

Summary for Input Data

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

SAP Rating	70 C	DER	7.14	TER	8.46
Environmental	94 A	% DER < TER			15.60
CO ₂ Emissions (t/year)	0.54	DFEE	71.32	TFEE	38.13
Compliance Check	See BREL	% DFEE < TFEE			-87.05
% DPER < TPER	-63.55	DPER	74.46	TPER	45.53

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

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

Orientation	Southeast	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Mid-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2023	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	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:	31.70 m	85.50 m ²	2.80 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	29.40	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 : plasterboard on dabs, dense block, filled cavity, any outside structure	0.18	150.00	34.72	28.13	0.00	None	6.59	Enter Gross Area
	Wall to Communal Stairs	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	28.00	28.00	0.82	Stairwell	0.00	Enter Gross Area
	New Ext Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	26.04	19.83	0.00	None	6.21	Enter Gross Area

9.1 Party Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
	Party Wall	Filled Cavity with Edge Sealing	Steel frame	0.00	20.00	43.40	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	186.76

Summary for Input Data

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.14	9.00	5.30	5.30	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling	Timber I-joists, carpeted	20.00	80.20

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Floor Over Commercial	Exposed Floor - Timber	Lowest occupied	Timber exposed floor, insulation between joists	0.25	None	0.00	20.00	85.50

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		None	0.63	Metal 32 mm break	0.80	1.20
Patio Doors	Manufacturer	Window	Double Low-E Soft 0.05		None	0.63	Metal 32 mm break	0.80	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front Elevation	Windows	Existing Ext Wall	North West	5.78	0
Entrance Door	Entrance Door	New Ext Wall	South East	1.89	0
Patio Doors	Patio Doors	New Ext Wall	South East	4.32	0
Rear Elevation	Windows	Existing Ext Wall	South East	0.81	0

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

Y-value

 W/m²K

18.0 Pressure Testing

Designed AP₅₀

 m³/(h.m²) @ 50 Pa

Property Tested?

Test Method

As Built AP₅₀

 m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

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

24.0 Main Heating 1

Percentage of Heat

 %

Database Ref. No.

Fuel Type

SAP Code

In Winter

In Summer

Controls SAP Code

PCDF Controls

Summary for Input Data

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

25.0 Main Heating 2

26.0 Heat Networks

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

28.0 Water Heating

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

28.1 Showers

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

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes

Summary for Input Data

Insulation Type	Measured Loss	
Insulation Thickness	0	
Cylinder Volume	210.00	L
Loss	1.94	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

31.0 Thermal Store

	None
Thermal Store Pipework	within a single casing

34.0 Small-scale Hydro

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

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

Recommendations

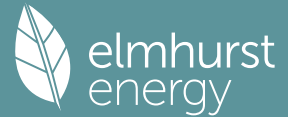
Lower cost measures

None

Further measures to achieve even higher standards

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

Full SAP Calculation Printout



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

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	85.5000 (1b)	2.8000 (2b)	239.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.5000		239.4000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	239.4000 (5)

2. Ventilation rate

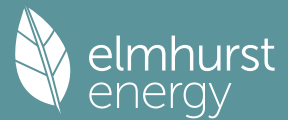
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1253 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8753 (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) = 0.7440 (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	0.9486	0.9300	0.9114	0.8184	0.7998	0.7068	0.7068	0.6882	0.7440	0.7998	0.8370	0.8742 (22b)
Effective ac	0.9499	0.9325	0.9153	0.8349	0.8199	0.7498	0.7498	0.7368	0.7768	0.8199	0.8503	0.8821 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			6.5900	1.1450	7.5458		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.5000	0.2500	21.3750	20.0000	1710.0000 (28b)
Existing Ext Wall	34.7200	6.5900	28.1300	0.1800	5.0634	150.0000	4219.5000 (29a)
Wall to Communal Stairs	28.0000		28.0000	0.1600	4.4800	9.0000	252.0000 (29a)
New Ext Wall	26.0400	6.2100	19.8300	0.1800	3.5694	9.0000	178.4700 (29a)
Flat Roof	5.3000		5.3000	0.1400	0.7420	9.0000	47.7000 (30)
Total net area of external elements Aum(A, m ²)			179.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.6122		(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Ceiling			80.2000			20.0000	1604.0000 (32b)
Internal Wall			186.7600			9.0000	1680.8400 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	10560.5100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							123.5147 (35)
Thermal bridges (Default value 0.200 * total exposed area)							35.9120 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	85.5242 (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	75.0472	73.6669	72.3139	65.9591	64.7701	59.2352	59.2352	58.2103	61.3672	64.7701	67.1754	69.6900	(38)
Heat transfer coeff	160.5714	159.1911	157.8381	151.4832	150.2943	144.7594	144.7594	143.7344	146.8913	150.2943	152.6996	155.2142	(39)
Average = Sum(39)m / 12 =												151.4776	
HLP	1.8780	1.8619	1.8461	1.7717	1.7578	1.6931	1.6931	1.6811	1.7180	1.7578	1.7860	1.8154	(40)
HLP (average)												1.7717	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5590 (42)
Hot water usage for mixer showers													
67.1255	66.1168	64.6468	61.8343	59.7587	57.4440	56.1284	57.5872	59.1864	61.6716	64.5446	66.8683	66.8683	(42a)
Hot water usage for baths													
28.9894	28.5589	27.9526	26.8347	25.9977	25.0695	24.5682	25.1702	25.8257	26.8189	27.9598	28.8914	28.8914	(42b)
Hot water usage for other uses													
40.8366	39.3516	37.8666	36.3817	34.8967	33.4117	33.4117	34.8967	36.3817	37.8666	39.3516	40.8366	40.8366	(42c)
Average daily hot water use (litres/day)												125.8894	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.9515	134.0272	130.4660	125.0506	120.6531	115.9253	114.1083	117.6541	121.3938	126.3571	131.8559	136.5963	(44)
Energy conte	216.8977	190.8530	200.5214	171.1881	162.4222	142.5436	138.0041	145.6804	149.6907	171.4654	187.8529	213.8768	(45)
Energy content (annual)										Total = Sum(45)m =		2090.9963	
Distribution loss (46)m = 0.15 x (45)m													
32.5347	28.6279	30.0782	25.6782	24.3633	21.3815	20.7006	21.8521	22.4536	25.7198	28.1779	32.0815	32.0815	(46)
Water storage loss:													
Store volume												210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.9400	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												1.0476	(55)
Total storage loss													
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	(56)
If cylinder contains dedicated solar storage													
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	269.6148	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	269.6148	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2747.2663	(64)
Electric shower(s)												2747	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
116.7089	103.7338	111.2638	100.0720	98.5958	90.5478	90.4768	93.0291	92.9241	101.6027	105.6131	115.7044	115.7044	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
123.6613	136.9108	123.6613	127.7834	123.6613	127.7834	123.6613	123.6613	127.7834	123.6613	127.7834	123.6613	123.6613	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
230.5513	232.9437	226.9149	214.0803	197.8790	182.6521	172.4796	170.0872	176.1159	188.9505	205.1518	220.3787	220.3787	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	(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)													
-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	(71)
Water heating gains (Table 5)													
156.8668	154.3658	149.5481	138.9889	132.5212	125.7608	121.6085	125.0392	129.0613	136.5627	146.6849	155.5167	155.5167	(72)
Total internal gains													
575.4641	588.6050	564.5091	545.2374	518.4464	497.5810	479.1342	480.1724	494.3454	513.5593	544.0048	563.9416	563.9416	(73)

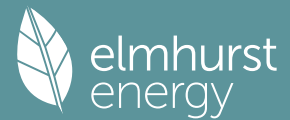
6. Solar gains

[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			
South-east				0.8100	36.7938	0.6300	0.8000	0.7700	10.4094 (77)			
North-west				5.7800	11.2829	0.6300	0.8000	0.7700	22.7779 (81)			
South-east				4.3200	36.7938	0.6300	0.8000	0.7700	55.5166 (77)			
Solar gains	88.7038	158.6613	237.1838	327.5668	397.6479	408.2963	388.0131	333.6619	268.1578	180.7731	107.6246	75.0204 (83)
Total gains	664.1680	747.2663	801.6928	872.8042	916.0942	905.8774	867.1474	813.8344	762.5032	694.3324	651.6294	638.9620 (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	18.2690	18.4274	18.5853	19.3650	19.5182	20.2645	20.2645	20.4090	19.9704	19.5182	19.2108	18.8995	
alpha	2.2179	2.2285	2.2390	2.2910	2.3012	2.3510	2.3510	2.3606	2.3314	2.3012	2.2807	2.2600	
util living area													

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	0.9656	0.9537	0.9358	0.8952	0.8267	0.7094	0.5880	0.6267	0.7917	0.9078	0.9521	0.9682 (86)
MIT	17.5085	17.8208	18.3462	19.1515	19.8703	20.4909	20.7721	20.7280	20.2696	19.3546	18.3692	17.5425 (87)
Th 2	19.4159	19.4270	19.4379	19.4899	19.4997	19.5458	19.5458	19.5544	19.5279	19.4997	19.4798	19.4593 (88)
util rest of house												
	0.9584	0.9439	0.9213	0.8693	0.7775	0.6156	0.4398	0.4850	0.7153	0.8798	0.9405	0.9617 (89)
MIT 2	15.4888	15.8873	16.5552	17.5833	18.4586	19.1815	19.4421	19.4189	18.9518	17.8550	16.6094	15.5487 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	16.1833	16.5521	17.1710	18.1225	18.9440	19.6317	19.8995	19.8690	19.4050	18.3706	17.2146	16.2343 (91)
Temperature adjustment												0.0000
adjusted MIT	16.1833	16.5521	17.1710	18.1225	18.9440	19.6317	19.8995	19.8690	19.4050	18.3706	17.2146	16.2343 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9351	0.9168	0.8907	0.8378	0.7547	0.6221	0.4804	0.5202	0.7074	0.8506	0.9142	0.9399	(94)
Useful gains	621.0420	685.1308	714.0785	731.2153	691.3613	563.5330	416.5512	423.3597	539.3854	590.6129	595.7043	600.5789	(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	1908.1159	1854.9160	1684.2939	1397.0550	1088.7378	728.3918	477.6281	498.6216	779.2524	1167.8818	1544.4899	1867.8922	(97)
Space heating kWh	957.5830	786.0957	721.8402	479.4046	295.6481	0.0000	0.0000	0.0000	0.0000	429.4880	683.1256	942.8811	(98a)
Space heating requirement - total per year (kWh/year)												5296.0663	
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	957.5830	786.0957	721.8402	479.4046	295.6481	0.0000	0.0000	0.0000	0.0000	429.4880	683.1256	942.8811	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5296.0663	
Space heating per m2												61.9423	(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	957.5830	786.0957	721.8402	479.4046	295.6481	0.0000	0.0000	0.0000	0.0000	429.4880	683.1256	942.8811	(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)	436.6543	358.4568	329.1565	218.6067	134.8145	0.0000	0.0000	0.0000	0.0000	195.8450	311.5028	429.9504	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	(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	143.1910	126.6791	134.5900	118.2395	114.5799	103.1952	101.7553	105.7870	106.9489	119.3295	126.9921	141.6044	(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	30.7820	24.6945	22.2346	16.2900	12.5829	10.2803	11.4785	14.9202	19.3799	25.4275	28.7203	31.6375	(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												2414.9869	(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												1442.8919	(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)												248.4283	(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												4106.3072	(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	2414.9869	0.1539	371.6987 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1442.8919	0.1409	203.2942 (264)
Space and water heating			574.9929 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	248.4283	0.1443	35.8559 (268)
Total CO2, kg/year			610.8488 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.1400 (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	2414.9869	1.5698	3791.1092 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1442.8919	1.5210	2194.5997 (278)
Space and water heating			5985.7089 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	248.4283	1.5338	381.0477 (282)
Total Primary energy kWh/year			6366.7566 (286)
Dwelling Primary energy Rate (DPER)			74.4600 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	85.5000 (1b)	x 2.8000 (2b)	= 239.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 239.4000 (5)

