

Summary for Input Data

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

SAP Rating	66 D	DER	8.49	TER	9.53
Environmental	93 A	% DER < TER			10.91
CO ₂ Emissions (t/year)	0.6	DFEE	88.30	TFEE	41.61
Compliance Check	See BREL	% DFEE < TFEE			-112.20
% DPER < TPER	-72.62	DPER	88.28	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	0.55	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	0.16	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	1.60
Patio Doors	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.60
Bifold Doors	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.60

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

 m²/(h.m²) @ 50 Pa

Property Tested?

Yes

Test Method

Blower Door

As Built AP₅₀

15.00

 m²/(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

SAP table

Percentage of Heat

100.00

 %

Database Ref. No.

0

Fuel Type

Electricity

SAP Code

224

In Winter

219.30

In Summer

190.40

Controls SAP Code

2207

PCDF Controls

0

Delayed Start Stat

Yes

HETAS approved System

No

Summary for Input Data

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

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

28.0 Water Heating

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

28.1 Showers

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

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

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

Summary for Input Data



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

31.0 Thermal Store

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				-112.20
% DPER < TPER	-72.62		DPER	88.28		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			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.3000		
Dwelling volume			

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)

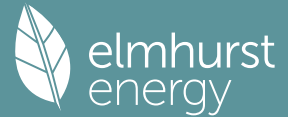
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.0231	1.0030	0.9829	0.8826	0.8626	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 = 1.60)			2.5900	1.5038	3.8947		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.5500	19.8330	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	0.1600	12.6880	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) =	75.7749		(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) =			120.9109 (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	190.5197	189.1548	187.7998	181.4340	180.2430	174.6987	174.6987	173.6719	176.8343	180.2430	182.6524	185.1714	(39)
Average = Sum(39)m / 12 =												181.4268	
HLP	Jan 2.4025	Feb 2.3853	Mar 2.3682	Apr 2.2879	May 2.2729	Jun 2.2030	Jul 2.2030	Aug 2.1901	Sep 2.2299	Oct 2.2729	Nov 2.3033	Dec 2.3351	(40)
HLP (average)												2.2879	
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	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	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-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	547.4812	559.3700	536.9249	518.2724	492.9126	472.6929	455.2850	456.3598	469.7235	488.4020	517.3162	536.5506	(73)

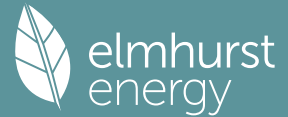
6. Solar gains

[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	660.9483	759.2175	827.8190	907.9597	956.0979	944.2745	905.0519	849.4982	794.5474	713.9821	654.4203	632.8804 (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 13.8344	Feb 13.9343	Mar 14.0348	Apr 14.5272	May 14.6232	Jun 15.0873	Jul 15.0873	Aug 15.1765	Sep 14.9051	Oct 14.6232	Nov 14.4303	Dec 14.2340		
alpha	1.9223	1.9290	1.9357	1.9685	1.9749	2.0058	2.0058	2.0118	1.9937	1.9749	1.9620	1.9489		
util living area														

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	0.9610	0.9476	0.9284	0.8888	0.8254	0.7218	0.6116	0.6473	0.7949	0.9025	0.9471	0.9639 (86)
MIT	16.7922	17.1409	17.7439	18.6424	19.4881	20.2436	20.6271	20.5670	19.9865	18.9035	17.7532	16.8008 (87)
Th 2	19.0785	19.0888	19.0992	19.1483	19.1576	19.2014	19.2014	19.2096	19.1844	19.1576	19.1388	19.1193 (88)
util rest of house												
	0.9521	0.9356	0.9108	0.8583	0.7687	0.6124	0.4303	0.4757	0.7062	0.8695	0.9330	0.9558 (89)
MIT 2	14.5163	14.9518	15.7042	16.8246	17.8417	18.7049	19.0583	19.0244	18.4459	17.1667	15.7356	14.5352 (90)
Living area fraction									fLA = Living area / (4) =			0.3783 (91)
MIT	15.3773	15.7800	16.4759	17.5123	18.4646	19.2870	19.6518	19.6080	19.0287	17.8237	16.4989	15.3923 (92)
Temperature adjustment												0.0000
adjusted MIT	15.3773	15.7800	16.4759	17.5123	18.4646	19.2870	19.6518	19.6080	19.0287	17.8237	16.4989	15.3923 (93)

