

Summary for Input Data

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

SAP Rating	72 C	DER	6.62	TER	7.46
Environmental	94 A	% DER < TER			11.26
CO ₂ Emissions (t/year)	0.5	DFEE	63.43	TFEE	34.50
Compliance Check	See BREL	% DFEE < TFEE			-83.89
% DPER < TPER	-71.73	DPER	68.98	TPER	40.17

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

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

Orientation	Southeast	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Top-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2023	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	0.00 m	0.00 m ²	0.00 m
Ground floor:	30.40 m	87.60 m ²	2.60 m
1st Storey:	0.00 m	0.00 m ²	0.00 m
2nd Storey:	0.00 m	0.00 m ²	0.00 m
3rd Storey:	0.00 m	0.00 m ²	0.00 m
4th Storey:	0.00 m	0.00 m ²	0.00 m
5th Storey:	0.00 m	0.00 m ²	0.00 m
6th Storey:	0.00 m	0.00 m ²	0.00 m
7th Storey:	0.00 m	0.00 m ²	0.00 m

8.0 Living Area	27.20	m ²
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9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
	Existing Ext Wall	Cavity Wall	Cavity wall : dense plaster, dense block, filled cavity, any outside structure	0.18	190.00	59.80	50.24	0.00	None	9.56	Enter Gross Area
	New Ext Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	19.24	13.03	0.00	None	6.21	Enter Gross Area

9.1 Party Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
	Party Wall	Filled Cavity with Edge Sealing	Steel frame	0.00	20.00	36.40	0.00	None

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Wall	Plasterboard on timber frame	9.00	176.80

10.0 External Roofs	
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Summary for Input Data



Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.14	9.00	87.60	87.60	None	0.00	Calculate Wall Area	0.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Floor Over Communal	Exposed Floor - Timber	Lowest occupied	Timber exposed floor, insulation between joists	0.25	Stairwell Stairwell 1	0.82	20.00	10.60

12.0 Opening Types

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

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front Elevation	Windows	Existing Ext Wall	North West	5.78	0
Entrance Door	Entrance Door	Existing Ext Wall	South East	1.89	0
Patio Doors	Patio Doors	New Ext Wall	South West	4.32	0
Rear Elevation	Windows	Existing Ext Wall	South East	1.89	0
Rear Elevation	Windows	New Ext Wall	South East	1.89	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 AP ₅₀	15.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP ₅₀	15.00	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	No				
Name	Efficacy	Power	Capacity	Count	
Low energy Lighting	75.00	5	375	15	

24.0 Main Heating 1

SAP table	100.00	%
Percentage of Heat		
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	224	
In Winter	219.30	
In Summer	190.40	
Controls SAP Code	2207	
PCDF Controls	0	
Delayed Start Stat	Yes	
HETAS approved System	No	
Oil Pump Inside	No	

Summary for Input Data

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	
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Measured Loss
Insulation Thickness	0
Cylinder Volume	210.00 L

Summary for Input Data



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
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Recommendations

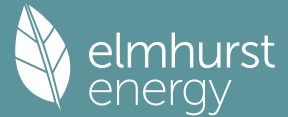
Lower cost measures

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	87.6000	2.6000	227.7600
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.6000		
Dwelling volume			

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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) = 0.1317 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8817 (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) = 0.7495 (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	0.9556	0.9368	0.9181	0.8244	0.8057	0.7120	0.7120	0.6933	0.7495	0.8057	0.8431	0.8806 (22b)
Effective ac	0.9565	0.9388	0.9214	0.8398	0.8246	0.7535	0.7535	0.7403	0.7808	0.8246	0.8554	0.8877 (25)