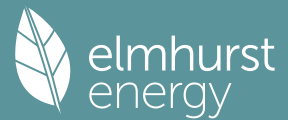
2. Ventilation rate

	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) = 0.1253 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3753 (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) = 0.3190 (21)
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	0.4067 0.3988 0.3908 0.3509 0.3429 0.3031 0.3031 0.2951 0.3190 0.3429 0.3589 0.3748 (22b)
Effective ac	0.5827 0.5795 0.5764 0.5616 0.5588 0.5459 0.5459 0.5435 0.5509 0.5588 0.5644 0.5703 (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)			10.9100	1.1450	12.4924		(27)
Floor Over Commercial			85.5000	0.1300	11.1150		(28b)
Existing Ext Wall	34.7200	6.5900	28.1300	0.1800	5.0634		(29a)
Wall to Communal Stairs	28.0000		28.0000	0.1800	5.0400		(29a)
New Ext Wall	26.0400	6.2100	19.8300	0.1800	3.5694		(29a)
Flat Roof	5.3000		5.3000	0.1100	0.5830		(30)
Total net area of external elements Aum(A, m2)			179.5600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		39.7532		(33)
Party Wall			43.4000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							132.8949 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							8.9780 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	48.7312 (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	46.0361	45.7824	45.5336	44.3653	44.1467	43.1291	43.1291	42.9407	43.5211	44.1467	44.5889	45.0512	(38)
Heat transfer coeff	94.7673	94.5135	94.2648	93.0965	92.8779	91.8603	91.8603	91.6718	92.2522	92.8779	93.3201	93.7824	(39)
Average = Sum(39)m / 12 =												93.0954	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1084	1.1054	1.1025	1.0888	1.0863	1.0744	1.0744	1.0722	1.0790	1.0863	1.0915	1.0969	(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													2.5590 (42)
Hot water usage for mixer showers	67.1255	66.1168	64.6468	61.8343	59.7587	57.4440	56.1284	57.5872	59.1864	61.6716	64.5446	66.8683	(42a)
Hot water usage for baths	28.9894	28.5589	27.9526	26.8347	25.9977	25.0695	24.5682	25.1702	25.8257	26.8189	27.9598	28.8914	(42b)
Hot water usage for other uses	40.8366	39.3516	37.8666	36.3817	34.8967	33.4117	33.4117	34.8967	36.3817	37.8666	39.3516	40.8366	(42c)
Average daily hot water use (litres/day)												125.8894	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	136.9515	134.0272	130.4660	125.0506	120.6531	115.9253	114.1083	117.6541	121.3938	126.3571	131.8559	136.5963	(44)
Energy content (annual)	216.8977	190.8530	200.5214	171.1881	162.4222	142.5436	138.0041	145.6804	149.6907	171.4654	187.8529	213.8768	(45)
Distribution loss (46)m = 0.15 x (45)m												2090.9963	
Water storage loss:	32.5347	28.6279	30.0782	25.6782	24.3633	21.3815	20.7006	21.8521	22.4536	25.7198	28.1779	32.0815	(46)
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	268.6443	237.5918	252.2680	221.2654	214.1688	192.6210	189.7507	197.4270	199.7680	223.2120	237.9303	265.6234	(62)
WWHRS	-30.6870	-27.1398	-28.4193	-23.5323	-21.9312	-18.7667	-17.5908	-18.7060	-19.4168	-22.8902	-25.9318	-30.1187	(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	237.9573	210.4520	223.8487	197.7332	192.2376	173.8543	172.1599	178.7209	180.3512	200.3218	211.9985	235.5047	(64)
12Total per year (kWh/year)												2415.1400	(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	113.5157	100.8497	108.0706	96.9819	95.4027	87.4576	87.2836	89.8360	89.8340	98.4095	102.5230	112.5113	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3277	140.9699	127.3277	131.5719	127.3277	131.5719	127.3277	127.3277	131.5719	127.3277	131.5719	127.3277	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	230.5513	232.9437	226.9149	214.0803	197.8790	182.6521	172.4796	170.0872	176.1159	188.9505	205.1518	220.3787	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	(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)	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	(71)
Water heating gains (Table 5)	152.5749	150.0740	145.2562	134.6971	128.2294	121.4689	117.3167	120.7473	124.7695	132.2709	142.3930	151.2249	(72)
Total internal gains	574.8387	588.3723	563.8836	544.7342	517.8209	497.0778	478.5087	479.5469	493.8421	512.9338	543.5015	563.3161	(73)

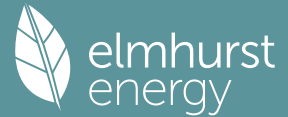
6. Solar gains

[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												5.1300	36.7938		0.6300		0.7000		0.7700		57.6852 (77)		
Northwest												5.7800	11.2829		0.6300		0.7000		0.7700		19.9307 (81)		
Solar gains	77.6158	138.8287	207.5358	286.6209	347.9419	357.2593	339.5115	291.9542	234.6381	158.1764	94.1715	65.6429 (83)											
Total gains	652.4545	727.2010	771.4194	831.3551	865.7628	854.3370	818.0202	771.5011	728.4802	671.1103	637.6730	628.9589 (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	33.3053	33.3947	33.4828	33.9030	33.9828	34.3593	34.3593	34.4299	34.2133	33.9828	33.8218	33.6551	
alpha	3.2204	3.2263	3.2322	3.2602	3.2655	3.2906	3.2906	3.2953	3.2809	3.2655	3.2548	3.2437	
util living area													

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	0.9653	0.9496	0.9247	0.8659	0.7647	0.6096	0.4683	0.5100	0.7123	0.8821	0.9470	0.9688 (86)
MIT	19.0798	19.3235	19.6808	20.1759	20.5908	20.8634	20.9570	20.9425	20.7609	20.2415	19.5959	19.0462 (87)
Th 2	19.9940	19.9964	19.9988	20.0100	20.0120	20.0218	20.0218	20.0236	20.0180	20.0120	20.0078	20.0034 (88)
util rest of house												
	0.9592	0.9408	0.9112	0.8411	0.7200	0.5373	0.3739	0.4149	0.6466	0.8551	0.9364	0.9633 (89)
MIT 2	17.7663	18.0743	18.5234	19.1384	19.6250	19.9199	19.9997	19.9920	19.8227	19.2304	18.4291	17.7299 (90)
Living area fraction										fLA = Living area / (4) =		0.3439 (91)
MIT	18.2180	18.5038	18.9214	19.4952	19.9571	20.2443	20.3289	20.3188	20.1453	19.5781	18.8303	18.1825 (92)
Temperature adjustment												0.0000
adjusted MIT	18.2180	18.5038	18.9214	19.4952	19.9571	20.2443	20.3289	20.3188	20.1453	19.5781	18.8303	18.1825 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9448	0.9241	0.8932	0.8260	0.7172	0.5546	0.4045	0.4448	0.6559	0.8410	0.9201	0.9498	(94)
Useful gains	616.4319	671.9963	689.0156	686.7170	620.9454	473.8453	330.9081	343.1788	477.8186	564.3797	586.7052	597.3669	(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	1318.9672	1285.7455	1170.8987	986.3744	766.9023	518.4880	342.5368	359.2469	557.6934	833.8643	1094.6726	1311.3131	(97)
Space heating kWh	522.6863	412.4394	358.5211	215.7533	108.5920	0.0000	0.0000	0.0000	0.0000	200.4965	365.7365	531.1759	(98a)
Space heating requirement - total per year (kWh/year)												2715.4010	
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	522.6863	412.4394	358.5211	215.7533	108.5920	0.0000	0.0000	0.0000	0.0000	200.4965	365.7365	531.1759	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2715.4010	
Space heating per m2										(98c) / (4) =		31.7591	(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	522.6863	412.4394	358.5211	215.7533	108.5920	0.0000	0.0000	0.0000	0.0000	200.4965	365.7365	531.1759	(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)	566.2906	446.8466	388.4302	233.7523	117.6511	0.0000	0.0000	0.0000	0.0000	217.2227	396.2476	575.4886	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	237.9573	210.4520	223.8487	197.7332	192.2376	173.8543	172.1599	178.7209	180.3512	200.3218	211.9985	235.5047	(64)
Efficiency of water heater (217)m	85.7737	85.5405	85.1104	84.2558	82.8304	79.8000	79.8000	79.8000	79.8000	84.0617	85.2711	85.8266	(216)
Fuel for water heating, kWh/month	277.4245	246.0262	263.0098	234.6820	232.0858	217.8625	215.7392	223.9611	226.0041	238.3032	248.6171	274.3958	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	26.4562	21.2241	19.1100	14.0008	10.8146	8.8356	9.8654	12.8235	16.6564	21.8541	24.6842	27.1915	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-65.4283	-85.6904	-114.5068	-119.3975	-121.3896	-110.7725	-109.3797	-106.7220	-101.1813	-93.2952	-69.5555	-57.3691	(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	-59.7606	-122.1640	-236.5896	-346.7510	-450.5494	-449.8794	-444.5652	-379.9253	-283.2767	-171.6416	-78.7320	-47.5292	(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												2941.9296	(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												2898.1112	(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)												213.5165	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-4226.0517	(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												1913.5056	(238)

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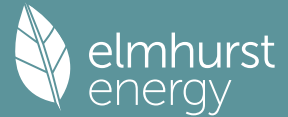
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2941.9296	0.2100	617.8052 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2898.1112	0.2100	608.6034 (264)
Space and water heating			1226.4086 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	213.5165	0.1443	30.8170 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1154.6879	0.1362	-157.2651
PV Unit electricity exported	-3071.3638	0.1266	-388.9374
Total			-546.2025 (269)
Total CO2, kg/year			722.9524 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.4600 (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	2941.9296	1.1300	3324.3805 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2898.1112	1.1300	3274.8657 (278)
Space and water heating			6599.2461 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	213.5165	1.5338	327.4987 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1154.6879	1.5034	-1736.0140
PV Unit electricity exported	-3071.3638	0.4649	-1427.7675
Total			-3163.7815 (283)
Total Primary energy kWh/year			3893.0642 (286)
Target Primary Energy Rate (TPER)			45.5300 (287)

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Property Reference	Flat 1A				Issued on Date	01/02/2024
Assessment Reference	Be Lean		Prop Type Ref	Conversion		
Property						
SAP Rating	70 C	DER	7.14	TER	8.46	
Environmental	94 A	% DER < TER				15.60
CO ₂ Emissions (t/year)	0.54	DFEE	71.32	TFEE	38.13	
Compliance Check	See BREL	% DFEE < TFEE				-87.05
% DPER < TPER	-63.55	DPER	74.46	TPER	45.53	
Assessor Details	Mr. Matthew Ray				Assessor ID	T806-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	85.5000 (1b)	2.8000 (2b)	239.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.5000		239.4000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	239.4000 (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) = 0.1253 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8753 (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) = 0.7440 (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	0.9486	0.9300	0.9114	0.8184	0.7998	0.7068	0.7068	0.6882	0.7440	0.7998	0.8370	0.8742 (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	0.9499	0.9325	0.9153	0.8349	0.8199	0.7498	0.7498	0.7368	0.7768	0.8199	0.8503	0.8821 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			6.5900	1.1450	7.5458		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.5000	0.2500	21.3750	20.0000	1710.0000 (28b)
Existing Ext Wall	34.7200	6.5900	28.1300	0.1800	5.0634	150.0000	4219.5000 (29a)
Wall to Communal Stairs	28.0000		28.0000	0.1600	4.4800	9.0000	252.0000 (29a)
New Ext Wall	26.0400	6.2100	19.8300	0.1800	3.5694	9.0000	178.4700 (29a)
Flat Roof	5.3000		5.3000	0.1400	0.7420	9.0000	47.7000 (30)
Total net area of external elements Aum(A, m ²)			179.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.6122		(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Ceiling			80.2000			30.0000	2406.0000 (32b)
Internal Wall			186.7600			9.0000	1680.8400 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11362.5100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							132.8949 (35)
Thermal bridges (Default value 0.200 * total exposed area)							35.9120 (36)
Point Thermal bridges						(36a) =	0.0000

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Total fabric heat loss (33) + (36) + (36a) = 85.5242 (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	75.0472	73.6669	72.3139	65.9591	64.7701	59.2352	59.2352	58.2103	61.3672	64.7701	67.1754	69.6900 (38)
Heat transfer coeff	160.5714	159.1911	157.8381	151.4832	150.2943	144.7594	144.7594	143.7344	146.8913	150.2943	152.6996	155.2142 (39)
Average = Sum(39)m / 12 =												151.4776