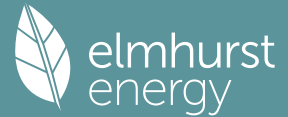
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9237	0.9026	0.8737	0.8202	0.7406	0.6188	0.4839	0.5215	0.6963	0.8344	0.9010	0.9290	(94)
Useful gains	610.5254	685.2348	723.2314	744.7374	708.1239	584.2927	437.9572	443.0468	553.2067	595.7516	589.6578	587.9668	(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	2110.4442	2057.9949	1873.4643	1562.5613	1219.2643	818.8096	533.1457	557.1392	871.5643	1302.0290	1716.7293	2072.5010	(97)
Space heating kWh	1115.9396	922.4948	855.7732	588.8332	380.2885	0.0000	0.0000	0.0000	0.0000	525.4704	811.4915	1104.4934	(98a)
Space heating requirement - total per year (kWh/year)												6304.7846	
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	1115.9396	922.4948	855.7732	588.8332	380.2885	0.0000	0.0000	0.0000	0.0000	525.4704	811.4915	1104.4934	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6304.7846	
Space heating per m2											(98c) / (4) =	79.5055	(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 %)													219.3000 (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	1115.9396	922.4948	855.7732	588.8332	380.2885	0.0000	0.0000	0.0000	0.0000	525.4704	811.4915	1104.4934	(98)
Space heating efficiency (main heating system 1)	219.3000	219.3000	219.3000	219.3000	219.3000	0.0000	0.0000	0.0000	0.0000	219.3000	219.3000	219.3000	(210)
Space heating fuel (main heating system)	508.8644	420.6543	390.2295	268.5058	173.4102	0.0000	0.0000	0.0000	0.0000	239.6126	370.0372	503.6450	(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	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	(216)
Fuel for water heating, kWh/month	140.0731	123.9357	131.7077	115.7788	112.2453	101.1463	99.7716	103.6929	104.7971	116.8647	124.2917	138.5300	(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												2874.9588	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												190.4000	
Water heating fuel used												1412.8349	(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												4510.0695	(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	2874.9588	0.1537	441.7982 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1412.8349	0.1409	199.0387 (264)
Space and water heating			640.8370 (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			672.9182 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			8.4900 (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	2874.9588	1.5689	4510.5993 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1412.8349	1.5209	2148.8066 (278)
Space and water heating			6659.4060 (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			7000.3401 (286)
Dwelling Primary energy Rate (DPER)			88.2800 (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)	= 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)

	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)
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)

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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)
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

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	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	31.6442	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												
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 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2365.7131 (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	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	0.0000	0.0000	0.0000	0.0000	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)

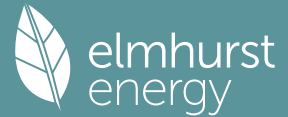
6. Solar gains

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

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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									fLA = Living area / (4) =			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												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	85.8842	(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	(217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(219)
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	(221)
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	(222)
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)

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

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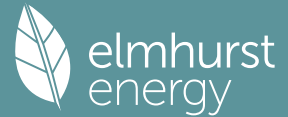


	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2983.7700	0.2100	626.5917 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2836.7814	0.2100	595.7241 (264)
Space and water heating			1222.3158 (265)
Pumps, fans and 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	Baseline		Prop Type Ref	Conversion		
Property						
SAP Rating	66 D	DER	8.49	TER	9.53	
Environmental	93 A	% DER < TER				10.91
CO ₂ Emissions (t/year)	0.6	DFEE	88.30	TFEE	41.61	
Compliance Check	See BREL	% DFEE < TFEE				-112.20
% DPER < TPER	-72.62	DPER	88.28	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

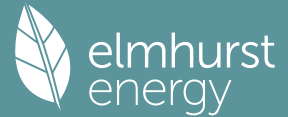
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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 = 1.60)			2.5900	1.5038	3.8947		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.5500	19.8330	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	0.1600	12.6880	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) =	75.7749		(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) =			120.9109 (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	186.9729	185.7286	184.5090	178.7806	177.7088	172.7195	172.7195	171.7956	174.6413	177.7088	179.8770	182.1437	(39)
Average = Sum(39)m / 12 =												178.7755	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.3578	2.3421	2.3267	2.2545	2.2410	2.1781	2.1781	2.1664	2.2023	2.2410	2.2683	2.2969	(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													(42a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													(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	28.1042	(42b)
Hot water usage for other uses													(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	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	
67.9143	66.0514	64.0174	61.4858	59.2274	56.8804	56.3927	58.4225	60.5043	62.9146	65.4686	67.8190	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)												1033.8358	
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	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	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	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	35.6364	(65)

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

Metabolic gains (Table 5), Watts													
(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	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	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	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	-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	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)													
tau	14.0969	14.1913	14.2851	14.7428	14.8318	15.2602	15.2602	15.3423	15.0923	14.8318	14.6530	14.4706	
alpha	1.9398	1.9461	1.9523	1.9829	1.9888	2.0173	2.0173	2.0228	2.0062	1.9888	1.9769	1.9647	
util living area	0.9713	0.9592	0.9421	0.9058	0.8470	0.7490	0.6425	0.6806	0.8227	0.9217	0.9602	0.9739	(86)

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MIT	16.6808	17.0351	17.6446	18.5526	19.4156	20.1923	20.5946	20.5269	19.9184	18.8042	17.6385	16.6810 (87)
Th 2	19.1055	19.1150	19.1244	19.1691	19.1775	19.2173	19.2173	19.2247	19.2019	19.1775	19.1605	19.1427 (88)
util rest of house												
	0.9646	0.9497	0.9275	0.8792	0.7953	0.6441	0.4617	0.5114	0.7412	0.8941	0.9493	0.9679 (89)
MIT 2	15.3717	15.7266	16.3335	17.2452	18.0728	18.7896	19.0900	19.0590	18.5648	17.5087	16.3532	15.3917 (90)
Living area fraction									fLA = Living area / (4) =			0.3783 (91)
MIT	15.8670	16.2216	16.8295	17.7398	18.5808	19.3203	19.6592	19.6143	19.0769	17.9988	16.8394	15.8795 (92)
Temperature adjustment												0.0000
adjusted MIT	15.8670	16.2216	16.8295	17.7398	18.5808	19.3203	19.6592	19.6143	19.0769	17.9988	16.8394	15.8795 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9464	0.9271	0.9008	0.8501	0.7730	0.6516	0.5154	0.5568	0.7337	0.8681	0.9278	0.9511 (94)	
Useful gains	522.4097	604.0250	651.2107	688.4333	666.2491	558.6712	423.1257	425.1359	518.1989	536.4887	512.1441	499.1855 (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													
	2162.7071	2102.7477	1905.8882	1580.3855	1222.7723	815.2868	528.3799	552.2036	869.1717	1314.8371	1751.8964	2127.3415 (97)	
Space heating kWh													
	1220.3813	1007.1417	933.4801	642.2056	414.0533	0.0000	0.0000	0.0000	0.0000	579.0912	892.6217	1211.3481 (98a)	
Space heating requirement - total per year (kWh/year)												6900.3229	
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													
	1220.3813	1007.1417	933.4801	642.2056	414.0533	0.0000	0.0000	0.0000	0.0000	579.0912	892.6217	1211.3481 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												6900.3229	
Space heating per m2												87.0154 (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	1623.5636	1278.1246	1305.6465	0.0000	0.0000	0.0000	0.0000 (100)	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.4849	0.5534	0.5205	0.0000	0.0000	0.0000	0.0000 (101)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	787.2646	707.3237	679.6504	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	122.1702	155.7937	128.0560	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	30.5426	38.9484	32.0140	0.0000	0.0000	0.0000	0.0000 (107)	
Space cooling requirement												101.5050 (107)	
Energy for space heating												87.0154 (99)	
Energy for space cooling												1.2800 (108)	
Total												88.2954 (109)	
Fabric Energy Efficiency (DFEE)												88.3 (109)	

