.4494 (42)											
Hot water usage for mixer showers	65.2888	64.3077	62.8779	60.1424	58.1236	55.8723	54.5926	56.0115	57.5669	59.9842	62.7785	65.0387
Hot water usage for baths	28.1996	27.7808	27.1910	26.1036	25.2893	24.3865	23.8988	24.4844	25.1221	26.0882	27.1980	28.1042
Hot water usage for other uses	39.7148	38.2706	36.8264	35.3822	33.9381	32.4939	32.4939	33.9381	35.3822	36.8264	38.2706	39.7148
Average daily hot water use (litres/day)	133.2032	130.3590	126.8953	121.6282	117.3510	112.7526	110.9853	114.4340	118.0713	122.8988	128.2471	132.8577
Daily hot water use	210.9613	185.6295	195.0334	166.5029	157.9770	138.6425	134.2271	141.6932	145.5937	166.7725	182.7115	208.0230
Energy content (annual)	31.6442	27.8444	29.2550	24.9754	23.6965	20.7964	20.1341	21.2540	21.8391	25.0159	27.4067	31.2035
Distribution loss (46)m = 0.15 x (45)m	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Store volume	262.7079	232.3684	246.7800	216.5803	209.7236	188.7199	185.9737	193.4398	195.6710	218.5191	232.7888	259.7696
a) If manufacturer declared loss factor is known (kWh/day):	-29.8473	-26.3972	-27.6417	-22.8884	-21.3312	-18.2532	-17.1095	-18.1942	-18.8855	-22.2639	-25.2223	-29.2946
Temperature factor from Table 2b	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
Enter (49) or (54) in (55)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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
If cylinder contains dedicated solar storage	232.3684	216.5803	209.7236	188.7199	185.9737	193.4398	195.6710	218.5191	232.7888	259.7696	299.2946	346.3632
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624
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
Total heat required for water heating calculated for each month	262.7079	232.3684	246.7800	216.5803	209.7236	188.7199	185.9737	193.4398	195.6710	218.5191	232.7888	259.7696
WWHRS	-29.8473	-26.3972	-27.6417	-22.8884	-21.3312	-18.2532	-17.1095	-18.1942	-18.8855	-22.2639	-25.2223	-29.2946
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
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
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
Output from w/h	232.3684	216.5803	209.7236	188.7199	185.9737	193.4398	195.6710	218.5191	232.7888	259.7696	299.2946	346.3632
12Total per year (kWh/year)	111.5419	99.1129	106.2459	95.4241	93.9246	86.1605	86.0278	88.5103	88.4718	96.8491	100.8134	110.5649
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
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)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
Heat gains from water heating, kWh/month	111.5419	99.1129	106.2459	95.4241	93.9246	86.1605	86.0278	88.5103	88.4718	96.8491	100.8134	110.5649

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

Metabolic gains (Table 5), Watts	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723	122.4723
(66)m	115.3977	127.7618	115.3977	119.2443	115.3977	119.2443	115.3977	115.3977	119.2443	115.3977	119.2443	115.3977
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	217.9713	220.2332	214.5334	202.3991	187.0819	172.6858	163.0683	160.8064	166.5062	178.6405	193.9578	208.3539
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472	35.2472
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000
Pumps, fans	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778
Losses e.g. evaporation (negative values) (Table 5)	149.9219	147.4894	142.8036	132.5335	126.2428	119.6674	115.6287	118.9654	122.8775	130.1736	140.0187	148.6088
Water heating gains (Table 5)	546.0326	558.2261	535.4764	516.9186	491.4640	471.3391	453.8364	454.9113	468.3697	486.9534	515.9624	535.1020
Total internal gains												

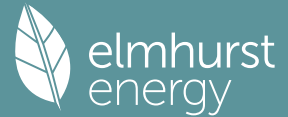
6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
	m ²	Table 6a	Specific data	Specific data	factor	W
		W/m ²	or Table 6b	or Table 6c	Table 6d	
Southeast	7.2900	36.7938	0.6300	0.7000	0.7700	81.9737
Northwest	5.0200	11.2829	0.6300	0.7000	0.7700	17.3100
Solar gains	99.2837	174.8666	254.5323	340.9764	405.2872	412.6339
Total gains	645.3163	733.0926	790.0087	857.8950	896.7512	883.9730

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)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	27.4299	27.4994	27.5678	27.8938	27.9557	28.2472	28.2472	28.3019	28.1342	27.9557	27.8308	27.7015
alpha	2.8287	2.8333	2.8379	2.8596	2.8637	2.8831	2.8831	2.8868	2.8756	2.8637	2.8554	2.8468
util living area	0.9531	0.9324	0.9014	0.8361	0.7328	0.5851	0.4516	0.4911	0.6832	0.8564	0.9311	0.9577 (86)
MIT	18.7669	19.0585	19.4759	20.0327	20.5008	20.8176	20.9364	20.9177	20.6988	20.1036	19.3569	18.7233 (87)
Th 2	19.9106	19.9131	19.9155	19.9267	19.9289	19.9387	19.9387	19.9405	19.9349	19.9289	19.9246	19.9201 (88)
util rest of house	0.9454	0.9215	0.8850	0.8080	0.6854	0.5108	0.3544	0.3933	0.6148	0.8257	0.9182	0.9507 (89)
MIT 2	17.3339	17.7006	18.2229	18.9107	19.4588	19.8022	19.9058	19.8950	19.6895	19.0120	18.0887	17.2848 (90)
Living area fraction	17.3339	17.7006	18.2229	18.9107	19.4588	19.8022	19.9058	19.8950	19.6895	19.0120	18.0887	17.2848 (90)
MIT	17.8760	18.2143	18.6969	19.3351	19.8530	20.1863	20.2957	20.2819	20.0714	19.4250	18.5685	17.8290 (92)
Temperature adjustment	17.8760	18.2143	18.6969	19.3351	19.8530	20.1863	20.2957	20.2819	20.0714	19.4250	18.5685	17.8290 (92)
adjusted MIT	17.8760	18.2143	18.6969	19.3351	19.8530	20.1863	20.2957	20.2819	20.0714	19.4250	18.5685	17.8290 (93)