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.8780	1.8619	1.8461	1.7717	1.7578	1.6931	1.6931	1.6811	1.7180	1.7578	1.7860	1.8154 (40)
HLP (average)												1.7717
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5590 (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 28.9894 28.5589 27.9526 26.8347 25.9977 25.0695 24.5682 25.1702 25.8257 26.8189 27.9598 28.8914 (42b)

Hot water usage for other uses 40.8366 39.3516 37.8666 36.3817 34.8967 33.4117 33.4117 34.8967 36.3817 37.8666 39.3516 40.8366 (42c)

Average daily hot water use (litres/day) 64.0019 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	69.8260	67.9105	65.8192	63.2164	60.8944	58.4812	57.9799	60.0669	62.2074	64.6855	67.3114	69.7280 (44)
Energy conte	110.5873	96.7036	101.1617	86.5401	81.9755	71.9095	70.1217	74.3754	76.7079	87.7776	95.8974	109.1771 (45)
Energy content (annual)												1062.9348
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month												
WWHRS	93.9992	82.1981	85.9874	73.5591	69.6792	61.1231	59.6034	63.2191	65.2017	74.6110	81.5128	92.8006 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	93.9992	82.1981	85.9874	73.5591	69.6792	61.1231	59.6034	63.2191	65.2017	74.6110	81.5128	92.8006 (64)
12Total per year (kWh/year)												903.4945 (64)
Electric shower(s)	53.7564	47.8974	52.3021	49.9112	50.8478	48.5039	50.1207	50.8478	49.9112	52.3021	51.3186	53.7564 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												611.4754 (64a)
Heat gains from water heating, kWh/month	36.9389	32.5239	34.5724	30.8676	30.1317	27.4067	27.4310	28.5167	28.7782	31.7283	33.2078	36.6392 (65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.6613	136.9108	123.6613	127.7834	123.6613	127.7834	123.6613	123.6613	127.7834	123.6613	127.7834	123.6613 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	230.5513	232.9437	226.9149	214.0803	197.8790	182.6521	172.4796	170.0872	176.1159	188.9505	205.1518	220.3787 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594 (71)
Water heating gains (Table 5)	49.6490	48.3986	46.4682	42.8716	40.4997	38.0649	36.8696	38.3289	39.9698	42.6455	46.1220	49.2463 (72)
Total internal gains	465.2464	479.6378	458.4293	446.1201	423.4248	409.8852	394.3953	393.4622	405.2539	416.6421	440.4419	454.6711 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	g or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W					
Southeast	0.8100	36.7938	0.6300	0.8000	0.7700	10.4094 (77)						
Northwest	5.7800	11.2829	0.6300	0.8000	0.7700	22.7779 (81)						
Southeast	4.3200	36.7938	0.6300	0.8000	0.7700	55.5166 (77)						
Solar gains	88.7038	158.6613	237.1838	327.5668	397.6479	408.2963	388.0131	333.6619	268.1578	180.7731	107.6246	75.0204 (83)
Total gains	553.9502	638.2991	695.6130	773.6869	821.0727	818.1815	782.4085	727.1241	673.4117	597.4152	548.0665	529.6916 (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	19.6564	19.8268	19.9968	20.8357	21.0005	21.8034	21.8034	21.9589	21.4870	21.0005	20.6697	20.3348
alpha	2.3104	2.3218	2.3331	2.3890	2.4000	2.4536	2.4536	2.4639	2.4325	2.4000	2.3780	2.3557
util living area	0.9791	0.9699	0.9559	0.9222	0.8624	0.7531	0.6344	0.6768	0.8354	0.9361	0.9700	0.9813 (86)

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MIT	17.4817	17.7905	18.3089	19.1108	19.8322	20.4661	20.7581	20.7082	20.2288	19.3002	18.3246	17.5139 (87)
Th 2	19.4159	19.4270	19.4379	19.4899	19.4997	19.5458	19.5458	19.5544	19.5279	19.4997	19.4798	19.4593 (88)
util rest of house												
	0.9744	0.9630	0.9450	0.9010	0.8184	0.6617	0.4812	0.5325	0.7658	0.9145	0.9620	0.9771 (89)
MIT 2	16.3116	16.6237	17.1429	17.9590	18.6526	19.2454	19.4599	19.4402	19.0463	18.1599	17.1874	16.3688 (90)
Living area fraction									fLA = Living area / (4) =			0.3439 (91)
MIT	16.7140	17.0249	17.5439	18.3551	19.0582	19.6651	19.9063	19.8762	19.4529	18.5520	17.5785	16.7625 (92)
Temperature adjustment												0.0000
adjusted MIT	16.7140	17.0249	17.5439	18.3551	19.0582	19.6651	19.9063	19.8762	19.4529	18.5520	17.5785	16.7625 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9620	0.9474	0.9261	0.8795	0.8021	0.6706	0.5247	0.5699	0.7613	0.8954	0.9471	0.9658	(94)
Useful gains	532.8868	604.7251	644.1871	680.4287	658.5525	548.6452	410.4957	414.3860	512.6659	534.9280	519.0910	511.5528	(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													
	1993.3276	1930.1757	1743.1429	1432.2852	1105.8920	733.2273	478.6204	499.6469	786.2983	1195.1371	1600.0572	1949.8822	(97)
Space heating kWh													
	1086.5680	890.7028	817.6231	541.3366	332.8206	0.0000	0.0000	0.0000	0.0000	491.1955	778.2957	1070.1170	(98a)
Space heating requirement - total per year (kWh/year)												6008.6594	
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													
	1086.5680	890.7028	817.6231	541.3366	332.8206	0.0000	0.0000	0.0000	0.0000	491.1955	778.2957	1070.1170	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6008.6594	
Space heating per m2													
											(98c) / (4) =	70.2767	(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	1360.7383	1071.2195	1092.3816	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5558	0.6307	0.5952	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	756.2468	675.6165	650.2053	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	902.8220	863.6076	801.4742	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	105.5341	139.8654	112.5441	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	26.3835	34.9663	28.1360	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement													89.4859 (107)
Energy for space heating													70.2767 (99)
Energy for space cooling													1.0466 (108)
Total													71.3233 (109)
Fabric Energy Efficiency (DFEE)													71.3 (109)

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

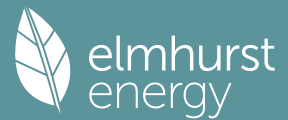
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	85.5000 (1b)	x 2.8000 (2b)	= 239.4000 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.5000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	239.4000 (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) =	
Pressure test	30.0000 / (5) =	0.1253 (8)
Pressure Test Method	Blower Door	
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3753 (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) =	0.3190 (21)

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	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 infiltr rate	0.4067	0.3988	0.3908	0.3509	0.3429	0.3031	0.3031	0.2951	0.3190	0.3429	0.3589	0.3748	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5827	0.5795	0.5764	0.5616	0.5588	0.5459	0.5459	0.5435	0.5509	0.5588	0.5644	0.5703	(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)			10.9100	1.1450	12.4924			(27)
Floor Over Commercial			85.5000	0.1300	11.1150			(28b)
Existing Ext Wall	34.7200	6.5900	28.1300	0.1800	5.0634			(29a)
Wall to Communal Stairs	28.0000		28.0000	0.1800	5.0400			(29a)
New Ext Wall	26.0400	6.2100	19.8300	0.1800	3.5694			(29a)
Flat Roof	5.3000		5.3000	0.1100	0.5830			(30)
Total net area of external elements Aum(A, m2)			179.5600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	39.7532			(33)
Party Wall			43.4000	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								132.8949 (35)
Thermal bridges (User defined value 0.050 * total exposed area)								8.9780 (36)
Point Thermal bridges								(36a) = 0.0000
Total fabric heat loss								(33) + (36) + (36a) = 48.7312 (37)

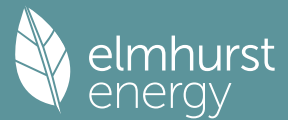
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5590 (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	(42a)
Hot water usage for baths												
	28.9894	28.5589	27.9526	26.8347	25.9977	25.0695	24.5682	25.1702	25.8257	26.8189	27.9598	28.8914 (42b)
Hot water usage for other uses												
	40.8366	39.3516	37.8666	36.3817	34.8967	33.4117	33.4117	34.8967	36.3817	37.8666	39.3516	40.8366 (42c)
Average daily hot water use (litres/day)												64.0019 (43)
Daily hot water use												
	69.8260	67.9105	65.8192	63.2164	60.8944	58.4812	57.9799	60.0669	62.2074	64.6855	67.3114	69.7280 (44)
Energy conte	110.5873	96.7036	101.1617	86.5401	81.9755	71.9095	70.1217	74.3754	76.7079	87.7776	95.8974	109.1771 (45)
Energy content (annual)										Total = Sum(45)m =		1062.9348
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												
	93.9992	82.1981	85.9874	73.5591	69.6792	61.1231	59.6034	63.2191	65.2017	74.6110	81.5128	92.8006 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	93.9992	82.1981	85.9874	73.5591	69.6792	61.1231	59.6034	63.2191	65.2017	74.6110	81.5128	92.8006 (64)
Total per year (kWh/year) = Sum(64)m =												903.4945 (64)
12Total per year (kWh/year)												903 (64)
Electric shower(s)												
	53.7564	47.8974	52.3021	49.9112	50.8478	48.5039	50.1207	50.8478	49.9112	52.3021	51.3186	53.7564 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												611.4754 (64a)
Heat gains from water heating, kWh/month												
	36.9389	32.5239	34.5724	30.8676	30.1317	27.4067	27.4310	28.5167	28.7782	31.7283	33.2078	36.6392 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3277	140.9699	127.3277	131.5719	127.3277	131.5719	127.3277	127.3277	131.5719	127.3277	131.5719	127.3277 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	230.5513	232.9437	226.9149	214.0803	197.8790	182.6521	172.4796	170.0872	176.1159	188.9505	205.1518	220.3787 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594 (71)
Water heating gains (Table 5)	49.6490	48.3986	46.4682	42.8716	40.4997	38.0649	36.8696	38.3289	39.9698	42.6455	46.1220	49.2463 (72)
Total internal gains	468.9128	483.6970	462.0956	449.9087	427.0912	413.6737	398.0617	397.1285	409.0424	420.3085	444.2305	458.3375 (73)

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6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Southeast				5.1300	36.7938	0.6300	0.7000	0.7700	57.6852 (77)
Northwest				5.7800	11.2829	0.6300	0.7000	0.7700	19.9307 (81)
Solar gains	77.6158	138.8287	207.5358	286.6209	347.9419	357.2593	339.5115	291.9542	234.6381
Total gains	546.5286	622.5256	669.6314	736.5296	775.0330	770.9330	737.5732	689.0827	643.6805
									158.1764
									94.1715
									65.6429 (83)
									523.9803 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	33.3053	33.3947	33.4828	33.9030	33.9828	34.3593	34.3593	34.4299	34.2133	33.9828	33.8218	33.6551
alpha	3.2204	3.2263	3.2322	3.2602	3.2655	3.2906	3.2906	3.2953	3.2809	3.2655	3.2548	3.2437
util living area	0.9784	0.9662	0.9466	0.8964	0.8052	0.6546	0.5110	0.5584	0.7621	0.9153	0.9658	0.9810 (86)
MIT	18.8882	19.1439	19.5202	20.0550	20.5138	20.8306	20.9444	20.9248	20.7032	20.1147	19.4259	18.8535 (87)
Th 2	19.9940	19.9964	19.9988	20.0100	20.0120	20.0218	20.0218	20.0236	20.0180	20.0120	20.0078	20.0034 (88)
util rest of house	0.9745	0.9600	0.9363	0.8755	0.7641	0.5819	0.4110	0.4585	0.6999	0.8939	0.9584	0.9776 (89)
MIT 2	18.0699	18.3239	18.6957	19.2206	19.6473	19.9211	19.9990	19.9905	19.8240	19.2878	18.6133	18.0422 (90)
Living area fraction									FLA = Living area / (4) =			0.3439 (91)
MIT	18.3513	18.6058	18.9792	19.5075	19.9452	20.2339	20.3241	20.3118	20.1263	19.5721	18.8927	18.3212 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3513	18.6058	18.9792	19.5075	19.9452	20.2339	20.3241	20.3118	20.1263	19.5721	18.8927	18.3212 (93)