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

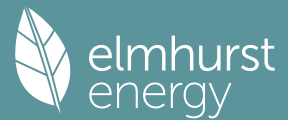
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	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)+(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)			(26)...(30) + (32) =		44.5358		(33)
Party Wall			27.3000	0.0000	0.0000		(32)
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							(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 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 =		1033.8358
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)
Total 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 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)
(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 (67)
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 (68)
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 (69)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
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 (71)
Losses e.g. evaporation (negative values) (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)
Water heating gains (Table 5)	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												
	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	877.1086	690.4897	707.7819	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	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)
Useful loss	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)
Total gains	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)
Space cooling kWh												
	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)
Cooled fraction												
Intermittency factor (Table 10b)									fc = cooled area / (4) =			1.0000 (105)
	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	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	Baseline			Prop Type Ref	Conversion		
Property							
SAP Rating	66 D		DER	8.49		TER	9.53
Environmental	93 A		% DER < TER				10.91
CO ₂ Emissions (t/year)	0.6		DFEE	88.30		TFEE	41.61
Compliance Check	See BREL		% DFEE < TFEE				-112.20
% DPER < TPER	-72.62		DPER	88.28		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 = 1.60)			2.5900	1.5038	3.8947		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.5500	19.8330	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	0.1600	12.6880	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) =	75.7749		(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) =			120.9109 (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	190.5197	189.1548	187.7998	181.4340	180.2430	174.6987	174.6987	173.6719	176.8343	180.2430	182.6524	185.1714	(39)
Average = Sum(39)m / 12 =												181.4268	

HLP	Jan 2.4025	Feb 2.3853	Mar 2.3682	Apr 2.2879	May 2.2729	Jun 2.2030	Jul 2.2030	Aug 2.1901	Sep 2.2299	Oct 2.2729	Nov 2.3033	Dec 2.3351	(40)
HLP (average)												2.2879	
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	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-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	547.4812	559.3700	536.9249	518.2724	492.9126	472.6929	455.2850	456.3598	469.7235	488.4020	517.3162	536.5506	(73)

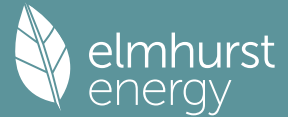
6. Solar gains

[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	660.9483	759.2175	827.8190	907.9597	956.0979	944.2745	905.0519	849.4982	794.5474	713.9821	654.4203	632.8804 (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 13.8344	Feb 13.9343	Mar 14.0348	Apr 14.5272	May 14.6232	Jun 15.0873	Jul 15.0873	Aug 15.1765	Sep 14.9051	Oct 14.6232	Nov 14.4303	Dec 14.2340		
alpha	1.9223	1.9290	1.9357	1.9685	1.9749	2.0058	2.0058	2.0118	1.9937	1.9749	1.9620	1.9489		
util living area														

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	0.9610	0.9476	0.9284	0.8888	0.8254	0.7218	0.6116	0.6473	0.7949	0.9025	0.9471	0.9639 (86)
MIT	16.7922	17.1409	17.7439	18.6424	19.4881	20.2436	20.6271	20.5670	19.9865	18.9035	17.7532	16.8008 (87)
Th 2	19.0785	19.0888	19.0992	19.1483	19.1576	19.2014	19.2014	19.2096	19.1844	19.1576	19.1388	19.1193 (88)
util rest of house												
	0.9521	0.9356	0.9108	0.8583	0.7687	0.6124	0.4303	0.4757	0.7062	0.8695	0.9330	0.9558 (89)
MIT 2	14.5163	14.9518	15.7042	16.8246	17.8417	18.7049	19.0583	19.0244	18.4459	17.1667	15.7356	14.5352 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	15.3773	15.7800	16.4759	17.5123	18.4646	19.2870	19.6518	19.6080	19.0287	17.8237	16.4989	15.3923 (91)
Temperature adjustment												0.0000
adjusted MIT	15.3773	15.7800	16.4759	17.5123	18.4646	19.2870	19.6518	19.6080	19.0287	17.8237	16.4989	15.3923 (93)