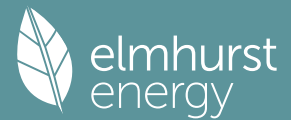
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9260	0.8995	0.8623	0.7900	0.6817	0.5291	0.3883	0.4262	0.6243	0.8086	0.8970	0.9323 (94)
Useful gains	597.5565	659.4276	681.2088	677.7632	611.3042	467.7269	329.0547	340.4905	469.8612	553.3700	570.4490	577.4636 (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	1304.5134	1276.1340	1166.1370	986.0341	768.6857	521.2586	344.8457	361.5174	559.4217	832.0397	1086.1300	1296.7687 (97)
Space heating kWh	525.9760	414.4267	360.7866	221.9550	117.0919	0.0000	0.0000	0.0000	0.0000	207.3303	371.2903	535.1630 (98a)
Space heating requirement - total per year (kWh/year)												2754.0197
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	525.9760	414.4267	360.7866	221.9550	117.0919	0.0000	0.0000	0.0000	0.0000	207.3303	371.2903	535.1630 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2754.0197
Space heating per m2										(98c) / (4) =		34.7291 (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	525.9760	414.4267	360.7866	221.9550	117.0919	0.0000	0.0000	0.0000	0.0000	207.3303	371.2903	535.1630 (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)	569.8548	448.9997	390.8847	240.4713	126.8601	0.0000	0.0000	0.0000	0.0000	224.6265	402.2647	579.8082 (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	232.8605	205.9712	219.1384	193.6919	188.3924	170.4666	168.8642	175.2456	176.7855	196.2552	207.5665	230.4750 (64)
Efficiency of water heater (217)m	85.8295	85.5950	85.1703	84.3660	83.0254	79.8000	79.8000	79.8000	79.8000	84.1831	85.3484	79.8000 (216)
Fuel for water heating, kWh/month	271.3058	240.6345	257.2944	229.5852	226.9095	213.6173	211.6093	219.6060	221.5358	233.1289	243.1991	268.3555 (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	23.9774	19.2355	17.3195	12.6890	9.8013	8.0078	8.9411	11.6220	15.0958	19.8065	22.3714	24.6438 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-61.0739	-80.1895	-107.4482	-112.3797	-114.5554	-104.6639	-103.3505	-100.6763	-95.1977	-87.4631	-65.0000	-53.5255 (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	-55.0369	-112.5924	-218.1886	-319.9663	-415.9097	-415.3325	-410.4253	-350.6819	-261.3815	-158.2619	-72.5344	-43.7661 (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												2983.7700 (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												2836.7814 (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)												193.5111 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3919.6012 (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												2180.4613 (238)

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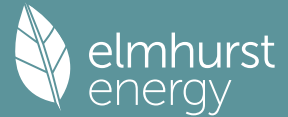
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2983.7700	0.2100	626.5917 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2836.7814	0.2100	595.7241 (264)
Space and water heating			1222.3158 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	193.5111	0.1443	27.9296 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1085.5238	0.1361	-147.7726
PV Unit electricity exported	-2834.0774	0.1266	-358.8401
Total			-506.6127 (269)
Total CO2, kg/year			755.5619 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.5300 (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	2983.7700	1.1300	3371.6601 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2836.7814	1.1300	3205.5630 (278)
Space and water heating			6577.2230 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	193.5111	1.5338	296.8138 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1085.5238	1.5032	-1631.7574
PV Unit electricity exported	-2834.0774	0.4648	-1317.2802
Total			-2949.0377 (283)
Total Primary energy kWh/year			4055.1000 (286)
Target Primary Energy Rate (TPER)			51.1400 (287)

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Property Reference	Flat 1C				Issued on Date	01/02/2024
Assessment Reference	Be Green		Prop Type Ref	Conversion		
Property						
SAP Rating	72 C	DER	6.80	TER	9.53	
Environmental	94 A	% DER < TER				28.65
CO ₂ Emissions (t/year)	0.49	DFEE	78.63	TFEE	41.61	
Compliance Check	See BREL	% DFEE < TFEE				-88.97
% DPER < TPER	-39.33	DPER	71.26	TPER	51.14	
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	79.3000 (1b)	2.6000 (2b)	206.1800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000		206.1800 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	206.1800 (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	4 * 10 = 40.0000 (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)	40.0000 / (5) = 0.1940 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9440 (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) = 0.8024 (21)

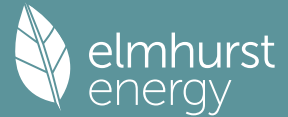
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.0231	1.0030	0.9829	0.8826	0.8626	0.7623	0.7623	0.7422	0.8024	0.8626	0.9027	0.9428 (22b)
Effective ac	1.0231	1.0030	0.9831	0.8895	0.8720	0.7905	0.7905	0.7754	0.8219	0.8720	0.9074	0.9445 (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)			2.5900	1.1450	2.9656		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.1800	6.4908	190.0000	6851.4000 (29a)
New Ext Wall	26.0000	9.1800	16.8200	0.1800	3.0276	9.0000	151.3800 (29a)
Flat Roof	79.3000		79.3000	0.1400	11.1020	9.0000	713.7000 (30)
Total net area of external elements Aum(A, m ²)			225.6800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.4308		(33)
Party Wall			27.3000	0.0000	0.0000	20.0000	546.0000 (32)
Internal Wall			136.2400			9.0000	1226.1600 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			9488.6400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							119.6550 (35)
Thermal bridges (Default value 0.200 * total exposed area)							45.1360 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss				(33) + (36) + (36a) =			101.5668 (37)