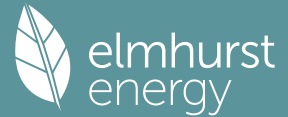
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9657	0.9488	0.9232	0.8630	0.7610	0.5987	0.4432	0.4895	0.7075	0.8823	0.9476	0.9695 (94)
Useful gains	527.7836	590.6825	618.2128	635.6444	589.7645	461.5742	326.8955	337.3277	455.3906	510.4236	510.2166	508.0209 (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	1331.6038	1295.3867	1176.3514	987.5207	765.8000	517.5282	342.0980	358.6006	555.9416	833.3122	1100.4962	1324.3169 (97)
Space heating kWh	598.0422	473.5612	415.2551	253.3510	130.9704	0.0000	0.0000	0.0000	0.0000	240.2292	425.0013	607.3243 (98a)
Space heating requirement - total per year (kWh/year)												3143.7346
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	598.0422	473.5612	415.2551	253.3510	130.9704	0.0000	0.0000	0.0000	0.0000	240.2292	425.0013	607.3243 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3143.7346
Space heating per m2										(98c) / (4) =		36.7688 (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	863.4866	679.7661	696.7060	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7579	0.8281	0.7961	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	654.4099	562.8856	554.6795	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	843.4891	807.2640	753.1754	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	136.1370	181.8175	147.6810	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	34.0342	45.4544	36.9203	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												116.4089 (107)
Energy for space heating												36.7688 (99)
Energy for space cooling												1.3615 (108)
Total												38.1303 (109)
Fabric Energy Efficiency (TFEE)												38.1 (109)

Full SAP Calculation Printout



Property Reference	Flat 1A				Issued on Date	01/02/2024
Assessment Reference	Be Lean		Prop Type Ref	Conversion		
Property						
SAP Rating	70 C	DER	7.14	TER	8.46	
Environmental	94 A	% DER < TER				15.60
CO ₂ Emissions (t/year)	0.54	DFEE	71.32	TFEE	38.13	
Compliance Check	See BREL	% DFEE < TFEE				-87.05
% DPER < TPER	-63.55	DPER	74.46	TPER	45.53	
Assessor Details	Mr. Matthew Ray				Assessor ID	T806-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	85.5000 (1b)	2.8000 (2b)	239.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.5000		239.4000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	239.4000 (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) = 0.1253 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8753 (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) = 0.7440 (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	0.9486	0.9300	0.9114	0.8184	0.7998	0.7068	0.7068	0.6882	0.7440	0.7998	0.8370	0.8742 (22b)
Effective ac	0.9499	0.9325	0.9153	0.8349	0.8199	0.7498	0.7498	0.7368	0.7768	0.8199	0.8503	0.8821 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			6.5900	1.1450	7.5458		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.5000	0.2500	21.3750	20.0000	1710.0000 (28b)
Existing Ext Wall	34.7200	6.5900	28.1300	0.1800	5.0634	150.0000	4219.5000 (29a)
Wall to Communal Stairs	28.0000		28.0000	0.1600	4.4800	9.0000	252.0000 (29a)
New Ext Wall	26.0400	6.2100	19.8300	0.1800	3.5694	9.0000	178.4700 (29a)
Flat Roof	5.3000		5.3000	0.1400	0.7420	9.0000	47.7000 (30)
Total net area of external elements Aum(A, m ²)			179.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.6122		(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Ceiling			80.2000			20.0000	1604.0000 (32b)
Internal Wall			186.7600			9.0000	1680.8400 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	10560.5100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							123.5147 (35)
Thermal bridges (Default value 0.200 * total exposed area)							35.9120 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	85.5242 (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	75.0472	73.6669	72.3139	65.9591	64.7701	59.2352	59.2352	58.2103	61.3672	64.7701	67.1754	69.6900 (38)
Average = Sum(39)m / 12 =	160.5714	159.1911	157.8381	151.4832	150.2943	144.7594	144.7594	143.7344	146.8913	150.2943	152.6996	155.2142 (39)
												151.4776

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.8780	1.8619	1.8461	1.7717	1.7578	1.6931	1.6931	1.6811	1.7180	1.7578	1.7860	1.8154 (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	2.5590 (42)											
Hot water usage for mixer showers	67.1255	66.1168	64.6468	61.8343	59.7587	57.4440	56.1284	57.5872	59.1864	61.6716	64.5446	66.8683 (42a)
Hot water usage for baths	28.9894	28.5589	27.9526	26.8347	25.9977	25.0695	24.5682	25.1702	25.8257	26.8189	27.9598	28.8914 (42b)
Hot water usage for other uses	40.8366	39.3516	37.8666	36.3817	34.8967	33.4117	33.4117	34.8967	36.3817	37.8666	39.3516	40.8366 (42c)
Average daily hot water use (litres/day)	32.5347	28.6279	30.0782	25.6782	24.3633	21.3815	20.7006	21.8521	22.4536	25.7198	28.1779	32.0815 (46)
Daily hot water use	136.9515	134.0272	130.4660	125.0506	120.6531	115.9253	114.1083	117.6541	121.3938	126.3571	131.8559	136.5963 (44)
Energy conte	216.8977	190.8530	200.5214	171.1881	162.4222	142.5436	138.0041	145.6804	149.6907	171.4654	187.8529	213.8768 (45)
Energy content (annual)	Total = Sum(45)m = 2090.9963											
Distribution loss (46)m = 0.15 x (45)m	32.5347	28.6279	30.0782	25.6782	24.3633	21.3815	20.7006	21.8521	22.4536	25.7198	28.1779	32.0815 (46)
Water storage loss:												
Store volume	210.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.9400 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	1.0476 (55)											
Total storage loss	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756 (56)
If cylinder contains dedicated solar storage	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 2747.2663 (64)											
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000 (64a)											
Heat gains from water heating, kWh/month	116.7089	103.7338	111.2638	100.0720	98.5958	90.5478	90.4768	93.0291	92.9241	101.6027	105.6131	115.7044 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.6613	136.9108	123.6613	127.7834	123.6613	127.7834	123.6613	123.6613	127.7834	123.6613	127.7834	123.6613 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	230.5513	232.9437	226.9149	214.0803	197.8790	182.6521	172.4796	170.0872	176.1159	188.9505	205.1518	220.3787 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949 (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)	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594 (71)
Water heating gains (Table 5)	156.8668	154.3658	149.5481	138.9889	132.5212	125.7608	121.6085	125.0392	129.0613	136.5627	146.6849	155.5167 (72)
Total internal gains	575.4641	588.6050	564.5091	545.2374	518.4464	497.5810	479.1342	480.1724	494.3454	513.5593	544.0048	563.9416 (73)

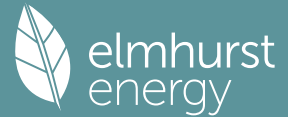
6. Solar gains

[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				0.8100	36.7938	0.6300		0.8000		0.7700		10.4094 (77)
Northwest				5.7800	11.2829	0.6300		0.8000		0.7700		22.7779 (81)
Southeast				4.3200	36.7938	0.6300		0.8000		0.7700		55.5166 (77)
Solar gains	88.7038	158.6613	237.1838	327.5668	397.6479	408.2963	388.0131	333.6619	268.1578	180.7731	107.6246	75.0204 (83)
Total gains	664.1680	747.2663	801.6928	872.8042	916.0942	905.8774	867.1474	813.8344	762.5032	694.3324	651.6294	638.9620 (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	18.2690	18.4274	18.5853	19.3650	19.5182	20.2645	20.2645	20.4090	19.9704	19.5182	19.2108	18.8995
alpha	2.2179	2.2285	2.2390	2.2910	2.3012	2.3510	2.3510	2.3606	2.3314	2.3012	2.2807	2.2600
util living area												

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	0.9656	0.9537	0.9358	0.8952	0.8267	0.7094	0.5880	0.6267	0.7917	0.9078	0.9521	0.9682 (86)
MIT	17.5085	17.8208	18.3462	19.1515	19.8703	20.4909	20.7721	20.7280	20.2696	19.3546	18.3692	17.5425 (87)
Th 2	19.4159	19.4270	19.4379	19.4899	19.4997	19.5458	19.5458	19.5544	19.5279	19.4997	19.4798	19.4593 (88)
util rest of house												
	0.9584	0.9439	0.9213	0.8693	0.7775	0.6156	0.4398	0.4850	0.7153	0.8798	0.9405	0.9617 (89)
MIT 2	15.4888	15.8873	16.5552	17.5833	18.4586	19.1815	19.4421	19.4189	18.9518	17.8550	16.6094	15.5487 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	16.1833	16.5521	17.1710	18.1225	18.9440	19.6317	19.8995	19.8690	19.4050	18.3706	17.2146	16.2343 (91)
Temperature adjustment												0.0000
adjusted MIT	16.1833	16.5521	17.1710	18.1225	18.9440	19.6317	19.8995	19.8690	19.4050	18.3706	17.2146	16.2343 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9351	0.9168	0.8907	0.8378	0.7547	0.6221	0.4804	0.5202	0.7074	0.8506	0.9142	0.9399	(94)
Useful gains	621.0420	685.1308	714.0785	731.2153	691.3613	563.5330	416.5512	423.3597	539.3854	590.6129	595.7043	600.5789	(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	1908.1159	1854.9160	1684.2939	1397.0550	1088.7378	728.3918	477.6281	498.6216	779.2524	1167.8818	1544.4899	1867.8922	(97)
Space heating kWh	957.5830	786.0957	721.8402	479.4046	295.6481	0.0000	0.0000	0.0000	0.0000	429.4880	683.1256	942.8811	(98a)
Space heating requirement - total per year (kWh/year)												5296.0663	
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	957.5830	786.0957	721.8402	479.4046	295.6481	0.0000	0.0000	0.0000	0.0000	429.4880	683.1256	942.8811	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5296.0663	
Space heating per m2											(98c) / (4) =	61.9423	(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	957.5830	786.0957	721.8402	479.4046	295.6481	0.0000	0.0000	0.0000	0.0000	429.4880	683.1256	942.8811	(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)	436.6543	358.4568	329.1565	218.6067	134.8145	0.0000	0.0000	0.0000	0.0000	195.8450	311.5028	429.9504	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	(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	143.1910	126.6791	134.5900	118.2395	114.5799	103.1952	101.7553	105.7870	106.9489	119.3295	126.9921	141.6044	(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	30.7820	24.6945	22.2346	16.2900	12.5829	10.2803	11.4785	14.9202	19.3799	25.4275	28.7203	31.6375	(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												2414.9869	(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												1442.8919	(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)												248.4283	(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												4106.3072	(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	2414.9869	0.1539	371.6987 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1442.8919	0.1409	203.2942 (264)
Space and water heating			574.9929 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	248.4283	0.1443	35.8559 (268)
Total CO2, kg/year			610.8488 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.1400 (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	2414.9869	1.5698	3791.1092 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1442.8919	1.5210	2194.5997 (278)
Space and water heating			5985.7089 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	248.4283	1.5338	381.0477 (282)
Total Primary energy kWh/year			6366.7566 (286)
Dwelling Primary energy Rate (DPER)			74.4600 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	85.5000 (1b)	x 2.8000 (2b)	= 239.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 239.4000 (5)