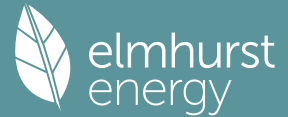
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9237	0.9026	0.8737	0.8202	0.7406	0.6188	0.4839	0.5215	0.6963	0.8344	0.9010	0.9290	(94)
Useful gains	610.5254	685.2348	723.2314	744.7374	708.1239	584.2927	437.9572	443.0468	553.2067	595.7516	589.6578	587.9668	(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	2110.4442	2057.9949	1873.4643	1562.5613	1219.2643	818.8096	533.1457	557.1392	871.5643	1302.0290	1716.7293	2072.5010	(97)
Space heating kWh	1115.9396	922.4948	855.7732	588.8332	380.2885	0.0000	0.0000	0.0000	0.0000	525.4704	811.4915	1104.4934	(98a)
Space heating requirement - total per year (kWh/year)												6304.7846	
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	1115.9396	922.4948	855.7732	588.8332	380.2885	0.0000	0.0000	0.0000	0.0000	525.4704	811.4915	1104.4934	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6304.7846	
Space heating per m2											(98c) / (4) =	79.5055	(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 %)													219.3000 (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	1115.9396	922.4948	855.7732	588.8332	380.2885	0.0000	0.0000	0.0000	0.0000	525.4704	811.4915	1104.4934	(98)
Space heating efficiency (main heating system 1)	219.3000	219.3000	219.3000	219.3000	219.3000	0.0000	0.0000	0.0000	0.0000	219.3000	219.3000	219.3000	(210)
Space heating fuel (main heating system)	508.8644	420.6543	390.2295	268.5058	173.4102	0.0000	0.0000	0.0000	0.0000	239.6126	370.0372	503.6450	(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	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	(216)
Fuel for water heating, kWh/month	140.0731	123.9357	131.7077	115.7788	112.2453	101.1463	99.7716	103.6929	104.7971	116.8647	124.2917	138.5300	(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												2874.9588	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												190.4000	
Water heating fuel used												1412.8349	(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												4510.0695	(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	2874.9588	0.1537	441.7982 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1412.8349	0.1409	199.0387 (264)
Space and water heating			640.8370 (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			672.9182 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			8.4900 (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	2874.9588	1.5689	4510.5993 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1412.8349	1.5209	2148.8066 (278)
Space and water heating			6659.4060 (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			7000.3401 (286)
Dwelling Primary energy Rate (DPER)			88.2800 (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)	= 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

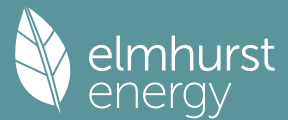
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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)

	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)
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)

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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	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	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	31.6442	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)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2365.7131 (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	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 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	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-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)

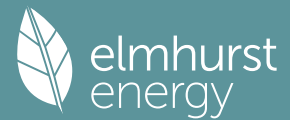
6. Solar gains

[Jan]				Area 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				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)	Jan 27.4299	Feb 27.4994	Mar 27.5678	Apr 27.8938	May 27.9557	Jun 28.2472	Jul 28.2472	Aug 28.3019	Sep 28.1342	Oct 27.9557	Nov 27.8308	Dec 27.7015
tau	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)

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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									fLA = Living area / (4) =			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												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	85.8842	(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	(217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(219)
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	(221)
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	(222)
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)

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

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	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	Baseline		Prop Type Ref		Conversion			
Property								
SAP Rating		66 D	DER		8.49	TER		9.53
Environmental		93 A	% DER < TER					10.91
CO ₂ Emissions (t/year)		0.6	DFEE		88.30	TFEE		41.61
Compliance Check		See BREL	% DFEE < TFEE					-112.20
% DPER < TPER		-72.62	DPER		88.28	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)

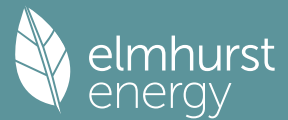
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.0231	1.0030	0.9829	0.8826	0.8626	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 = 1.60)			2.5900	1.5038	3.8947		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.5500	19.8330	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	0.1600	12.6880	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) =	75.7749		(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) =			120.9109 (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	190.5197	189.1548	187.7998	181.4340	180.2430	174.6987	174.6987	173.6719	176.8343	180.2430	182.6524	185.1714	(39)
Average = Sum(39)m / 12 =												181.4268	
HLP	Jan 2.4025	Feb 2.3853	Mar 2.3682	Apr 2.2879	May 2.2729	Jun 2.2030	Jul 2.2030	Aug 2.1901	Sep 2.2299	Oct 2.2729	Nov 2.3033	Dec 2.3351	(40)
HLP (average)												2.2879	
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)	
	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)	
								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)	
								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	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-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	615.1445	612.5699	594.1578	560.2554	526.7585	493.6930	476.1745	479.6534	497.2916	531.2200	568.2713	600.3515	(73)

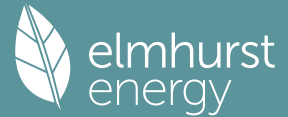
6. Solar gains

[Jan]												Area		Solar flux		g		FF		Access		Gains		
												m2		Table 6a		Specific data		Specific data		factor		W		
														W/m2		or Table 6b		or Table 6c		Table 6d				
Southeast												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												728.6116	812.4174	885.0519	949.9427	989.9439	965.2747	925.9414	872.7918	822.1155	756.8001	705.3754	696.6814	(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	13.8344	13.9343	14.0348	14.5272	14.6232	15.0873	15.0873	15.1765	14.9051	14.6232	14.4303	14.2340	
alpha	1.9223	1.9290	1.9357	1.9685	1.9749	2.0058	2.0058	2.0118	1.9937	1.9749	1.9620	1.9489	
util living area	0.9540	0.9415	0.9204	0.8810	0.8171	0.7150	0.6036	0.6380	0.7859	0.8934	0.9401	0.9575 (86)	