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

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(38)m	Jan 69.6088	Feb 68.2439	Mar 66.8889	Apr 60.5232	May 59.3321	Jun 53.7878	Jul 53.7878	Aug 52.7610	Sep 55.9234	Oct 59.3321	Nov 61.7415	Dec 64.2605	(38)
Heat transfer coeff	171.1756	169.8107	168.4557	162.0900	160.8990	155.3546	155.3546	154.3279	157.4902	160.8990	163.3084	165.8273	(39)
Average = Sum(39)m / 12 =												162.0827	
HLP	Jan 2.1586	Feb 2.1414	Mar 2.1243	Apr 2.0440	May 2.0290	Jun 1.9591	Jul 1.9591	Aug 1.9461	Sep 1.9860	Oct 2.0290	Nov 2.0594	Dec 2.0911	(40)
HLP (average)												2.0439	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4494	(42)
Hot water usage for mixer showers	65.2888	64.3077	62.8779	60.1424	58.1236	55.8723	54.5926	56.0115	57.5669	59.9842	62.7785	65.0387	(42a)	
Hot water usage for baths	28.1996	27.7808	27.1910	26.1036	25.2893	24.3865	23.8988	24.4844	25.1221	26.0882	27.1980	28.1042	(42b)	
Hot water usage for other uses	39.7148	38.2706	36.8264	35.3822	33.9381	32.4939	32.4939	33.9381	35.3822	36.8264	38.2706	39.7148	(42c)	
Average daily hot water use (litres/day)												122.4439	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	133.2032	130.3590	126.8953	121.6282	117.3510	112.7526	110.9853	114.4340	118.0713	122.8988	128.2471	132.8577	(44)	
Distribution loss (46)m = 0.15 x (45)m	210.9613	185.6295	195.0334	166.5029	157.9770	138.6425	134.2271	141.6932	145.5937	166.7725	182.7115	208.0230	(45)	
Water storage loss:										Total = Sum(45)m =		2033.7677		
Store volume	31.6442	27.8444	29.2550	24.9754	23.6965	20.7964	20.1341	21.2540	21.8391	25.0159	27.4067	31.2035	(46)	
a) If manufacturer declared loss factor is known (kWh/day):												210.0000	(47)	
Temperature factor from Table 2b												1.9400	(48)	
Enter (49) or (54) in (55)												0.5400	(49)	
Total storage loss												1.0476	(55)	
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	(56)	
Primary loss	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(57)	
Combi 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)	
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
WWHRS	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	(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	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)	
Electric shower(s)	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	(64)	
Heat gains from water heating, kWh/month								Total per year (kWh/year) = Sum(64)m =				2690.0377	(64)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)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	(64a)	
												0.0000	(64a)	
Heat gains from water heating, kWh/month	114.7350	101.9970	109.4390	98.5142	97.1178	89.2506	89.2209	91.7034	91.5619	100.0423	103.9036	113.7581	(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	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	31.4654	27.9473	22.7283	17.2068	12.8623	10.8589	11.7334	15.2515	20.4705	25.9921	30.3366	32.3400	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	325.3303	328.7062	320.1991	302.0883	279.2266	257.7399	243.3855	240.0096	248.5168	266.6276	289.4892	310.9759	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	(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)	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	(71)
Water heating gains (Table 5)	154.2137	151.7813	147.0954	136.8253	130.5346	123.9592	119.9206	123.2573	127.1693	134.4654	144.3105	152.9006	(72)
Total internal gains	612.1445	609.5699	591.1578	557.2554	523.7585	493.6930	476.1745	479.6534	497.2916	528.2200	565.2713	597.3515	(73)

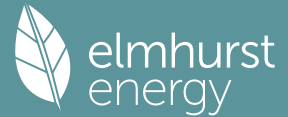
6. Solar gains

[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
				1.8900	36.7938		0.6300		0.8000		0.7700		24.2885 (77)
				0.7000	11.2829		0.6300		0.8000		0.7700		2.7586 (81)
				4.3200	11.2829		0.6300		0.8000		0.7700		17.0243 (81)
				5.4000	36.7938		0.6300		0.8000		0.7700		69.3957 (77)
Solar gains	113.4671	199.8475	290.8940	389.6873	463.1853	471.5816	449.7669	393.1384	324.8239	225.5801	137.1041	96.3299	(83)
Total gains	725.6116	809.4174	882.0519	946.9427	986.9439	965.2747	925.9414	872.7918	822.1155	753.8001	702.3754	693.6814	(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	15.3978	15.5216	15.6464	16.2609	16.3813	16.9659	16.9659	17.0788	16.7359	16.3813	16.1396	15.8944
alpha	2.0265	2.0348	2.0431	2.0841	2.0921	2.1311	2.1311	2.1386	2.1157	2.0921	2.0760	2.0596
util living area	0.9529	0.9393	0.9165	0.8732	0.8031	0.6906	0.5732	0.6088	0.7677	0.8868	0.9378	0.9565 (86)

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Living	17.2036	17.5284	18.1136	18.9571	19.7281	20.3976	20.7191	20.6707	20.1679	19.1838	18.1092	17.2213
Non living	15.0614	15.4694	16.2026	17.2612	18.1874	18.9534	19.2455	19.2203	18.7216	17.5619	16.2210	15.0948
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	19.0582	17.5284	18.1136	18.9571	19.7281	20.3976	20.7191	20.6707	20.1679	19.1838	18.1092	17.7498 (87)
Th 2	19.2297	19.2408	19.2518	19.3042	19.3141	19.3608	19.3608	19.3695	19.3427	19.3141	19.2940	19.2733 (88)
util rest of house												
	0.9429	0.9264	0.8975	0.8416	0.7463	0.5867	0.4102	0.4526	0.6805	0.8521	0.9225	0.9474 (89)
MIT 2	17.5529	15.4694	16.2026	17.2612	18.1874	18.9534	19.2455	19.2203	18.7216	17.5619	16.2210	15.8434 (90)
Living area fraction									FLA = Living area /	(4) =		0.3783 (91)
MIT	18.1224	16.2484	16.9255	17.9027	18.7703	19.4998	19.8029	19.7690	19.2688	18.1755	16.9353	16.5646 (92)
Temperature adjustment												0.0000
adjusted MIT	18.1224	16.2484	16.9255	17.9027	18.7703	19.4998	19.8029	19.7690	19.2688	18.1755	16.9353	16.5646 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9350	0.8930	0.8610	0.8064	0.7232	0.5970	0.4602	0.4967	0.6757	0.8195	0.8903	0.9263	(94)
Useful gains	678.4383	722.8337	759.4664	763.6456	713.8053	576.2951	426.0809	433.4968	555.4916	617.7763	625.3521	642.5781	(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	2366.0594	1927.0725	1756.2360	1459.2546	1137.5976	761.2048	497.5909	519.9305	814.0303	1218.8834	1606.1915	2050.3905	(97)
Space heating kWh	1255.5900	809.2485	741.5965	500.8385	315.3015	0.0000	0.0000	0.0000	0.0000	447.2237	706.2043	1047.4124	(98a)
Space heating requirement - total per year (kWh/year)												5823.4155	
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	1255.5900	809.2485	741.5965	500.8385	315.3015	0.0000	0.0000	0.0000	0.0000	447.2237	706.2043	1047.4124	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5823.4155	
Space heating per m2										(98c) / (4) =		73.4353	(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 %)													340.7520 (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	1255.5900	809.2485	741.5965	500.8385	315.3015	0.0000	0.0000	0.0000	0.0000	447.2237	706.2043	1047.4124	(98)
Space heating efficiency (main heating system 1)	340.7520	340.7520	340.7520	340.7520	340.7520	0.0000	0.0000	0.0000	0.0000	340.7520	340.7520	340.7520	(210)
Space heating fuel (main heating system)	368.4762	237.4890	217.6353	146.9804	92.5311	0.0000	0.0000	0.0000	0.0000	131.2461	207.2488	307.3826	(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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	(64)
Efficiency of water heater (217)m	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	(216)
Fuel for water heating, kWh/month	166.6462	147.4473	156.6937	137.7430	133.5391	120.3346	118.6991	123.3643	124.6780	139.0349	147.8709	164.8102	(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	27.5415	22.0948	19.8939	14.5752	11.2583	9.1981	10.2702	13.3496	17.3398	22.7507	25.6969	28.3070	(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												1708.9893	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												160.0392	
Water heating fuel used												1680.8613	(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)												222.2758	(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												3612.1264	(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	1708.9893	16.4900	281.8123 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1680.8613	16.4900	277.1740 (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	222.2758	16.4900	36.6533 (250)
Additional standing charges			0.0000 (251)
Total energy cost			595.6396 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.7251 (257)
SAP value		72.0361
SAP rating (Section 12)		72 (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	1708.9893	0.1544	263.8377 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1680.8613	0.1409	236.7980 (264)
Space and water heating			500.6358 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	222.2758	0.1443	32.0813 (268)
Total CO2, kg/year			532.7170 (272)
CO2 emissions per m2			6.7200 (273)
EI value			94.2571
EI rating			94 (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	79.3000 (1b)	x 2.6000 (2b)	= 206.1800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 206.1800 (5)