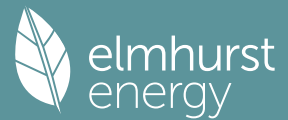
2. Ventilation rate

	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) = 0.1253 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3753 (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) = 0.3190 (21)
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	0.4067 0.3988 0.3908 0.3509 0.3429 0.3031 0.3031 0.2951 0.3190 0.3429 0.3589 0.3748 (22b)
Effective ac	0.5827 0.5795 0.5764 0.5616 0.5588 0.5459 0.5459 0.5435 0.5509 0.5588 0.5644 0.5703 (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)			10.9100	1.1450	12.4924		(27)
Floor Over Commercial			85.5000	0.1300	11.1150		(28b)
Existing Ext Wall	34.7200	6.5900	28.1300	0.1800	5.0634		(29a)
Wall to Communal Stairs	28.0000		28.0000	0.1800	5.0400		(29a)
New Ext Wall	26.0400	6.2100	19.8300	0.1800	3.5694		(29a)
Flat Roof	5.3000		5.3000	0.1100	0.5830		(30)
Total net area of external elements Aum(A, m2)			179.5600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		39.7532		(33)
Party Wall			43.4000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							132.8949 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							8.9780 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	48.7312 (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	46.0361	45.7824	45.5336	44.3653	44.1467	43.1291	43.1291	42.9407	43.5211	44.1467	44.5889	45.0512	(38)
Heat transfer coeff	94.7673	94.5135	94.2648	93.0965	92.8779	91.8603	91.8603	91.6718	92.2522	92.8779	93.3201	93.7824	(39)
Average = Sum(39)m / 12 =												93.0954	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1084	1.1054	1.1025	1.0888	1.0863	1.0744	1.0744	1.0722	1.0790	1.0863	1.0915	1.0969	(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													2.5590 (42)
Hot water usage for mixer showers	67.1255	66.1168	64.6468	61.8343	59.7587	57.4440	56.1284	57.5872	59.1864	61.6716	64.5446	66.8683	(42a)
Hot water usage for baths	28.9894	28.5589	27.9526	26.8347	25.9977	25.0695	24.5682	25.1702	25.8257	26.8189	27.9598	28.8914	(42b)
Hot water usage for other uses	40.8366	39.3516	37.8666	36.3817	34.8967	33.4117	33.4117	34.8967	36.3817	37.8666	39.3516	40.8366	(42c)
Average daily hot water use (litres/day)												125.8894	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	136.9515	134.0272	130.4660	125.0506	120.6531	115.9253	114.1083	117.6541	121.3938	126.3571	131.8559	136.5963	(44)
Energy content (annual)	216.8977	190.8530	200.5214	171.1881	162.4222	142.5436	138.0041	145.6804	149.6907	171.4654	187.8529	213.8768	(45)
Distribution loss (46)m = 0.15 x (45)m	32.5347	28.6279	30.0782	25.6782	24.3633	21.3815	20.7006	21.8521	22.4536	25.7198	28.1779	32.0815	(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	268.6443	237.5918	252.2680	221.2654	214.1688	192.6210	189.7507	197.4270	199.7680	223.2120	237.9303	265.6234	(62)
WWHRS	-30.6870	-27.1398	-28.4193	-23.5323	-21.9312	-18.7667	-17.5908	-18.7060	-19.4168	-22.8902	-25.9318	-30.1187	(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	237.9573	210.4520	223.8487	197.7332	192.2376	173.8543	172.1599	178.7209	180.3512	200.3218	211.9985	235.5047	(64)
12Total per year (kWh/year)												2415.1400	(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	113.5157	100.8497	108.0706	96.9819	95.4027	87.4576	87.2836	89.8360	89.8340	98.4095	102.5230	112.5113	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	127.9493	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3277	140.9699	127.3277	131.5719	127.3277	131.5719	127.3277	127.3277	131.5719	127.3277	131.5719	127.3277	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	230.5513	232.9437	226.9149	214.0803	197.8790	182.6521	172.4796	170.0872	176.1159	188.9505	205.1518	220.3787	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	35.7949	(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)	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	(71)
Water heating gains (Table 5)	152.5749	150.0740	145.2562	134.6971	128.2294	121.4689	117.3167	120.7473	124.7695	132.2709	142.3930	151.2249	(72)
Total internal gains	574.8387	588.3723	563.8836	544.7342	517.8209	497.0778	478.5087	479.5469	493.8421	512.9338	543.5015	563.3161	(73)

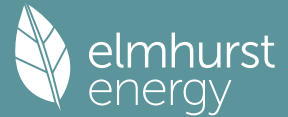
6. Solar gains

[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				5.1300	36.7938	0.6300	0.7000	0.7700	57.6852 (77)				
Northwest				5.7800	11.2829	0.6300	0.7000	0.7700	19.9307 (81)				
Solar gains	77.6158	138.8287	207.5358	286.6209	347.9419	357.2593	339.5115	291.9542	234.6381	158.1764	94.1715	65.6429	(83)
Total gains	652.4545	727.2010	771.4194	831.3551	865.7628	854.3370	818.0202	771.5011	728.4802	671.1103	637.6730	628.9589	(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	33.3053	33.3947	33.4828	33.9030	33.9828	34.3593	34.3593	34.4299	34.2133	33.9828	33.8218	33.6551	
alpha	3.2204	3.2263	3.2322	3.2602	3.2655	3.2906	3.2906	3.2953	3.2809	3.2655	3.2548	3.2437	
util living area													

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	0.9653	0.9496	0.9247	0.8659	0.7647	0.6096	0.4683	0.5100	0.7123	0.8821	0.9470	0.9688 (86)
MIT	19.0798	19.3235	19.6808	20.1759	20.5908	20.8634	20.9570	20.9425	20.7609	20.2415	19.5959	19.0462 (87)
Th 2	19.9940	19.9964	19.9988	20.0100	20.0120	20.0218	20.0218	20.0236	20.0180	20.0120	20.0078	20.0034 (88)
util rest of house												
	0.9592	0.9408	0.9112	0.8411	0.7200	0.5373	0.3739	0.4149	0.6466	0.8551	0.9364	0.9633 (89)
MIT 2	17.7663	18.0743	18.5234	19.1384	19.6250	19.9199	19.9997	19.9920	19.8227	19.2304	18.4291	17.7299 (90)
Living area fraction										fLA = Living area / (4) =		0.3439 (91)
MIT	18.2180	18.5038	18.9214	19.4952	19.9571	20.2443	20.3289	20.3188	20.1453	19.5781	18.8303	18.1825 (92)
Temperature adjustment												0.0000
adjusted MIT	18.2180	18.5038	18.9214	19.4952	19.9571	20.2443	20.3289	20.3188	20.1453	19.5781	18.8303	18.1825 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9448	0.9241	0.8932	0.8260	0.7172	0.5546	0.4045	0.4448	0.6559	0.8410	0.9201	0.9498	(94)
Useful gains	616.4319	671.9963	689.0156	686.7170	620.9454	473.8453	330.9081	343.1788	477.8186	564.3797	586.7052	597.3669	(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	1318.9672	1285.7455	1170.8987	986.3744	766.9023	518.4880	342.5368	359.2469	557.6934	833.8643	1094.6726	1311.3131	(97)
Space heating kWh	522.6863	412.4394	358.5211	215.7533	108.5920	0.0000	0.0000	0.0000	0.0000	200.4965	365.7365	531.1759	(98a)
Space heating requirement - total per year (kWh/year)												2715.4010	
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	522.6863	412.4394	358.5211	215.7533	108.5920	0.0000	0.0000	0.0000	0.0000	200.4965	365.7365	531.1759	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2715.4010	
Space heating per m2										(98c) / (4) =		31.7591	(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	522.6863	412.4394	358.5211	215.7533	108.5920	0.0000	0.0000	0.0000	0.0000	200.4965	365.7365	531.1759	(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)	566.2906	446.8466	388.4302	233.7523	117.6511	0.0000	0.0000	0.0000	0.0000	217.2227	396.2476	575.4886	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	237.9573	210.4520	223.8487	197.7332	192.2376	173.8543	172.1599	178.7209	180.3512	200.3218	211.9985	235.5047	(64)
Efficiency of water heater (217)m	85.7737	85.5405	85.1104	84.2558	82.8304	79.8000	79.8000	79.8000	79.8000	84.0617	85.2711	85.8266	(216)
Fuel for water heating, kWh/month	277.4245	246.0262	263.0098	234.6820	232.0858	217.8625	215.7392	223.9611	226.0041	238.3032	248.6171	274.3958	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	26.4562	21.2241	19.1100	14.0008	10.8146	8.8356	9.8654	12.8235	16.6564	21.8541	24.6842	27.1915	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-65.4283	-85.6904	-114.5068	-119.3975	-121.3896	-110.7725	-109.3797	-106.7220	-101.1813	-93.2952	-69.5555	-57.3691	(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	-59.7606	-122.1640	-236.5896	-346.7510	-450.5494	-449.8794	-444.5652	-379.9253	-283.2767	-171.6416	-78.7320	-47.5292	(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												2941.9296	(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												2898.1112	(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)												213.5165	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-4226.0517	(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												1913.5056	(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	2941.9296	0.2100	617.8052 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2898.1112	0.2100	608.6034 (264)
Space and water heating			1226.4086 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	213.5165	0.1443	30.8170 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1154.6879	0.1362	-157.2651
PV Unit electricity exported	-3071.3638	0.1266	-388.9374
Total			-546.2025 (269)
Total CO2, kg/year			722.9524 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.4600 (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	2941.9296	1.1300	3324.3805 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2898.1112	1.1300	3274.8657 (278)
Space and water heating			6599.2461 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	213.5165	1.5338	327.4987 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1154.6879	1.5034	-1736.0140
PV Unit electricity exported	-3071.3638	0.4649	-1427.7675
Total			-3163.7815 (283)
Total Primary energy kWh/year			3893.0642 (286)
Target Primary Energy Rate (TPER)			45.5300 (287)

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Property Reference	Flat 1A			Issued on Date	01/02/2024	
Assessment Reference	Be Lean	Prop Type Ref	Conversion			
Property						
SAP Rating	70 C	DER	7.14	TER	8.46	
Environmental	94 A	% DER < TER				15.60
CO ₂ Emissions (t/year)	0.54	DFEE	71.32	TFEE	38.13	
Compliance Check	See BREL	% DFEE < TFEE				-87.05
% DPER < TPER	-63.55	DPER	74.46	TPER	45.53	
Assessor Details	Mr. Matthew Ray			Assessor ID	T806-0001	
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	85.5000 (1b)	2.8000 (2b)	239.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.5000		239.4000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	239.4000 (5)

2. Ventilation rate

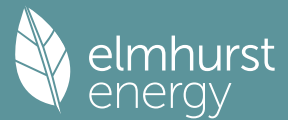
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1253 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8753 (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) = 0.7440 (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	0.9486	0.9300	0.9114	0.8184	0.7998	0.7068	0.7068	0.6882	0.7440	0.7998	0.8370	0.8742 (22b)
Effective ac	0.9499	0.9325	0.9153	0.8349	0.8199	0.7498	0.7498	0.7368	0.7768	0.8199	0.8503	0.8821 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			6.5900	1.1450	7.5458		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.5000	0.2500	21.3750	20.0000	1710.0000 (28b)
Existing Ext Wall	34.7200	6.5900	28.1300	0.1800	5.0634	150.0000	4219.5000 (29a)
Wall to Communal Stairs	28.0000		28.0000	0.1600	4.4800	9.0000	252.0000 (29a)
New Ext Wall	26.0400	6.2100	19.8300	0.1800	3.5694	9.0000	178.4700 (29a)
Flat Roof	5.3000		5.3000	0.1400	0.7420	9.0000	47.7000 (30)
Total net area of external elements Aum(A, m ²)			179.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.6122		(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Ceiling			80.2000			30.0000	2406.0000 (32b)
Internal Wall			186.7600			9.0000	1680.8400 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	11362.5100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							132.8949 (35)
Thermal bridges (Default value 0.200 * total exposed area)							35.9120 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	85.5242 (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	75.0472	73.6669	72.3139	65.9591	64.7701	59.2352	59.2352	58.2103	61.3672	64.7701	67.1754	69.6900	(38)
Heat transfer coeff	160.5714	159.1911	157.8381	151.4832	150.2943	144.7594	144.7594	143.7344	146.8913	150.2943	152.6996	155.2142	(39)
Average = Sum(39)m / 12 =												151.4776	
HLP	1.8780	1.8619	1.8461	1.7717	1.7578	1.6931	1.6931	1.6811	1.7180	1.7578	1.7860	1.8154	(40)
HLP (average)												1.7717	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5590 (42)
Hot water usage for mixer showers													
67.1255	66.1168	64.6468	61.8343	59.7587	57.4440	56.1284	57.5872	59.1864	61.6716	64.5446	66.8683	66.8683	(42a)
Hot water usage for baths													
28.9894	28.5589	27.9526	26.8347	25.9977	25.0695	24.5682	25.1702	25.8257	26.8189	27.9598	28.8914	28.8914	(42b)
Hot water usage for other uses													
40.8366	39.3516	37.8666	36.3817	34.8967	33.4117	33.4117	34.8967	36.3817	37.8666	39.3516	40.8366	40.8366	(42c)
Average daily hot water use (litres/day)												125.8894	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.9515	134.0272	130.4660	125.0506	120.6531	115.9253	114.1083	117.6541	121.3938	126.3571	131.8559	136.5963	(44)
Energy conte	216.8977	190.8530	200.5214	171.1881	162.4222	142.5436	138.0041	145.6804	149.6907	171.4654	187.8529	213.8768	(45)
Energy content (annual)										Total = Sum(45)m =		2090.9963	
Distribution loss (46)m = 0.15 x (45)m													
32.5347	28.6279	30.0782	25.6782	24.3633	21.3815	20.7006	21.8521	22.4536	25.7198	28.1779	32.0815	32.0815	(46)
Water storage loss:													
Store volume												210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.9400	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												1.0476	(55)
Total storage loss													
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	(56)
If cylinder contains dedicated solar storage													
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	269.6148	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	269.6148	(64)
Total per year (kWh/year) = Sum(64)m =												2747.2663	(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
116.7089	103.7338	111.2638	100.0720	98.5958	90.5478	90.4768	93.0291	92.9241	101.6027	105.6131	115.7044	115.7044	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
35.1676	31.2356	25.4025	19.2313	14.3756	12.1365	13.1139	17.0460	22.8791	29.0502	33.9059	36.1450	36.1450	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
344.1064	347.6771	338.6789	319.5229	295.3419	272.6151	257.4322	253.8614	262.8596	282.0156	306.1967	328.9235	328.9235	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	(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)													
-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	(71)
Water heating gains (Table 5)													
156.8668	154.3658	149.5481	138.9889	132.5212	125.7608	121.6085	125.0392	129.0613	136.5627	146.6849	155.5167	155.5167	(72)
Total internal gains													
643.2334	640.3711	620.7221	584.8358	549.3313	514.6050	496.2473	500.0392	518.8926	554.7212	593.8801	627.6778	627.6778	(73)