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MIT	16.8913	17.2163	17.8207	18.6933	19.5218	20.2583	20.6365	20.5792	20.0115	18.9576	17.8265	16.8966 (87)
Th 2	19.0785	19.0888	19.0992	19.1483	19.1576	19.2014	19.2014	19.2096	19.1844	19.1576	19.1388	19.1193 (88)
util rest of house	0.9438	0.9283	0.9012	0.8490	0.7589	0.6047	0.4229	0.4665	0.6953	0.8581	0.9244	0.9481 (89)
MIT 2	14.6381	15.0436	15.7962	16.8832	17.8769	18.7169	19.0629	19.0311	18.4688	17.2286	15.8245	14.6534 (90)
Living area fraction									fLA = Living area / (4) =			0.3783 (91)
MIT	15.4905	15.8655	16.5620	17.5679	18.4992	19.3001	19.6582	19.6168	19.0524	17.8827	16.5819	15.5020 (92)
Temperature adjustment												0.0000
adjusted MIT	15.4905	15.8655	16.5620	17.5679	18.4992	19.3001	19.6582	19.6168	19.0524	17.8827	16.5819	15.5020 (93)

8. Space heating requirement

Utilisation	Jan 0.9126	Feb 0.8934	Mar 0.8627	Apr 0.8109	May 0.7317	Jun 0.6121	Jul 0.4768	Aug 0.5131	Sep 0.6868	Oct 0.8229	Nov 0.8906	Dec 0.9186 (94)
Useful gains	664.9617	725.8158	763.5648	770.2745	724.3906	590.8605	441.5057	447.7914	564.6091	622.7414	628.2220	639.9896 (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	2132.0098	2074.1848	1889.6496	1572.6602	1225.5065	821.0963	534.2686	558.6673	875.7590	1312.6523	1731.8870	2092.8053 (97)
Space heating kWh	1091.4838	906.1039	837.8071	577.7177	372.8303	0.0000	0.0000	0.0000	0.0000	513.2937	794.6388	1080.8949 (98a)
Space heating requirement - total per year (kWh/year)												6174.7702
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	1091.4838	906.1039	837.8071	577.7177	372.8303	0.0000	0.0000	0.0000	0.0000	513.2937	794.6388	1080.8949 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6174.7702
Space heating per m2										(98c) / (4) =		77.8660 (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 %)												219.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan 1091.4838	Feb 906.1039	Mar 837.8071	Apr 577.7177	May 372.8303	Jun 0.0000	Jul 0.0000	Aug 0.0000	Sep 0.0000	Oct 513.2937	Nov 794.6388	Dec 1080.8949 (98)
Space heating efficiency (main heating system 1)	219.3000	219.3000	219.3000	219.3000	219.3000	0.0000	0.0000	0.0000	0.0000	219.3000	219.3000	219.3000 (210)
Space heating fuel (main heating system)	497.7126	413.1801	382.0370	263.4372	170.0092	0.0000	0.0000	0.0000	0.0000	234.0600	362.3524	492.8841 (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	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000 (216)
Fuel for water heating, kWh/month	140.0731	123.9357	131.7077	115.7788	112.2453	101.1463	99.7716	103.6929	104.7971	116.8647	124.2917	138.5300 (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												2815.6727 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												190.4000
Water heating fuel used												1412.8349 (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												4450.7834 (238)

10a. Fuel costs - using Table 12 prices

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	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2815.6727	16.4900	464.3044 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1412.8349	16.4900	232.9765 (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			733.9342 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.1256 (257)
SAP value		65.5435
SAP rating (Section 12)		66 (258)
SAP band		D

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	2815.6727	0.1537	432.6879 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1412.8349	0.1409	199.0387 (264)
Space and water heating			631.7266 (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			663.8079 (272)
CO2 emissions per m2			8.3700 (273)
EI value			92.8439
EI rating			93 (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)	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

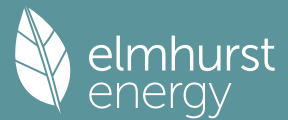
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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)

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)

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Windows (Uw = 1.60)			2.5900	1.5038	3.8947			(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962			(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203			(27)
Floor Over Commercial			79.3000	0.2500	19.8250			(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.5500	19.8330	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	0.1600	12.6880	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) =		75.7749			(33)
Party Wall			27.3000	0.0000	0.0000			(32)
Internal Wall			136.2400			20.0000	546.0000	(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) =	120.9109 (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	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)
Average = Sum(39)m / 12 =	179.0794	176.8343	176.8343	173.6719	173.6719	169.8388	170.7560	168.9489	169.8388	171.7006	171.7006	174.6987	(39)
												173.1312	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.2583	2.2299	2.2299	2.1901	2.1901	2.1417	2.1533	2.1305	2.1417	2.1652	2.1652	2.2030	(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														
Hot water usage for baths	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 other uses	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 daily hot water use (litres/day)	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)	
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:														
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	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(57)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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)	
												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)	

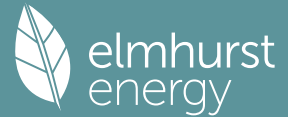
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	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)
Appliances gains (calculated in Appendix L, equation L13 or L13a), 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)
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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)
Pumps, fans	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)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Water heating gains (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)
Total internal gains	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)
	615.1445	612.5699	594.1578	560.2554	526.7585	493.6930	476.1745	479.6534	497.2916	531.2200	568.2713	600.3515	(73)