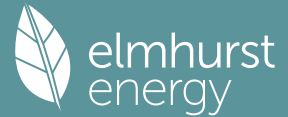
2. Ventilation rate

	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	4 * 10 = 40.0000 (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) =	40.0000 / (5) =	0.1940 (8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.9440	(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) =		0.8024 (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	0.8425	0.8024	0.8024	0.7422	0.7422	0.6620	0.6820	0.6419	0.6620	0.7021	0.7021	0.7623 (22b)
Effective ac	0.8549	0.8219	0.8219	0.7754	0.7754	0.7191	0.7326	0.7060	0.7191	0.7465	0.7465	0.7905 (25)

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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	
Entrance Door			1.8900	1.0000	1.8900			(26)
Windows (Uw = 1.20)			2.5900	1.1450	2.9656			(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466			(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832			(27)
Floor Over Commercial			79.3000	0.2500	19.8250			(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.1800	6.4908	190.0000	6851.4000	(29a)
New Ext Wall	26.0000	9.1800	16.8200	0.1800	3.0276	9.0000	151.3800	(29a)
Flat Roof	79.3000		79.3000	0.1400	11.1020	9.0000	713.7000	(30)
Total net area of external elements Aum(A, m2)			225.6800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.4308			(33)
Party Wall			27.3000	0.0000	0.0000	20.0000	546.0000	(32)
Internal Wall			136.2400			9.0000	1226.1600	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 9488.6400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 119.6550 (35)
Thermal bridges (Default value 0.200 * total exposed area) 45.1360 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 101.5668 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	58.1685	55.9234	55.9234	52.7610	52.7610	48.9279	49.8451	48.0381	48.9279	50.7897	50.7897	53.7878 (38)
Heat transfer coeff	159.7353	157.4902	157.4902	154.3279	154.3279	150.4947	151.4119	149.6049	150.4947	152.3565	152.3565	155.3546 (39)
Average = Sum(39)m / 12 =												153.7871
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	2.0143	1.9860	1.9860	1.9461	1.9461	1.8978	1.9094	1.8866	1.8978	1.9213	1.9213	1.9591 (40)
HLP (average)												1.9393
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4494 (42)
Hot water usage for mixer showers													65.0387 (42a)
	65.2888	64.3077	62.8779	60.1424	58.1236	55.8723	54.5926	56.0115	57.5669	59.9842	62.7785	65.0387	
Hot water usage for baths													28.1042 (42b)
	28.1996	27.7808	27.1910	26.1036	25.2893	24.3865	23.8988	24.4844	25.1221	26.0882	27.1980	28.1042	
Hot water usage for other uses													39.7148 (42c)
	39.7148	38.2706	36.8264	35.3822	33.9381	32.4939	32.4939	33.9381	35.3822	36.8264	38.2706	39.7148	
Average daily hot water use (litres/day)													122.4439 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	133.2032	130.3590	126.8953	121.6282	117.3510	112.7526	110.9853	114.4340	118.0713	122.8988	128.2471	132.8577	(44)
Energy conte	210.9613	185.6295	195.0334	166.5029	157.9770	138.6425	134.2271	141.6932	145.5937	166.7725	182.7115	208.0230	(45)
Energy content (annual)										Total = Sum(45)m =		2033.7677	
Distribution loss (46)m = 0.15 x (45)m													31.2035 (46)
	31.6442	27.8444	29.2550	24.9754	23.6965	20.7964	20.1341	21.2540	21.8391	25.0159	27.4067	31.2035	
Water storage loss:													210.0000 (47)
Store volume													1.9400 (48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400 (49)
Temperature factor from Table 2b													1.0476 (55)
Enter (49) or (54) in (55)													
Total storage loss													32.4756 (56)
	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	
If cylinder contains dedicated solar storage													32.4756 (57)
	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	
Primary loss													23.2624 (59)
	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	
Combi loss													0.0000 (61)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Total heat required for water heating calculated for each month													266.6993 (62)
	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	
WWHRS													0.0000 (63a)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
PV diverter													0.0000 (63b)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Solar input													0.0000 (63c)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
FGHRS													0.0000 (63d)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Output from w/h													266.6993 (64)
	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	
Electric shower(s)													0.0000 (64a)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													114.7350 (65)
	114.7350	101.9970	109.4390	98.5142	97.1178	89.2506	89.2209	91.7034	91.5619	100.0423	103.9036	113.7581	

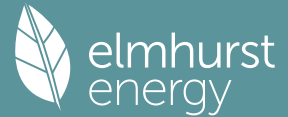
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													31.4654 (67)
	31.4654	27.9473	22.7283	17.2068	12.8623	10.8589	11.7334	15.2515	20.4705	25.9921	30.3366	32.3400	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													325.3303 (68)
	325.3303	328.7062	320.1991	302.0883	279.2266	257.7399	243.3855	240.0096	248.5168	266.6276	289.4892	310.9759	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													52.1461 (69)
	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	
Pumps, fans													0.0000 (70)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Losses e.g. evaporation (negative values) (Table 5)													-97.9778 (71)
	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	
Water heating gains (Table 5)													154.2137 (72)
	154.2137	151.7813	147.0954	136.8253	130.5346	123.9592	119.9206	123.2573	127.1693	134.4654	144.3105	152.9006	
Total internal gains													612.1445 (73)
	612.1445	609.5699	591.1578	557.2554	523.7585	493.6930	476.1745	479.6534	497.2916	528.2200	565.2713	597.3515	