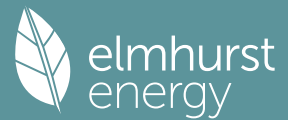
6. Solar gains

[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				0.8100	36.7938	0.6300	0.8000			0.7700		10.4094 (77)
Northwest				5.7800	11.2829	0.6300	0.8000			0.7700		22.7779 (81)
Southeast				4.3200	36.7938	0.6300	0.8000			0.7700		55.5166 (77)
Solar gains	88.7038	158.6613	237.1838	327.5668	397.6479	408.2963	388.0131	333.6619	268.1578	180.7731	107.6246	75.0204 (83)
Total gains	731.9372	799.0324	857.9058	912.4026	946.9792	922.9013	884.2604	833.7011	787.0504	735.4943	701.5047	702.6983 (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	19.6564	19.8268	19.9968	20.8357	21.0005	21.8034	21.8034	21.9589	21.4870	21.0005	20.6697	20.3348
alpha	2.3104	2.3218	2.3331	2.3890	2.4000	2.4536	2.4536	2.4639	2.4325	2.4000	2.3780	2.3557
util living area												
	0.9633	0.9530	0.9341	0.8953	0.8274	0.7118	0.5874	0.6252	0.7918	0.9061	0.9507	0.9663 (86)

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MIT	17.7493	18.0256	18.5351	19.2853	19.9599	20.5362	20.7978	20.7584	20.3325	19.4816	18.5521	17.7798 (87)
Th 2	19.4159	19.4270	19.4379	19.4899	19.4997	19.5458	19.5458	19.5544	19.5279	19.4997	19.4798	19.4593 (88)
util rest of house	0.9554	0.9428	0.9188	0.8686	0.7768	0.6160	0.4369	0.4809	0.7132	0.8767	0.9383	0.9591 (89)
MIT 2	15.7694	16.1236	16.7714	17.7322	18.5510	19.2202	19.4572	19.4382	19.0102	17.9944	16.8209	15.8287 (90)
Living area fraction									fLA = Living area / (4) =			0.3439 (91)
MIT	16.4502	16.7776	17.3778	18.2662	19.0354	19.6727	19.9182	19.8922	19.4649	18.5058	17.4162	16.4996 (92)
Temperature adjustment												0.0000
adjusted MIT	16.4502	16.7776	17.3778	18.2662	19.0354	19.6727	19.9182	19.8922	19.4649	18.5058	17.4162	16.4996 (93)

8. Space heating requirement

Utilisation	Jan 0.9325	Feb 0.9171	Mar 0.8900	Apr 0.8398	May 0.7574	Jun 0.6257	Jul 0.4800	Aug 0.5191	Sep 0.7091	Oct 0.8502	Nov 0.9133	Dec 0.9378 (94)
Useful gains	682.5327	732.7976	763.5060	766.2495	717.2503	577.4434	424.4582	432.8019	558.1086	625.2963	640.7140	659.0068 (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	1950.9709	1890.8118	1716.9379	1418.8245	1102.4756	734.3230	480.3396	501.9436	788.0507	1188.1977	1575.2731	1909.0783 (97)
Space heating kWh	943.7180	778.1856	709.3533	469.8540	286.6076	0.0000	0.0000	0.0000	0.0000	418.7987	672.8826	930.0532 (98a)
Space heating requirement - total per year (kWh/year)												5209.4529
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	943.7180	778.1856	709.3533	469.8540	286.6076	0.0000	0.0000	0.0000	0.0000	418.7987	672.8826	930.0532 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5209.4529
Space heating per m2										(98c) / (4) =		60.9293 (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	943.7180	778.1856	709.3533	469.8540	286.6076	0.0000	0.0000	0.0000	0.0000	418.7987	672.8826	930.0532 (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)	430.3320	354.8498	323.4625	214.2517	130.6920	0.0000	0.0000	0.0000	0.0000	190.9707	306.8320	424.1009 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating												
Water heating requirement	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148 (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	143.1910	126.6791	134.5900	118.2395	114.5799	103.1952	101.7553	105.7870	106.9489	119.3295	126.9921	141.6044 (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	30.7820	24.6945	22.2346	16.2900	12.5829	10.2803	11.4785	14.9202	19.3799	25.4275	28.7203	31.6375 (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												2375.4915 (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												1442.8919 (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)												248.4283 (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												4066.8118 (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	2375.4915	16.4900	391.7186 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1442.8919	16.4900	237.9329 (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	248.4283	16.4900	40.9658 (250)
Additional standing charges			0.0000 (251)
Total energy cost			670.6173 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.8500 (257)
SAP value		70.0118
SAP rating (Section 12)		70 (258)
SAP band		C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2375.4915	0.1540	365.7313 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1442.8919	0.1409	203.2942 (264)
Space and water heating			569.0254 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	248.4283	0.1443	35.8559 (268)
Total CO2, kg/year			604.8813 (272)
CO2 emissions per m2			7.0700 (273)
EI value			93.7890
EI rating			94 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	85.5000 (1b)	2.8000 (2b)	239.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.5000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 239.4000 (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)

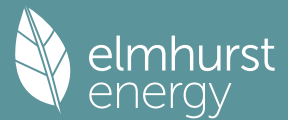
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1253 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.8753	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7440 (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	0.7812	0.7440	0.7440	0.6882	0.6882	0.6138	0.6324	0.5952	0.6138	0.6510	0.6510	0.7068 (22b)
Effective ac	0.8052	0.7768	0.7768	0.7368	0.7368	0.6884	0.7000	0.6771	0.6884	0.7119	0.7119	0.7498 (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 = 1.20)			6.5900	1.1450	7.5458		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.5000	0.2500	21.3750	20.0000	1710.0000 (28b)
Existing Ext Wall	34.7200	6.5900	28.1300	0.1800	5.0634	150.0000	4219.5000 (29a)
Wall to Communal Stairs	28.0000		28.0000	0.1600	4.4800	9.0000	252.0000 (29a)
New Ext Wall	26.0400	6.2100	19.8300	0.1800	3.5694	9.0000	178.4700 (29a)
Flat Roof	5.3000		5.3000	0.1400	0.7420	9.0000	47.7000 (30)
Total net area of external elements Aum(A, m2)			179.5600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	49.6122			(33)
Party Wall			43.4000	0.0000	0.0000		868.0000 (32)
Party Ceiling			80.2000			30.0000	2406.0000 (32b)
Internal Wall			186.7600			9.0000	1680.8400 (32c)

Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =	11362.5100	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				132.8949	(35)
Thermal bridges (Default value 0.200 * total exposed area)				35.9120	(36)
Point Thermal bridges				(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	85.5242	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	63.6085	61.3672	61.3672	58.2103	58.2103	54.3837	55.2993	53.4954	54.3837	56.2423	56.2423	59.2352	(38)
Average = Sum(39)m / 12 =	149.1326	146.8913	146.8913	143.7344	143.7344	139.9078	140.8235	139.0195	139.9078	141.7665	141.7665	144.7594	(39)
												143.1946	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.7442	1.7180	1.7180	1.6811	1.6811	1.6363	1.6471	1.6260	1.6363	1.6581	1.6581	1.6931	(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													2.5590 (42)
Hot water usage for mixer showers													
	67.1255	66.1168	64.6468	61.8343	59.7587	57.4440	56.1284	57.5872	59.1864	61.6716	64.5446	66.8683	(42a)
Hot water usage for baths	28.9894	28.5589	27.9526	26.8347	25.9977	25.0695	24.5682	25.1702	25.8257	26.8189	27.9598	28.8914	(42b)
Hot water usage for other uses	40.8366	39.3516	37.8666	36.3817	34.8967	33.4117	33.4117	34.8967	36.3817	37.8666	39.3516	40.8366	(42c)
Average daily hot water use (litres/day)													125.8894 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.9515	134.0272	130.4660	125.0506	120.6531	115.9253	114.1083	117.6541	121.3938	126.3571	131.8559	136.5963	(44)
Energy conte	216.8977	190.8530	200.5214	171.1881	162.4222	142.5436	138.0041	145.6804	149.6907	171.4654	187.8529	213.8768	(45)
Energy content (annual)										Total = Sum(45)m =		2090.9963	
Distribution loss (46)m = 0.15 x (45)m													
	32.5347	28.6279	30.0782	25.6782	24.3633	21.3815	20.7006	21.8521	22.4536	25.7198	28.1779	32.0815	(46)
Water storage loss:													
Store volume													210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.9400 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.0476 (55)
Total storage loss													
	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(56)
If cylinder contains dedicated solar storage													
	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month													
	116.7089	103.7338	111.2638	100.0720	98.5958	90.5478	90.4768	93.0291	92.9241	101.6027	105.6131	115.7044	(65)

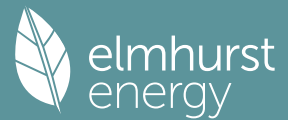
5. Internal gains (see Table 5 and 5a)

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	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	35.1676	31.2356	25.4025	19.2313	14.3756	12.1365	13.1139	17.0460	22.8791	29.0502	33.9059	36.1450	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	344.1064	347.6771	338.6789	319.5229	295.3419	272.6151	257.4322	253.8614	262.8596	282.0156	306.1967	328.9235	(68)
Pumps, fans	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	(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)	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	(71)
Total internal gains	156.8668	154.3658	149.5481	138.9889	132.5212	125.7608	121.6085	125.0392	129.0613	136.5627	146.6849	155.5167	(72)
	643.2334	640.3711	620.7221	584.8358	549.3313	514.6050	496.2473	500.0392	518.8926	554.7212	593.8801	627.6778	(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		0.8100	40.4699	0.6300	0.8000	0.7700	11.4494 (77)

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Northwest			5.7800		12.9236		0.6300		0.8000		0.7700		26.0900 (81)
Southeast			4.3200		40.4699		0.6300		0.8000		0.7700		61.0632 (77)

Solar gains	98.6026	159.1535	236.2292	338.0551	400.9993	440.9865	414.4208	363.7041	290.1716	193.9591	122.6527	82.5333 (83)
Total gains	741.8359	799.5246	856.9512	922.8908	950.3306	955.5915	910.6680	863.7432	809.0642	748.6803	716.5328	710.2112 (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	21.1641	21.4870	21.4870	21.9589	21.9589	22.5595	22.4128	22.7037	22.5595	22.2637	22.2637	21.8034
alpha	2.4109	2.4325	2.4325	2.4639	2.4639	2.5040	2.4942	2.5136	2.5040	2.4842	2.4842	2.4536
util living area	0.9575	0.9470	0.9229	0.8713	0.7755	0.5969	0.4362	0.4628	0.7157	0.8792	0.9393	0.9607 (86)