6. Solar gains

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

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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	740.8482	812.1914	882.4387	960.5092	992.0362	1001.3285	954.8298	906.2908	847.0137	772.1443	723.9528	705.9978 (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	14.7182	14.9051	14.9051	15.1765	15.1765	15.5190	15.4357	15.6008	15.5190	15.3508	15.3508	15.0873
alpha	1.9812	1.9937	1.9937	2.0118	2.0118	2.0346	2.0290	2.0401	2.0346	2.0234	2.0234	2.0058
util living area	0.9477	0.9354	0.9097	0.8592	0.7722	0.6139	0.4647	0.4906	0.7196	0.8685	0.9284	0.9514 (86)
MIT	17.3310	17.6189	18.2412	19.0833	19.9163	20.5876	20.8499	20.8307	20.3394	19.3501	18.2717	17.3501 (87)
Th 2	19.1667	19.1844	19.1844	19.2096	19.2096	19.2405	19.2331	19.2478	19.2405	19.2255	19.2255	19.2014 (88)
util rest of house	0.9359	0.9207	0.8875	0.8201	0.6954	0.4622	0.2284	0.2560	0.5979	0.8233	0.9092	0.9404 (89)
MIT 2	15.2074	15.5694	16.3421	17.3785	18.3515	19.0445	19.2117	19.2195	18.8382	17.7277	16.4035	15.2407 (90)
Living area fraction									fLA = Living area / (4) =			0.3783 (91)
MIT	16.0108	16.3448	17.0606	18.0234	18.9435	19.6283	19.8315	19.8290	19.4061	18.3415	17.1102	16.0387 (92)
Temperature adjustment												0.0000
adjusted MIT	16.0108	16.3448	17.0606	18.0234	18.9435	19.6283	19.8315	19.8290	19.4061	18.3415	17.1102	16.0387 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9038	0.8859	0.8497	0.7853	0.6811	0.5011	0.3182	0.3441	0.6120	0.7921	0.8748	0.9099 (94)
Useful gains	669.5507	719.4855	749.7673	754.2538	675.7120	501.7213	303.7938	311.8652	518.3582	611.6348	633.3140	642.3995 (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	1953.9029	1900.0420	1708.3184	1410.8134	1032.2137	616.2262	329.8073	342.8058	714.3635	1157.5168	1564.2340	1910.9706 (97)
Space heating kWh	955.5580	793.3340	713.1620	472.7229	265.2373	0.0000	0.0000	0.0000	0.0000	406.1362	670.2624	943.8169 (98a)
Space heating requirement - total per year (kWh/year)												5220.2296
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	955.5580	793.3340	713.1620	472.7229	265.2373	0.0000	0.0000	0.0000	0.0000	406.1362	670.2624	943.8169 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5220.2296
Space heating per m2										(98c) / (4) =		65.8289 (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 %)												219.3000 (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	955.5580	793.3340	713.1620	472.7229	265.2373	0.0000	0.0000	0.0000	0.0000	406.1362	670.2624	943.8169 (98)
Space heating efficiency (main heating system 1)	219.3000	219.3000	219.3000	219.3000	219.3000	0.0000	0.0000	0.0000	0.0000	219.3000	219.3000	219.3000 (210)
Space heating fuel (main heating system)	435.7310	361.7574	325.1993	215.5599	120.9472	0.0000	0.0000	0.0000	0.0000	185.1966	305.6372	430.3771 (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	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000 (216)
Fuel for water heating, kWh/month	140.0731	123.9357	131.7077	115.7788	112.2453	101.1463	99.7716	103.6929	104.7971	116.8647	124.2917	138.5300 (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												2380.4057 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												190.4000
Water heating fuel used												1412.8349 (219)
Space cooling fuel												0.0000 (221)

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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	4015.5164 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2380.4057	25.1600	598.9101 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1412.8349	25.1600	355.4693 (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			1010.3039 (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	2380.4057	0.1542	366.9403 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1412.8349	0.1409	199.0387 (264)
Space and water heating			565.9791 (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			598.0604 (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	2380.4057	1.5707	3738.9315 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1412.8349	1.5209	2148.8066 (278)
Space and water heating			5887.7381 (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			6228.6723 (286)

SAP 10 EPC IMPROVEMENTS

Baseline

Current energy efficiency rating:	D 66
Current environmental impact rating:	A 93

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

Recommended measures: (none)	SAP change	Cost change	CO2 change
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Recommended measures (none)	Typical annual savings		Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating:	D 66
Potential environmental impact rating:	A 93

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 £1010	Potential £1010	Saving £0
Electricity			
Space heating	£599	£599	£0
Water heating	£355	£355	£0
Lighting	£56	£56	£0
Total cost of fuels	£1010	£1010	£0
Total cost of uses	£1010	£1010	£0
Delivered energy	51 kWh/m²	51 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.6 tonnes	0.6 tonnes	0.0 tonnes
CO2 emissions per m²	8 kg/m²	8 kg/m²	0 kg/m²
Primary energy	79 kWh/m²	79 kWh/m²	0 kWh/m²

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	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) =	Air changes per hour 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 = 1.60)			2.5900	1.5038	3.8947		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.5500	19.8330	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	0.1600	12.6880	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) =	75.7749			(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) =		120.9109 (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	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)
Heat transfer coeff	190.5197	189.1548	187.7998	181.4340	180.2430	174.6987	174.6987	173.6719	176.8343	180.2430	182.6524	185.1714 (39)
Average = Sum(39)m / 12 =												181.4268
HLP	2.4025	2.3853	2.3682	2.2879	2.2729	2.2030	2.2030	2.1901	2.2299	2.2729	2.3033	2.3351 (40)
HLP (average)												2.2879
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												
Hot water usage for mixer showers												2.4494 (42)
Hot water usage for baths	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 other uses	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)