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2	Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	factor Table 6d	W
Southeast	1.8900	40.4699	0.6300	0.8000	0.7700	26.7152 (77)
Northwest	0.7000	12.9236	0.6300	0.8000	0.7700	3.1597 (81)
Northwest	4.3200	12.9236	0.6300	0.8000	0.7700	19.4998 (81)
Southeast	5.4000	40.4699	0.6300	0.8000	0.7700	76.3290 (77)

Solar gains	125.7037	199.6215	288.2809	400.2538	465.2776	507.6355	478.6553	426.6375	349.7221	240.9242	155.6815	105.6463 (83)
Total gains	737.8482	809.1914	879.4387	957.5092	989.0362	1001.3285	954.8298	906.2908	847.0137	769.1443	720.9528	702.9978 (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	16.5006	16.7359	16.7359	17.0788	17.0788	17.5138	17.4077	17.6180	17.5138	17.2998	17.2998	16.9659	
alpha	2.1000	2.1157	2.1157	2.1386	2.1386	2.1676	2.1605	2.1745	2.1676	2.1533	2.1533	2.1311	
util living area	0.9459	0.9325	0.9044	0.8485	0.7532	0.5826	0.4313	0.4566	0.6945	0.8587	0.9247	0.9499 (86)	
Living	17.6591	17.9483	18.5406	19.3387	20.0966	20.6844	20.8929	20.8784	20.4687	19.5677	18.5612	17.6860	
Non living	15.6596	16.0265	16.7651	17.7522	18.6357	19.2437	19.3759	19.3859	19.0657	18.0569	16.8182	15.7060	
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	19.2909	17.9483	18.5406	19.3387	20.0966	20.6844	20.8929	20.8784	20.4687	19.5677	18.5612	18.1496 (87)	
Th 2	19.3238	19.3427	19.3427	19.3695	19.3695	19.4023	19.3944	19.4100	19.4023	19.3863	19.3863	19.3608 (88)	
util rest of house	0.9344	0.9181	0.8824	0.8100	0.6793	0.4450	0.2288	0.2547	0.5803	0.8143	0.9059	0.9392 (89)	
MIT 2	17.8553	16.0265	16.7651	17.7522	18.6357	19.2437	19.3759	19.3859	19.0657	18.0569	16.8182	16.3625 (90)	
Living area fraction									fLA = Living area / (4) =				0.3783 (91)
MIT	18.3984	16.7535	17.4368	18.3524	19.1884	19.7887	19.9498	19.9505	19.5964	18.6284	17.4776	17.0385 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.3984	16.7535	17.4368	18.3524	19.1884	19.7887	19.9498	19.9505	19.5964	18.6284	17.4776	17.0385 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9264	0.8851	0.8471	0.7789	0.6694	0.4825	0.3051	0.3300	0.5967	0.7867	0.8737	0.9175 (94)
Useful gains	683.5321	716.2122	744.9529	745.8466	662.0545	483.1186	291.3378	299.0568	505.4261	605.0992	629.8611	644.9880 (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	2124.2250	1756.5706	1580.6956	1304.4350	955.0443	570.1802	310.3630	321.7311	661.6395	1070.8294	1443.9722	1854.7080 (97)
Space heating kWh	1071.8755	699.1208	621.7926	402.1837	217.9844	0.0000	0.0000	0.0000	0.0000	346.5033	586.1600	900.0317 (98a)
Space heating requirement - total per year (kWh/year)												4845.6519
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	1071.8755	699.1208	621.7926	402.1837	217.9844	0.0000	0.0000	0.0000	0.0000	346.5033	586.1600	900.0317 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4845.6519
Space heating per m2										(98c) / (4) =		61.1053 (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 %)												338.5555 (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	1071.8755	699.1208	621.7926	402.1837	217.9844	0.0000	0.0000	0.0000	0.0000	346.5033	586.1600	900.0317 (98)
Space heating efficiency (main heating system 1)	338.5555	338.5555	338.5555	338.5555	338.5555	0.0000	0.0000	0.0000	0.0000	338.5555	338.5555	338.5555 (210)
Space heating fuel (main heating system)	316.6026	206.5011	183.6604	118.7940	64.3866	0.0000	0.0000	0.0000	0.0000	102.3476	173.1356	265.8446 (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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610 (64)
Efficiency of water heater (217)m	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500 (216)
Fuel for water heating, kWh/month	166.8435	147.6219	156.8792	137.9061	133.6972	120.4770	118.8396	123.5103	124.8256	139.1996	148.0460	165.0053 (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	27.5415	22.0948	19.8939	14.5752	11.2583	9.1981	10.2702	13.3496	17.3398	22.7507	25.6969	28.3070 (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)												

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(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												1431.2725	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												159.8500	
Water heating fuel used												1682.8512	(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)												222.2758	(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												3336.3996	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1431.2725	25.1600	360.1082	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1682.8512	25.1600	423.4054	(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	222.2758	25.1600	55.9246	(250)
Additional standing charges			0.0000	(251)
Total energy cost			839.4381	(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	1431.2725	0.1548	221.6284	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1682.8512	0.1409	237.0784	(264)
Space and water heating			458.7068	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	222.2758	0.1443	32.0813	(268)
Total CO2, kg/year			490.7881	(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	1431.2725	1.5732	2251.7216	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1682.8512	1.5209	2559.4794	(278)
Space and water heating			4811.2010	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	222.2758	1.5338	340.9341	(282)
Total Primary energy kWh/year			5152.1351	(286)

SAP 10 EPC IMPROVEMENTS

Be Green

Current energy efficiency rating: C 72
Current environmental impact rating: A 94

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 Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: C 72
Potential environmental impact rating: A 94

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	£839	£839	£0
Space heating	£360	£360	£0
Water heating	£423	£423	£0

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Lighting	£56	£56	£0
Total cost of fuels	£839	£839	£0
Total cost of uses	£839	£839	£0
Delivered energy	42 kWh/m²	42 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.5 tonnes	0.5 tonnes	0.0 tonnes
CO2 emissions per m²	6 kg/m²	6 kg/m²	0 kg/m²
Primary energy	65 kWh/m²	65 kWh/m²	0 kWh/m²

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 (m²)	Storey height (m)	Volume (m³)
Ground floor	79.3000 (1b)	x 2.6000 (2b)	= 206.1800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 206.1800 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1940 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.9440 (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) =	0.8024 (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	1.0231	1.0030	0.9829	0.8826	0.8626	0.7623	0.7623	0.7422	0.8024	0.8626	0.9027	0.9428 (22b)
Effective ac	1.0231	1.0030	0.9831	0.8895	0.8720	0.7905	0.7905	0.7754	0.8219	0.8720	0.9074	0.9445 (25)