MIT	18.1780	18.4263	18.9362	19.6341	20.2873	20.7746	20.9315	20.9211	20.5943	19.8293	18.9690	18.2135 (87)
Th 2	19.5093	19.5279	19.5279	19.5544	19.5544	19.5868	19.5790	19.5944	19.5868	19.5710	19.5710	19.5458 (88)
util rest of house	0.9482	0.9355	0.9048	0.8379	0.7082	0.4696	0.2529	0.2796	0.6108	0.8407	0.9238	0.9522 (89)
MIT 2	16.3579	16.6797	17.3201	18.1938	18.9585	19.4680	19.5653	19.5766	19.3189	18.4559	17.3915	16.4216 (90)
Living area fraction									fLA = Living area / (4) =			0.3439 (91)
MIT	16.9838	17.2803	17.8758	18.6891	19.4154	19.9173	20.0351	20.0389	19.7574	18.9281	17.9339	17.0377 (92)
Temperature adjustment												0.0000
adjusted MIT	16.9838	17.2803	17.8758	18.6891	19.4154	19.9173	20.0351	20.0389	19.7574	18.9281	17.9339	17.0377 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9249	0.9101	0.8768	0.8125	0.7005	0.5026	0.3159	0.3421	0.6255	0.8181	0.8987	0.9303 (94)
Useful gains	686.1439	727.6590	751.3697	749.8359	665.7221	480.3019	287.7087	295.5089	506.0927	612.5093	643.9547	660.7093 (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	1772.2596	1715.7365	1538.8046	1263.2949	922.1206	548.0557	300.6758	311.2504	637.6220	1038.8845	1408.2985	1728.0996 (97)
Space heating kWh	808.0701	663.9881	585.8516	369.6904	190.7605	0.0000	0.0000	0.0000	0.0000	317.2232	550.3275	794.1384 (98a)
Space heating requirement - total per year (kWh/year)												4280.0497
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	808.0701	663.9881	585.8516	369.6904	190.7605	0.0000	0.0000	0.0000	0.0000	317.2232	550.3275	794.1384 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4280.0497
Space heating per m2										(98c) / (4) =		50.0591 (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	808.0701	663.9881	585.8516	369.6904	190.7605	0.0000	0.0000	0.0000	0.0000	317.2232	550.3275	794.1384 (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)	368.4770	302.7761	267.1462	168.5775	86.9861	0.0000	0.0000	0.0000	0.0000	144.6526	250.9473	362.1242 (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	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148 (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	143.1910	126.6791	134.5900	118.2395	114.5799	103.1952	101.7553	105.7870	106.9489	119.3295	126.9921	141.6044 (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	30.7820	24.6945	22.2346	16.2900	12.5829	10.2803	11.4785	14.9202	19.3799	25.4275	28.7203	31.6375 (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												1951.6871 (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												1442.8919 (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)	248.4283 (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	3643.0073 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1951.6871	25.1600	491.0445 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1442.8919	25.1600	363.0316 (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	248.4283	25.1600	62.5046 (250)
Additional standing charges			0.0000 (251)
Total energy cost			916.5806 (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	1951.6871	0.1545	301.5601 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1442.8919	0.1409	203.2942 (264)
Space and water heating			504.8543 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	248.4283	0.1443	35.8559 (268)
Total CO2, kg/year			540.7102 (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	1951.6871	1.5721	3068.1604 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1442.8919	1.5210	2194.5997 (278)
Space and water heating			5262.7600 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	248.4283	1.5338	381.0477 (282)
Total Primary energy kWh/year			5643.8077 (286)

SAP 10 EPC IMPROVEMENTS

Be Lean

Current energy efficiency rating:	C 70
Current environmental impact rating:	A 94

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

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

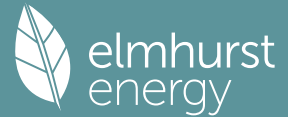
Potential energy efficiency rating:	C 70
Potential environmental impact rating:	A 94

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

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current £917	Potential £917	Saving £0
Electricity			
Space heating	£491	£491	£0
Water heating	£363	£363	£0
Lighting	£63	£63	£0
Total cost of fuels	£917	£917	£0
Total cost of uses	£917	£917	£0
Delivered energy	43 kWh/m²	43 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.5 tonnes	0.5 tonnes	0.0 tonnes
CO2 emissions per m²	6 kg/m²	6 kg/m²	0 kg/m²
Primary energy	66 kWh/m²	66 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	85.5000 (1b)	x 2.8000 (2b)	= 239.4000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.5000		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	239.4000 (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) = 0.1253 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8753 (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) = 0.7440 (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	0.9486	0.9300	0.9114	0.8184	0.7998	0.7068	0.7068	0.6882	0.7440	0.7998	0.8370	0.8742 (22b)
Effective ac	0.9499	0.9325	0.9153	0.8349	0.8199	0.7498	0.7498	0.7368	0.7768	0.8199	0.8503	0.8821 (25)

3. Heat losses and heat loss parameter

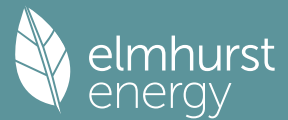
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			6.5900	1.1450	7.5458		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Commercial			85.5000	0.2500	21.3750	20.0000	1710.0000 (28b)
Existing Ext Wall	34.7200	6.5900	28.1300	0.1800	5.0634	150.0000	4219.5000 (29a)
Wall to Communal Stairs	28.0000		28.0000	0.1600	4.4800	9.0000	252.0000 (29a)
New Ext Wall	26.0400	6.2100	19.8300	0.1800	3.5694	9.0000	178.4700 (29a)
Flat Roof	5.3000		5.3000	0.1400	0.7420	9.0000	47.7000 (30)
Total net area of external elements Aum(A, m ²)			179.5600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	49.6122			(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000 (32)
Party Ceiling			80.2000			30.0000	2406.0000 (32b)
Internal Wall			186.7600			9.0000	1680.8400 (32c)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =	11362.5100			(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K				132.8949			(35)
Thermal bridges (Default value 0.200 * total exposed area)				35.9120			(36)
Point Thermal bridges				(36a) =	0.0000		
Total fabric heat loss			(33) + (36) + (36a) =	85.5242			(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	75.0472	73.6669	72.3139	65.9591	64.7701	59.2352	59.2352	58.2103	61.3672	64.7701	67.1754	69.6900 (38)
Heat transfer coeff	160.5714	159.1911	157.8381	151.4832	150.2943	144.7594	144.7594	143.7344	146.8913	150.2943	152.6996	155.2142 (39)
Average = Sum(39)m / 12 =												151.4776
HLP	1.8780	1.8619	1.8461	1.7717	1.7578	1.6931	1.6931	1.6811	1.7180	1.7578	1.7860	1.8154 (40)
HLP (average)												1.7717
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5590 (42)
Hot water usage for mixer showers	67.1255	66.1168	64.6468	61.8343	59.7587	57.4440	56.1284	57.5872	59.1864	61.6716	64.5446	66.8683 (42a)
Hot water usage for baths	28.9894	28.5589	27.9526	26.8347	25.9977	25.0695	24.5682	25.1702	25.8257	26.8189	27.9598	28.8914 (42b)
Hot water usage for other uses												

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	40.8366	39.3516	37.8666	36.3817	34.8967	33.4117	33.4117	34.8967	36.3817	37.8666	39.3516	40.8366 (42c)
Average daily hot water use (litres/day)												125.8894 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
Energy conte	136.9515	134.0272	130.4660	125.0506	120.6531	115.9253	114.1083	117.6541	121.3938	126.3571	131.8559	136.5963 (44)
Energy content (annual)	216.8977	190.8530	200.5214	171.1881	162.4222	142.5436	138.0041	145.6804	149.6907	171.4654	187.8529	213.8768 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2090.9963
Water storage loss:	32.5347	28.6279	30.0782	25.6782	24.3633	21.3815	20.7006	21.8521	22.4536	25.7198	28.1779	32.0815 (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												
	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148 (64)
								Total per year (kWh/year) = Sum(64)m =				2747.2663 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				0.0000 (64a)
Heat gains from water heating, kWh/month												
	116.7089	103.7338	111.2638	100.0720	98.5958	90.5478	90.4768	93.0291	92.9241	101.6027	105.6131	115.7044 (65)

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	35.1676	31.2356	25.4025	19.2313	14.3756	12.1365	13.1139	17.0460	22.8791	29.0502	33.9059	36.1450 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	344.1064	347.6771	338.6789	319.5229	295.3419	272.6151	257.4322	253.8614	262.8596	282.0156	306.1967	328.9235 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594 (71)
Water heating gains (Table 5)												
	156.8668	154.3658	149.5481	138.9889	132.5212	125.7608	121.6085	125.0392	129.0613	136.5627	146.6849	155.5167 (72)
Total internal gains												
	643.2334	640.3711	620.7221	584.8358	549.3313	514.6050	496.2473	500.0392	518.8926	554.7212	593.8801	627.6778 (73)

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				0.8100	36.7938	0.6300		0.8000		0.7700			10.4094 (77)		
Northwest				5.7800	11.2829	0.6300		0.8000		0.7700			22.7779 (81)		
Southeast				4.3200	36.7938	0.6300		0.8000		0.7700			55.5166 (77)		
Solar gains				88.7038	158.6613	237.1838	327.5668	397.6479	408.2963	388.0131	333.6619	268.1578	180.7731	107.6246	75.0204 (83)
Total gains				731.9372	799.0324	857.9058	912.4026	946.9792	922.9013	884.2604	833.7011	787.0504	735.4943	701.5047	702.6983 (84)

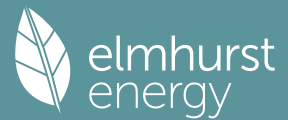
7. Mean internal temperature (heating season)

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	19.6564	19.8268	19.9968	20.8357	21.0005	21.8034	21.8034	21.9589	21.4870	21.0005	20.6697	20.3348
alpha	2.3104	2.3218	2.3331	2.3890	2.4000	2.4536	2.4536	2.4639	2.4325	2.4000	2.3780	2.3557
util living area	0.9633	0.9530	0.9341	0.8953	0.8274	0.7118	0.5874	0.6252	0.7918	0.9061	0.9507	0.9663 (86)
MIT	17.7493	18.0256	18.5351	19.2853	19.9599	20.5362	20.7978	20.7584	20.3325	19.4816	18.5521	17.7798 (87)
Th 2	19.4159	19.4270	19.4379	19.4899	19.4997	19.5458	19.5458	19.5544	19.5279	19.4997	19.4798	19.4593 (88)
util rest of house												
	0.9554	0.9428	0.9188	0.8686	0.7768	0.6160	0.4369	0.4809	0.7132	0.8767	0.9383	0.9591 (89)
MIT 2	15.7694	16.1236	16.7714	17.7322	18.5510	19.2202	19.4572	19.4382	19.0102	17.9944	16.8209	15.8287 (90)
Living area fraction									fLA = Living area / (4) =			0.3439 (91)
MIT	16.4502	16.7776	17.3778	18.2662	19.0354	19.6727	19.9182	19.8922	19.4649	18.5058	17.4162	16.4996 (92)
Temperature adjustment												0.0000
adjusted MIT	16.4502	16.7776	17.3778	18.2662	19.0354	19.6727	19.9182	19.8922	19.4649	18.5058	17.4162	16.4996 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9325	0.9171	0.8900	0.8398	0.7574	0.6257	0.4800	0.5191	0.7091	0.8502	0.9133	0.9378 (94)
Useful gains	682.5327	732.7976	763.5060	766.2495	717.2503	577.4434	424.4582	432.8019	558.1086	625.2963	640.7140	659.0068 (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												
	1950.9709	1890.8118	1716.9379	1418.8245	1102.4756	734.3230	480.3396	501.9436	788.0507	1188.1977	1575.2731	1909.0783 (97)
Space heating kWh												