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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	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	31.6442	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:												210.0000	(47)
Store volume												1.9400	(48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400	(49)
Temperature factor from Table 2b												1.0476	(55)
Enter (49) or (54) in (55)													
Total storage loss	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(56)
If cylinder contains dedicated solar storage	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	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	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-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	615.1445	612.5699	594.1578	560.2554	526.7585	493.6930	476.1745	479.6534	497.2916	531.2200	568.2713	600.3515	(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	728.6116	812.4174	885.0519	949.9427	989.9439	965.2747	925.9414	872.7918	822.1155	756.8001	705.3754	696.6814 (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)													
tau	13.8344	13.9343	14.0348	14.5272	14.6232	15.0873	15.0873	15.1765	14.9051	14.6232	14.4303	14.2340	
alpha	1.9223	1.9290	1.9357	1.9685	1.9749	2.0058	2.0058	2.0118	1.9937	1.9749	1.9620	1.9489	
util living area	0.9540	0.9415	0.9204	0.8810	0.8171	0.7150	0.6036	0.6380	0.7859	0.8934	0.9401	0.9575	(86)
MIT	16.8913	17.2163	17.8207	18.6933	19.5218	20.2583	20.6365	20.5792	20.0115	18.9576	17.8265	16.8966	(87)
Th 2	19.0785	19.0888	19.0992	19.1483	19.1576	19.2014	19.2014	19.2096	19.1844	19.1576	19.1388	19.1193	(88)
util rest of house	0.9438	0.9283	0.9012	0.8490	0.7589	0.6047	0.4229	0.4665	0.6953	0.8581	0.9244	0.9481	(89)
MIT 2	14.6381	15.0436	15.7962	16.8832	17.8769	18.7169	19.0629	19.0311	18.4688	17.2286	15.8245	14.6534	(90)
Living area fraction	15.4905	15.8655	16.5620	17.5679	18.4992	19.3001	19.6582	19.6168	19.0524	17.8827	16.5819	15.5020	(91)
MIT	15.4905	15.8655	16.5620	17.5679	18.4992	19.3001	19.6582	19.6168	19.0524	17.8827	16.5819	15.5020	(92)
Temperature adjustment	15.4905	15.8655	16.5620	17.5679	18.4992	19.3001	19.6582	19.6168	19.0524	17.8827	16.5819	15.5020	(93)
adjusted MIT	15.4905	15.8655	16.5620	17.5679	18.4992	19.3001	19.6582	19.6168	19.0524	17.8827	16.5819	15.5020	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9126	0.8934	0.8627	0.8109	0.7317	0.6121	0.4768	0.5131	0.6868	0.8229	0.8906	0.9186	(94)
Useful gains	664.9617	725.8158	763.5648	770.2745	724.3906	590.8605	441.5057	447.7914	564.6091	622.7414	628.2220	639.9896	(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	2132.0098	2074.1848	1889.6496	1572.6602	1225.5065	821.0963	534.2686	558.6673	875.7590	1312.6523	1731.8870	2092.8053	(97)
Space heating kWh													

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Space heating requirement - total per year (kWh/year)	1091.4838	906.1039	837.8071	577.7177	372.8303	0.0000	0.0000	0.0000	0.0000	513.2937	794.6388	1080.8949 (98a)
Solar heating kWh												6174.7702
Space heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	1091.4838	906.1039	837.8071	577.7177	372.8303	0.0000	0.0000	0.0000	0.0000	513.2937	794.6388	1080.8949 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6174.7702
Space heating per m2										(98c) / (4) =		77.8660 (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 %)												219.3000 (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	1091.4838	906.1039	837.8071	577.7177	372.8303	0.0000	0.0000	0.0000	0.0000	513.2937	794.6388	1080.8949 (98)
Space heating efficiency (main heating system 1)	219.3000	219.3000	219.3000	219.3000	219.3000	0.0000	0.0000	0.0000	0.0000	219.3000	219.3000	219.3000 (210)
Space heating fuel (main heating system)	497.7126	413.1801	362.0370	263.4372	170.0092	0.0000	0.0000	0.0000	0.0000	234.0600	362.3524	492.8841 (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 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	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000 (216)
Fuel for water heating, kWh/month	140.0731	123.9357	131.7077	115.7788	112.2453	101.1463	99.7716	103.6929	104.7971	116.8647	124.2917	138.5300 (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)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2815.6727 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												190.4000
Water heating fuel used												1412.8349 (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												4450.7834 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2815.6727	16.4900	464.3044 (240)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1412.8349	16.4900	232.9765 (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			733.9342 (255)	

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	2.1256 (257)
SAP value		65.5435
SAP rating (Section 12)		66 (258)
SAP band		D

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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	2815.6727	0.1537	432.6879 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1412.8349	0.1409	199.0387 (264)
Space and water heating			631.7266 (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			663.8079 (272)
CO2 emissions per m2			8.3700 (273)
EI value			92.8439
EI rating			93 (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 (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) =	Air changes per hour 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)

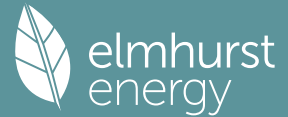
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate	0.8425	0.8024	0.8024	0.7422	0.7422	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 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 = 1.60)			2.5900	1.5038	3.8947		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			79.3000	0.2500	19.8250		(28b)
Existing Ext Wall	41.0800	5.0200	36.0600	0.5500	19.8330	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	0.1600	12.6880	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) =	75.7749			(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) =		120.9109 (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	179.0794	176.8343	176.8343	173.6719	173.6719	169.8388	170.7560	168.9489	169.8388	171.7006	171.7006	174.6987 (39)
Average = Sum(39)m / 12 =												173.1312