3. Heat losses and heat loss parameter

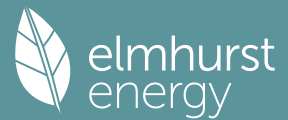
Element	Gross m²	Openings m²	NetArea m²	U-value W/m²K	A x U W/K	K-value kJ/m²K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			2.5900	1.1450	2.9656		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.1800	6.4908	190.0000	6851.4000 (29a)
New Ext Wall	26.0000	9.1800	16.8200	0.1800	3.0276	9.0000	151.3800 (29a)
Flat Roof	79.3000		79.3000	0.1400	11.1020	9.0000	713.7000 (30)
Total net area of external elements Aum(A, m²)			225.6800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.4308		(33)
Party Wall			27.3000	0.0000	0.0000	20.0000	546.0000 (32)
Internal Wall			136.2400			9.0000	1226.1600 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9488.6400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K		119.6550 (35)
Thermal bridges (Default value 0.200 * total exposed area)		45.1360 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	101.5668 (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	69.6088	68.2439	66.8889	60.5232	59.3321	53.7878	53.7878	52.7610	55.9234	59.3321	61.7415	64.2605 (38)
Average = Sum(39)m / 12 =	171.1756	169.8107	168.4557	162.0900	160.8990	155.3546	155.3546	154.3279	157.4902	160.8990	163.3084	165.8273 (39)
												162.0827

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.1586	2.1414	2.1243	2.0440	2.0290	1.9591	1.9591	1.9461	1.9860	2.0290	2.0594	2.0911 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.4494 (42)
Hot water usage for mixer showers												65.0387 (42a)
Hot water usage for baths												28.1042 (42b)
Hot water usage for other uses												39.7148 (42c)
Average daily hot water use (litres/day)												122.4439 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	133.2032	130.3590	126.8953	121.6282	117.3510	112.7526	110.9853	114.4340	118.0713	122.8988	128.2471	132.8577 (44)
Energy content (annual)	210.9613	185.6295	195.0334	166.5029	157.9770	138.6425	134.2271	141.6932	145.5937	166.7725	182.7115	208.0230 (45)
Distribution loss (46)m = 0.15 x (45)m	31.6442	27.8444	29.2550	24.9754	23.6965	20.7964	20.1341	21.2540	21.8391	25.0159	27.4067	31.2035 (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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610 (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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	114.7350	101.9970	109.4390	98.5142	97.1178	89.2506	89.2209	91.7034	91.5619	100.0423	103.9036	113.7581 (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	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	31.4654	27.9473	22.7283	17.2068	12.8623	10.8589	11.7334	15.2515	20.4705	25.9921	30.3366	32.3400 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	325.3303	328.7062	320.1991	302.0883	279.2266	257.7399	243.3855	240.0096	248.5168	266.6276	289.4892	310.9759 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461 (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)	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778 (71)
Water heating gains (Table 5)	154.2137	151.7813	147.0954	136.8253	130.5346	123.9592	119.9206	123.2573	127.1693	134.4654	144.3105	152.9006 (72)
Total internal gains	612.1445	609.5699	591.1578	557.2554	523.7585	493.6930	476.1745	479.6534	497.2916	528.2200	565.2713	597.3515 (73)

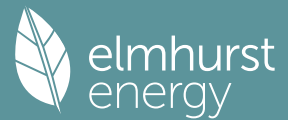
6. Solar gains

[Jan]												
				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast				1.8900	36.7938	0.6300	0.8000		0.7700		24.2885 (77)	
Northwest				0.7000	11.2829	0.6300	0.8000		0.7700		2.7586 (81)	
Northwest				4.3200	11.2829	0.6300	0.8000		0.7700		17.0243 (81)	
Southeast				5.4000	36.7938	0.6300	0.8000		0.7700		69.3957 (77)	
Solar gains	113.4671	199.8475	290.8940	389.6873	463.1853	471.5816	449.7669	393.1384	324.8239	225.5801	137.1041	96.3299 (83)
Total gains	725.6116	809.4174	882.0519	946.9427	986.9439	965.2747	925.9414	872.7918	822.1155	753.8001	702.3754	693.6814 (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	15.3978	15.5216	15.6464	16.2609	16.3813	16.9659	16.9659	17.0788	16.7359	16.3813	16.1396	15.8944	
alpha	2.0265	2.0348	2.0431	2.0841	2.0921	2.1311	2.1311	2.1386	2.1157	2.0921	2.0760	2.0596	
util living area	0.9529	0.9393	0.9165	0.8732	0.8031	0.6906	0.5732	0.6088	0.7677	0.8868	0.9378	0.9565 (86)	
Living	17.2036	17.5284	18.1136	18.9571	19.7281	20.3976	20.7191	20.6707	20.1679	19.1838	18.1092	17.2213	
Non living	15.0614	15.4694	16.2026	17.2612	18.1874	18.9534	19.2455	19.2203	18.7216	17.5619	16.2210	15.0948	
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	19.0582	17.5284	18.1136	18.9571	19.7281	20.3976	20.7191	20.6707	20.1679	19.1838	18.1092	17.7498 (87)	
Th 2	19.2297	19.2408	19.2518	19.3042	19.3141	19.3608	19.3608	19.3695	19.3427	19.3141	19.2940	19.2733 (88)	
util rest of house	0.9429	0.9264	0.8975	0.8416	0.7463	0.5867	0.4102	0.4526	0.6805	0.8521	0.9225	0.9474 (89)	
MIT 2	17.5529	15.4694	16.2026	17.2612	18.1874	18.9534	19.2455	19.2203	18.7216	17.5619	16.2210	15.8434 (90)	
Living area fraction	fLA = Living area / (4) =												0.3783 (91)
MIT	18.1224	16.2484	16.9255	17.9027	18.7703	19.4998	19.8029	19.7690	19.2688	18.1755	16.9353	16.5646 (92)	
Temperature adjustment													0.0000

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adjusted MIT 18.1224 16.2484 16.9255 17.9027 18.7703 19.4998 19.8029 19.7690 19.2688 18.1755 16.9353 16.5646 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9350	0.8930	0.8610	0.8064	0.7232	0.5970	0.4602	0.4967	0.6757	0.8195	0.8903	0.9263	(94)
Useful gains	678.4383	722.8337	759.4664	763.6456	713.8053	576.2951	426.0809	433.4968	555.4916	617.7763	625.3521	642.5781	(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	2366.0594	1927.0725	1756.2360	1459.2546	1137.5976	761.2048	497.5909	519.9305	814.0303	1218.8834	1606.1915	2050.3905	(97)
Space heating kWh	1255.5900	809.2485	741.5965	500.8385	315.3015	0.0000	0.0000	0.0000	0.0000	447.2237	706.2043	1047.4124	(98a)
Space heating requirement - total per year (kWh/year)												5823.4155	
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	1255.5900	809.2485	741.5965	500.8385	315.3015	0.0000	0.0000	0.0000	0.0000	447.2237	706.2043	1047.4124	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5823.4155	
Space heating per m2										(98c) / (4) =		73.4353	(99)