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Space heating requirement - total per year (kWh/year)	943.7180	778.1856	709.3533	469.8540	286.6076	0.0000	0.0000	0.0000	0.0000	418.7987	672.8826	930.0532 (98a)
Solar heating kWh												5209.4529
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	943.7180	778.1856	709.3533	469.8540	286.6076	0.0000	0.0000	0.0000	0.0000	418.7987	672.8826	930.0532 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5209.4529
Space heating per m2										(98c) / (4) =		60.9293 (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	943.7180	778.1856	709.3533	469.8540	286.6076	0.0000	0.0000	0.0000	0.0000	418.7987	672.8826	930.0532 (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)	430.3320	354.8498	323.4625	214.2517	130.6920	0.0000	0.0000	0.0000	0.0000	190.9707	306.8320	424.1009 (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	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148 (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	143.1910	126.6791	134.5900	118.2395	114.5799	103.1952	101.7553	105.7870	106.9489	119.3295	126.9921	141.6044 (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	30.7820	24.6945	22.2346	16.2900	12.5829	10.2803	11.4785	14.9202	19.3799	25.4275	28.7203	31.6375 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2375.4915 (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												1442.8919 (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)												248.4283 (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												4066.8118 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2375.4915	16.4900	391.7186 (240)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1442.8919	16.4900	237.9329 (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	248.4283	16.4900	40.9658 (250)	
Additional standing charges			0.0000 (251)	
Total energy cost			670.6173 (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] =	1.8500 (257)
SAP value		70.0118
SAP rating (Section 12)		70 (258)
SAP band		C

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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	2375.4915	0.1540	365.7313	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1442.8919	0.1409	203.2942	(264)
Space and water heating			569.0254	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	248.4283	0.1443	35.8559	(268)
Total CO2, kg/year			604.8813	(272)
CO2 emissions per m2			7.0700	(273)
EI value			93.7890	
EI rating			94	(274)
EI band			A	

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	85.5000 (1b)	x 2.8000 (2b)	= 239.4000 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.5000		(4)	
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	239.4000 (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) =	0.1253 (8)	
Pressure test	No		
Pressure Test Method	Blower Door		
Measured/design AP50	15.0000 (17)		
Infiltration rate	0.8753 (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) =	0.7440 (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	0.7812	0.7440	0.7440	0.6882	0.6882	0.6138	0.6324	0.5952	0.6138	0.6510	0.6510	0.7068	(22b)
Effective ac	0.8052	0.7768	0.7768	0.7368	0.7368	0.6884	0.7000	0.6771	0.6884	0.7119	0.7119	0.7498	(25)

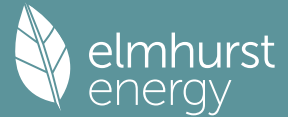
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Entrance Door			1.8900	1.0000	1.8900			(26)
Windows (Uw = 1.20)			6.5900	1.1450	7.5458			(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466			(27)
Floor Over Commercial			85.5000	0.2500	21.3750	20.0000	1710.0000	(28b)
Existing Ext Wall	34.7200	6.5900	28.1300	0.1800	5.0634	150.0000	4219.5000	(29a)
Wall to Communal Stairs	28.0000		28.0000	0.1600	4.4800	9.0000	252.0000	(29a)
New Ext Wall	26.0400	6.2100	19.8300	0.1800	3.5694	9.0000	178.4700	(29a)
Flat Roof	5.3000		5.3000	0.1400	0.7420	9.0000	47.7000	(30)
Total net area of external elements Aum(A, m2)			179.5600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	49.6122				(33)
Party Wall			43.4000	0.0000	0.0000	20.0000	868.0000	(32)
Party Ceiling			80.2000			30.0000	2406.0000	(32b)
Internal Wall			186.7600			9.0000	1680.8400	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11362.5100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		132.8949 (35)
Thermal bridges (Default value 0.200 * total exposed area)		35.9120 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	85.5242 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	63.6085	61.3672	61.3672	58.2103	58.2103	54.3837	55.2993	53.4954	54.3837	56.2423	56.2423	59.2352	(38)
	149.1326	146.8913	146.8913	143.7344	143.7344	139.9078	140.8235	139.0195	139.9078	141.7665	141.7665	144.7594	(39)

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Average = Sum(39)m / 12 =

143.1946

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.7442	1.7180	1.7180	1.6811	1.6811	1.6363	1.6471	1.6260	1.6363	1.6581	1.6581	1.6931	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5590 (42)
Hot water usage for mixer showers													
67.1255	66.1168	64.6468	61.8343	59.7587	57.4440	56.1284	57.5872	59.1864	61.6716	64.5446	66.8683	(42a)	
Hot water usage for baths													
28.9894	28.5589	27.9526	26.8347	25.9977	25.0695	24.5682	25.1702	25.8257	26.8189	27.9598	28.8914	(42b)	
Hot water usage for other uses													
40.8366	39.3516	37.8666	36.3817	34.8967	33.4117	33.4117	34.8967	36.3817	37.8666	39.3516	40.8366	(42c)	
Average daily hot water use (litres/day)													125.8894 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
136.9515	134.0272	130.4660	125.0506	120.6531	115.9253	114.1083	117.6541	121.3938	126.3571	131.8559	136.5963	(44)	
Energy content (annual)	216.8977	190.8530	200.5214	171.1881	162.4222	142.5436	138.0041	145.6804	149.6907	171.4654	187.8529	213.8768	(45)
Energy content (annual)										Total = Sum(45)m =		2090.9963	
Distribution loss (46)m = 0.15 x (45)m													
32.5347	28.6279	30.0782	25.6782	24.3633	21.3815	20.7006	21.8521	22.4536	25.7198	28.1779	32.0815	(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	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month													
272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	(64)
								Total per year (kWh/year) = Sum(64)m =				2747.2663	(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)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													
Heat gains from water heating, kWh/month													
116.7089	103.7338	111.2638	100.0720	98.5958	90.5478	90.4768	93.0291	92.9241	101.6027	105.6131	115.7044	(65)	

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392	153.5392 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	35.1676	31.2356	25.4025	19.2313	14.3756	12.1365	13.1139	17.0460	22.8791	29.0502	33.9059	36.1450 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	344.1064	347.6771	338.6789	319.5229	295.3419	272.6151	257.4322	253.8614	262.8596	282.0156	306.1967	328.9235 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129	52.9129 (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)												
	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594	-102.3594 (71)
Water heating gains (Table 5)												
	156.8668	154.3658	149.5481	138.9889	132.5212	125.7608	121.6085	125.0392	129.0613	136.5627	146.6849	155.5167 (72)
Total internal gains												
	643.2334	640.3711	620.7221	584.8358	549.3313	514.6050	496.2473	500.0392	518.8926	554.7212	593.8801	627.6778 (73)

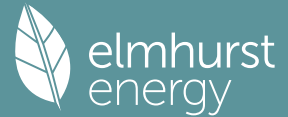
6. Solar gains

[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				0.8100	40.4699	0.6300	0.8000	0.7700	11.4494 (77)				
Northwest				5.7800	12.9236	0.6300	0.8000	0.7700	26.0900 (81)				
Southeast				4.3200	40.4699	0.6300	0.8000	0.7700	61.0632 (77)				
Solar gains	98.6026	159.1535	236.2292	338.0551	400.9993	440.9865	414.4208	363.7041	290.1716	193.9591	122.6527	82.5333	(83)
Total gains	741.8359	799.5246	856.9512	922.8908	950.3306	955.5915	910.6680	863.7432	809.0642	748.6803	716.5328	710.2112	(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	21.1641	21.4870	21.4870	21.9589	21.9589	22.5595	22.4128	22.7037	22.5595	22.2637	22.2637	21.8034
alpha	2.4109	2.4325	2.4325	2.4639	2.4639	2.5040	2.4942	2.5136	2.5040	2.4842	2.4842	2.4536
util living area	0.9575	0.9470	0.9229	0.8713	0.7755	0.5969	0.4362	0.4628	0.7157	0.8792	0.9393	0.9607 (86)
MIT	18.1780	18.4263	18.9362	19.6341	20.2873	20.7746	20.9315	20.9211	20.5943	19.8293	18.9690	18.2135 (87)
Th 2	19.5093	19.5279	19.5279	19.5544	19.5544	19.5868	19.5790	19.5944	19.5868	19.5710	19.5710	19.5458 (88)
util rest of house	0.9482	0.9355	0.9048	0.8379	0.7082	0.4696	0.2529	0.2796	0.6108	0.8407	0.9238	0.9522 (89)

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MIT 2	16.3579	16.6797	17.3201	18.1938	18.9585	19.4680	19.5653	19.5766	19.3189	18.4559	17.3915	16.4216 (90)
Living area fraction									FLA = Living area / (4) =			0.3439 (91)
MIT	16.9838	17.2803	17.8758	18.6891	19.4154	19.9173	20.0351	20.0389	19.7574	18.9281	17.9339	17.0377 (92)
Temperature adjustment												0.0000
adjusted MIT	16.9838	17.2803	17.8758	18.6891	19.4154	19.9173	20.0351	20.0389	19.7574	18.9281	17.9339	17.0377 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9249	0.9101	0.8768	0.8125	0.7005	0.5026	0.3159	0.3421	0.6255	0.8181	0.8987	0.9303	(94)
Useful gains	686.1439	727.6590	751.3697	749.8359	665.7221	480.3019	287.7087	295.5089	506.0927	612.5093	643.9547	660.7093	(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	1772.2596	1715.7365	1538.8046	1263.2949	922.1206	548.0557	300.6758	311.2504	637.6220	1038.8845	1408.2985	1728.0996	(97)
Space heating kWh	808.0701	663.9881	585.8516	369.6904	190.7605	0.0000	0.0000	0.0000	0.0000	317.2232	550.3275	794.1384	(98a)
Space heating requirement - total per year (kWh/year)												4280.0497	
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	808.0701	663.9881	585.8516	369.6904	190.7605	0.0000	0.0000	0.0000	0.0000	317.2232	550.3275	794.1384	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4280.0497	
Space heating per m2											(98c) / (4) =	50.0591	(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	808.0701	663.9881	585.8516	369.6904	190.7605	0.0000	0.0000	0.0000	0.0000	317.2232	550.3275	794.1384	(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)	368.4770	302.7761	267.1462	168.5775	86.9861	0.0000	0.0000	0.0000	0.0000	144.6526	250.9473	362.1242	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	272.6357	241.1970	256.2594	225.1281	218.1602	196.4836	193.7421	201.4184	203.6307	227.2034	241.7929	269.6148	(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	143.1910	126.6791	134.5900	118.2395	114.5799	103.1952	101.7553	105.7870	106.9489	119.3295	126.9921	141.6044	(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	30.7820	24.6945	22.2346	16.2900	12.5829	10.2803	11.4785	14.9202	19.3799	25.4275	28.7203	31.6375	(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													1951.6871 (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													1442.8919 (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)													248.4283 (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 (235)
Electricity generated - Micro CHP (Appendix N)													0.0000 (236)
Appendix Q - special features													
Energy saved or generated													-0.0000 (237)
Energy used													0.0000 (238)
Total delivered energy for all uses													3643.0073 (239)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1951.6871	25.1600	491.0445 (240)	
Total CO2 associated with community systems			0.0000 (473)	

Full SAP Calculation Printout



Water heating (other fuel)	1442.8919	25.1600	363.0316 (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	248.4283	25.1600	62.5046 (250)
Additional standing charges			0.0000 (251)
Total energy cost			916.5806 (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	1951.6871	0.1545	301.5601 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1442.8919	0.1409	203.2942 (264)
Space and water heating			504.8543 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	248.4283	0.1443	35.8559 (268)
Total CO2, kg/year			540.7102 (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	1951.6871	1.5721	3068.1604 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1442.8919	1.5210	2194.5997 (278)
Space and water heating			5262.7600 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	248.4283	1.5338	381.0477 (282)
Total Primary energy kWh/year			5643.8077 (286)

Overview Report

Dwelling Address	
Report Date	01/02/2024
Property Type	Flat, Semi-Detached
Floor Area [m ²]	86

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

70

70

Least energy efficient - higher running costs

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good
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Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.17 W/m ² K	Very Good
Roof	Average thermal transmittance 0.14 W/m ² K	Very Good
Floor	Average thermal transmittance 0.25 W/m ² K	Good
Windows	High performance glazing	Very Good
Main heating	Air source heat pump, underfloor, electric	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 66 kilowatt hour (kWh) per square metre

Estimated CO₂ emissions of the dwelling

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

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

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

£917

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