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HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.2583	2.2299	2.2299	2.1901	2.1901	2.1417	2.1533	2.1305	2.1417	2.1652	2.1652	2.2030	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	2.1832	
												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	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													
31.6442	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	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
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)	

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	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-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	615.1445	612.5699	594.1578	560.2554	526.7585	493.6930	476.1745	479.6534	497.2916	531.2200	568.2713	600.3515 (73)

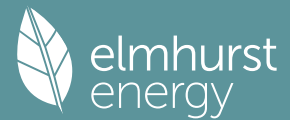
6. Solar gains

[Jan]													
	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								
Southeast	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	740.8482	812.1914	882.4387	960.5092	992.0362	1001.3285	954.8298	906.2908	847.0137	772.1443	723.9528	705.9978	(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	14.7182	14.9051	14.9051	15.1765	15.1765	15.5190	15.4357	15.6008	15.5190	15.3508	15.3508	15.0873
alpha	1.9812	1.9937	1.9937	2.0118	2.0118	2.0346	2.0290	2.0401	2.0346	2.0234	2.0234	2.0058
util living area												
	0.9477	0.9354	0.9097	0.8592	0.7722	0.6139	0.4647	0.4906	0.7196	0.8685	0.9284	0.9514 (86)
MIT	17.3310	17.6189	18.2412	19.0833	19.9163	20.5876	20.8499	20.8307	20.3394	19.3501	18.2717	17.3501 (87)
Th 2	19.1667	19.1844	19.1844	19.2096	19.2096	19.2405	19.2331	19.2478	19.2405	19.2255	19.2255	19.2014 (88)
util rest of house												
	0.9359	0.9207	0.8875	0.8201	0.6954	0.4622	0.2284	0.2560	0.5979	0.8233	0.9092	0.9404 (89)

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MIT 2	15.2074	15.5694	16.3421	17.3785	18.3515	19.0445	19.2117	19.2195	18.8382	17.7277	16.4035	15.2407 (90)
Living area fraction									FLA = Living area / (4) =			0.3783 (91)
MIT	16.0108	16.3448	17.0606	18.0234	18.9435	19.6283	19.8315	19.8290	19.4061	18.3415	17.1102	16.0387 (92)
Temperature adjustment												0.0000
adjusted MIT	16.0108	16.3448	17.0606	18.0234	18.9435	19.6283	19.8315	19.8290	19.4061	18.3415	17.1102	16.0387 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9038	0.8859	0.8497	0.7853	0.6811	0.5011	0.3182	0.3441	0.6120	0.7921	0.8748	0.9099 (94)	
Useful gains	669.5507	719.4855	749.7673	754.2538	675.7120	501.7213	303.7938	311.8652	518.3582	611.6348	633.3140	642.3995 (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	1953.9029	1900.0420	1708.3184	1410.8134	1032.2137	616.2262	329.8073	342.8058	714.3635	1157.5168	1564.2340	1910.9706 (97)	
Space heating kWh	955.5580	793.3340	713.1620	472.7229	265.2373	0.0000	0.0000	0.0000	0.0000	406.1362	670.2624	943.8169 (98a)	
Space heating requirement - total per year (kWh/year)												5220.2296	
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	955.5580	793.3340	713.1620	472.7229	265.2373	0.0000	0.0000	0.0000	0.0000	406.1362	670.2624	943.8169 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												5220.2296	
Space heating per m2										(98c) / (4) =		65.8289 (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 %)													219.3000 (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	955.5580	793.3340	713.1620	472.7229	265.2373	0.0000	0.0000	0.0000	0.0000	406.1362	670.2624	943.8169 (98)	
Space heating efficiency (main heating system 1)	219.3000	219.3000	219.3000	219.3000	219.3000	0.0000	0.0000	0.0000	0.0000	219.3000	219.3000	219.3000 (210)	
Space heating fuel (main heating system)	435.7310	361.7574	325.1993	215.5599	120.9472	0.0000	0.0000	0.0000	0.0000	185.1966	305.6372	430.3771 (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												190.4000 (216)	
(217)m	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000 (217)	
Fuel for water heating, kWh/month	140.0731	123.9357	131.7077	115.7788	112.2453	101.1463	99.7716	103.6929	104.7971	116.8647	124.2917	138.5300 (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													2380.4057 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													190.4000
Water heating fuel used													1412.8349 (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													4015.5164 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2380.4057	25.1600	598.9101 (240)
Total CO2 associated with community systems			0.0000 (473)

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Water heating (other fuel)	1412.8349	25.1600	355.4693 (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			1010.3039 (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	2380.4057	0.1542	366.9403 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1412.8349	0.1409	199.0387 (264)
Space and water heating			565.9791 (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			598.0604 (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	2380.4057	1.5707	3738.9315 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1412.8349	1.5209	2148.8066 (278)
Space and water heating			5887.7381 (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			6228.6723 (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

66

66

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

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.43 W/m ² K	Good
Roof	Average thermal transmittance 0.16 W/m ² K	Very Good
Floor	Average thermal transmittance 0.25 W/m ² K	Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, underfloor, electric	Average
Main heating controls	Time and temperature zone control	Very Good
Secondary heating	None	
Hot water	From main system	Average
Lighting	Good lighting efficiency	Good
Air tightness	(not tested)	

Primary Energy use

The primary energy use for this property per year is 79 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: **0.6** per year

With the recommended measures the potential CO emissions could be: **1** 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

£1010

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