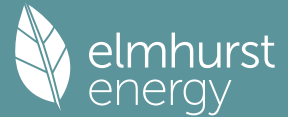
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %)												340.7520	(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	1255.5900	809.2485	741.5965	500.8385	315.3015	0.0000	0.0000	0.0000	0.0000	447.2237	706.2043	1047.4124	(98)
Space heating efficiency (main heating system 1)	340.7520	340.7520	340.7520	340.7520	340.7520	0.0000	0.0000	0.0000	0.0000	340.7520	340.7520	340.7520	(210)
Space heating fuel (main heating system)	368.4762	237.4890	217.6353	146.9804	92.5311	0.0000	0.0000	0.0000	0.0000	131.2461	207.2488	307.3826	(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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	(64)
Efficiency of water heater (217)m	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	160.0392	(216)
Fuel for water heating, kWh/month	166.6462	147.4473	156.6937	137.7430	133.5391	120.3346	118.6991	123.3643	124.6780	139.0349	147.8709	164.8102	(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	27.5415	22.0948	19.8939	14.5752	11.2583	9.1981	10.2702	13.3496	17.3398	22.7507	25.6969	28.3070	(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												1708.9893	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												160.0392	
Water heating fuel used												1680.8613	(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)												222.2758	(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												3612.1264	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1708.9893	16.4900	281.8123	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1680.8613	16.4900	277.1740	(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	222.2758	16.4900	36.6533	(250)

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Additional standing charges
Total energy cost

0.0000 (251)
595.6396 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):

Energy cost factor (ECF)

SAP value

SAP rating (Section 12)

SAP band

0.3600 (256)
1.7251 (257)
72.0361
72 (258)
C

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	1708.9893	0.1544	263.8377 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	1680.8613	0.1409	236.7980 (264)
Space and water heating			500.6358 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	222.2758	0.1443	32.0813 (268)
Total CO ₂ , kg/year			532.7170 (272)
CO ₂ emissions per m ²			6.7200 (273)
EI value			94.2571
EI rating			94 (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	79.3000 (1b)	x 2.6000 (2b)	= 206.1800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 206.1800 (5)

2. Ventilation rate

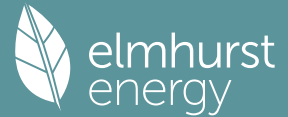
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1940 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9440 (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) = 0.8024 (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	0.8425	0.8024	0.8024	0.7422	0.7422	0.6620	0.6820	0.6419	0.6620	0.7021	0.7021	0.7623 (22b)
Effective ac	0.8549	0.8219	0.8219	0.7754	0.7754	0.7191	0.7326	0.7060	0.7191	0.7465	0.7465	0.7905 (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)			2.5900	1.1450	2.9656		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.1800	6.4908	190.0000	6851.4000 (29a)
New Ext Wall	26.0000	9.1800	16.8200	0.1800	3.0276	9.0000	151.3800 (29a)
Flat Roof	79.3000		79.3000	0.1400	11.1020	9.0000	713.7000 (30)
Total net area of external elements Aum(A, m ²)			225.6800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.4308		(33)

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Party Wall	27.3000	0.0000	0.0000	20.0000	546.0000 (32)
Internal Wall	136.2400			9.0000	1226.1600 (32c)

Heat capacity $C_m = \text{Sum}(A \times k)$
Thermal mass parameter (TMP = C_m / TFA) in $\text{kJ/m}^2\text{K}$
Thermal bridges (Default value $0.200 \times \text{total exposed area}$)
Point Thermal bridges
Total fabric heat loss

(28)...(30) + (32) + (32a)...(32e) = 9488.6400 (34)
119.6550 (35)
45.1360 (36)
(36a) = 0.0000
(33) + (36) + (36a) = 101.5668 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	58.1685	55.9234	55.9234	52.7610	52.7610	48.9279	49.8451	48.0381	48.9279	50.7897	50.7897	53.7878	(38)
Heat transfer coeff	159.7353	157.4902	157.4902	154.3279	154.3279	150.4947	151.4119	149.6049	150.4947	152.3565	152.3565	155.3546	(39)
Average = $\text{Sum}(39)\text{m} / 12 =$												153.7871	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.0143	1.9860	1.9860	1.9461	1.9461	1.8978	1.9094	1.8866	1.8978	1.9213	1.9213	1.9591	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4494 (42)
Hot water usage for mixer showers	65.2888	64.3077	62.8779	60.1424	58.1236	55.8723	54.5926	56.0115	57.5669	59.9842	62.7785	65.0387	(42a)
Hot water usage for baths	28.1996	27.7808	27.1910	26.1036	25.2893	24.3865	23.8988	24.4844	25.1221	26.0882	27.1980	28.1042	(42b)
Hot water usage for other uses	39.7148	38.2706	36.8264	35.3822	33.9381	32.4939	32.4939	33.9381	35.3822	36.8264	38.2706	39.7148	(42c)
Average daily hot water use (litres/day)												122.4439	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	133.2032	130.3590	126.8953	121.6282	117.3510	112.7526	110.9853	114.4340	118.0713	122.8988	128.2471	132.8577	(44)
Energy content (annual)	210.9613	185.6295	195.0334	166.5029	157.9770	138.6425	134.2271	141.6932	145.5937	166.7725	182.7115	208.0230	(45)
Distribution loss (46)m = $0.15 \times (45)\text{m}$	31.6442	27.8444	29.2550	24.9754	23.6965	20.7964	20.1341	21.2540	21.8391	25.0159	27.4067	31.2035	(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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	(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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = $\text{Sum}(64a)\text{m} =$												0.0000	(64a)
Heat gains from water heating, kWh/month	114.7350	101.9970	109.4390	98.5142	97.1178	89.2506	89.2209	91.7034	91.5619	100.0423	103.9036	113.7581	(65)

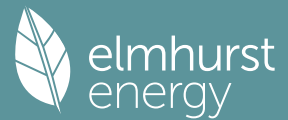
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	146.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	31.4654	27.9473	22.7283	17.2068	12.8623	10.8589	11.7334	15.2515	20.4705	25.9921	30.3366	32.3400	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	325.3303	328.7062	320.1991	302.0883	279.2266	257.7399	243.3855	240.0096	248.5168	266.6276	289.4892	310.9759	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	52.1461	(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)	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	-97.9778	(71)
Water heating gains (Table 5)	154.2137	151.7813	147.0954	136.8253	130.5346	123.9592	119.9206	123.2573	127.1693	134.4654	144.3105	152.9006	(72)
Total internal gains	612.1445	609.5699	591.1578	557.2554	523.7585	493.6930	476.1745	479.6534	497.2916	528.2200	565.2713	597.3515	(73)

6. Solar gains

[Jan]															
				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W					
Southeast				1.8900	40.4699		0.6300	0.8000	0.7700	26.7152 (77)					
Northwest				0.7000	12.9236		0.6300	0.8000	0.7700	3.1597 (81)					
Northwest				4.3200	12.9236		0.6300	0.8000	0.7700	19.4998 (81)					
Southeast				5.4000	40.4699		0.6300	0.8000	0.7700	76.3290 (77)					
Solar gains				125.7037	199.6215	288.2809	400.2538	465.2776	507.6355	478.6553	426.6375	349.7221	240.9242	155.6815	105.6463 (83)
Total gains				737.8482	809.1914	879.4387	957.5092	989.0362	1001.3285	954.8298	906.2908	847.0137	769.1443	720.9528	702.9978 (84)

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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	16.5006	16.7359	16.7359	17.0788	17.0788	17.5138	17.4077	17.6180	17.5138	17.2998	17.2998	16.9659	
alpha	2.1000	2.1157	2.1157	2.1386	2.1386	2.1676	2.1605	2.1745	2.1676	2.1533	2.1533	2.1311	
util living area	0.9459	0.9325	0.9044	0.8485	0.7532	0.5826	0.4313	0.4566	0.6945	0.8587	0.9247	0.9499 (86)	
Living	17.6591	17.9483	18.5406	19.3387	20.0966	20.6844	20.8929	20.8784	20.4687	19.5677	18.5612	17.6860	
Non living	15.6596	16.0265	16.7651	17.7522	18.6357	19.2437	19.3759	19.3859	19.0657	18.0569	16.8182	15.7060	
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	19.2909	17.9483	18.5406	19.3387	20.0966	20.6844	20.8929	20.8784	20.4687	19.5677	18.5612	18.1496 (87)	
Th 2	19.3238	19.3427	19.3427	19.3695	19.3695	19.4023	19.3944	19.4100	19.4023	19.3863	19.3863	19.3608 (88)	
util rest of house	0.9344	0.9181	0.8824	0.8100	0.6793	0.4450	0.2288	0.2547	0.5803	0.8143	0.9059	0.9392 (89)	
MIT 2	17.8553	16.0265	16.7651	17.7522	18.6357	19.2437	19.3759	19.3859	19.0657	18.0569	16.8182	16.3625 (90)	
Living area fraction									FLA = Living area / (4) =				0.3783 (91)
MIT	18.3984	16.7535	17.4368	18.3524	19.1884	19.7887	19.9498	19.9505	19.5964	18.6284	17.4776	17.0385 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.3984	16.7535	17.4368	18.3524	19.1884	19.7887	19.9498	19.9505	19.5964	18.6284	17.4776	17.0385 (93)	

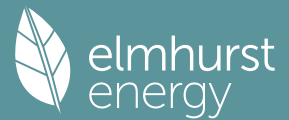
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9264	0.8851	0.8471	0.7789	0.6694	0.4825	0.3051	0.3300	0.5967	0.7867	0.8737	0.9175 (94)
Useful gains	683.5321	716.2122	744.9529	745.8466	662.0545	483.1186	291.3378	299.0568	505.4261	605.0992	629.8611	644.9880 (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	2124.2250	1756.5706	1580.6956	1304.4350	955.0443	570.1802	310.3630	321.7311	661.6395	1070.8294	1443.9722	1854.7080 (97)
Space heating kWh	1071.8755	699.1208	621.7926	402.1837	217.9844	0.0000	0.0000	0.0000	0.0000	346.5033	586.1600	900.0317 (98a)
Space heating requirement - total per year (kWh/year)												4845.6519
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	1071.8755	699.1208	621.7926	402.1837	217.9844	0.0000	0.0000	0.0000	0.0000	346.5033	586.1600	900.0317 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4845.6519
Space heating per m2										(98c) / (4) =		61.1053 (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 %)													338.5555 (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	1071.8755	699.1208	621.7926	402.1837	217.9844	0.0000	0.0000	0.0000	0.0000	346.5033	586.1600	900.0317 (98)	
Space heating efficiency (main heating system 1)	338.5555	338.5555	338.5555	338.5555	338.5555	0.0000	0.0000	0.0000	0.0000	338.5555	338.5555	338.5555 (210)	
Space heating fuel (main heating system)	316.6026	206.5011	183.6604	118.7940	64.3866	0.0000	0.0000	0.0000	0.0000	102.3476	173.1356	265.8446 (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	266.6993	235.9735	250.7714	220.4429	213.7150	192.5825	189.9651	197.4312	199.5337	222.5105	236.6515	263.7610 (64)	
Efficiency of water heater	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500	159.8500 (216)	
Fuel for water heating, kWh/month	166.8435	147.6219	156.8792	137.9061	133.6972	120.4770	118.8396	123.5103	124.8256	139.1996	148.0460	165.0053 (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	27.5415	22.0948	19.8939	14.5752	11.2583	9.1981	10.2702	13.3496	17.3398	22.7507	25.6969	28.3070 (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													1431.2725 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													159.8500
Water heating fuel used													1682.8512 (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)													222.2758 (232)

Full SAP Calculation Printout



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	3336.3996 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1431.2725	25.1600	360.1082 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1682.8512	25.1600	423.4054 (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	222.2758	25.1600	55.9246 (250)
Additional standing charges			0.0000 (251)
Total energy cost			839.4381 (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	1431.2725	0.1548	221.6284 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1682.8512	0.1409	237.0784 (264)
Space and water heating			458.7068 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	222.2758	0.1443	32.0813 (268)
Total CO2, kg/year			490.7881 (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	1431.2725	1.5732	2251.7216 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1682.8512	1.5209	2559.4794 (278)
Space and water heating			4811.2010 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	222.2758	1.5338	340.9341 (282)
Total Primary energy kWh/year			5152.1351 (286)

Overview Report

Dwelling Address	
Report Date	01/02/2024
Property Type	Flat, Semi-Detached
Floor Area [m ²]	79

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

72

72

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

Primary Energy use

The primary energy use for this property per year is 65 kilowatt hour (kWh) per square metre

Estimated CO₂ emissions of the dwelling

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

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

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

Recommendations

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

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

Estimated energy cost for this property over a year

£839

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