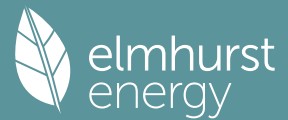
3. Heat losses and heat loss parameter

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)			9.5600	1.1450	10.9466		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Communal			10.6000	0.2075	2.1992	20.0000	212.0000 (28b)
Existing Ext Wall	59.8000	9.5600	50.2400	0.1800	9.0432	190.0000	9545.6000 (29a)
New Ext Wall	19.2400	6.2100	13.0300	0.1800	2.3454	9.0000	117.2700 (29a)
Flat Roof	87.6000		87.6000	0.1400	12.2640	9.0000	788.4000 (30)
Total net area of external elements Aum(A, m ²)			177.2400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.6349		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Internal Wall			176.8000			9.0000	1591.2000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12982.4700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							148.2017 (35)
Thermal bridges (Default value 0.200 * total exposed area)							35.4480 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	79.0829 (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
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(38)m	71.8950	70.5625	69.2564	63.1217	61.9740	56.6309	56.6309	55.6414	58.6889	61.9740	64.2959	66.7234 (38)
Heat transfer coeff	150.9779	149.6454	148.3393	142.2046	141.0569	135.7138	135.7138	134.7243	137.7718	141.0569	143.3788	145.8063 (39)
Average = Sum(39)m / 12 =												142.1991
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.7235	1.7083	1.6934	1.6233	1.6102	1.5492	1.5492	1.5379	1.5727	1.6102	1.6367	1.6645 (40)
HLP (average)												1.6233
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5914 (42)
Hot water usage for mixer showers												
67.6694	66.6525	65.1706	62.3353	60.2429	57.9095	56.5832	58.0538	59.6660	62.1713	65.0675	67.4101 (42a)	
Hot water usage for baths												
29.2233	28.7893	28.1781	27.0512	26.2074	25.2718	24.7664	25.3733	26.0341	27.0352	28.1853	29.1245 (42b)	
Hot water usage for other uses												
41.1688	39.6717	38.1747	36.6776	35.1806	33.6835	33.6835	35.1806	36.6776	38.1747	39.6717	41.1688 (42c)	
Average daily hot water use (litres/day)												126.9097 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
138.0615	135.1135	131.5234	126.0641	121.6309	116.8648	115.0331	118.6077	122.3777	127.3813	132.9246	137.7034 (44)	
Energy content (annual)	218.6556	192.3998	202.1465	172.5755	163.7386	143.6989	139.1225	146.8611	150.9039	172.8552	189.3755	215.6103 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2107.9433
32.7983	28.8600	30.3220	25.8863	24.5608	21.5548	20.8684	22.0292	22.6356	25.9283	28.4063	32.3415 (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 (61)	
Total heat required for water heating calculated for each month												
274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483 (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												
274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483 (64)	
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2764.2133 (64)
Electric shower(s)												2764 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
117.2934	104.2481	111.8041	100.5334	99.0335	90.9319	90.8486	93.4217	93.3275	102.0647	106.1193	116.2808 (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	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	120.7371	133.6732	120.7371	124.7617	120.7371	124.7617	120.7371	120.7371	124.7617	120.7371	124.7617	120.7371 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	234.5924	237.0267	230.8923	217.8328	201.3475	185.8537	175.5028	173.0685	179.2029	192.2624	208.7477	224.2416 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571 (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)	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570 (71)
Water heating gains (Table 5)	157.6524	155.1311	150.2744	139.6297	133.1095	126.2943	122.1084	125.5668	129.6216	137.1838	147.3880	156.2914 (72)
Total internal gains	577.8533	590.7025	566.7751	547.0955	520.0655	498.7810	480.2197	481.2438	495.4576	515.0547	545.7688	566.1415 (73)

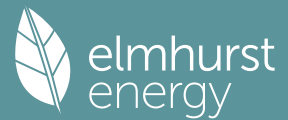
6. Solar gains

[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				3.7800	36.7938		0.6300	0.8000		0.7700	48.5770 (77)	
Northwest				5.7800	11.2829		0.6300	0.8000		0.7700	22.7779 (81)	
Southwest				4.3200	36.7938		0.6300	0.8000		0.7700	55.5166 (79)	
Solar gains	126.8715	223.6749	326.1382	437.7857	521.1022	530.8579	506.1756	441.9501	364.4767	252.6270	153.3406	107.6840 (83)
Total gains	704.7248	814.3774	892.9133	984.8812	1041.1677	1029.6389	986.3953	923.1939	859.9343	767.6817	699.1094	673.8254 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	23.8859	24.0986	24.3108	25.3595	25.5659	26.5724	26.5724	26.7676	26.1755	25.5659	25.1518	24.7331
alpha	2.5924	2.6066	2.6207	2.6906	2.7044	2.7715	2.7715	2.7845	2.7450	2.7044	2.6768	2.6489
util living area												
	0.9733	0.9600	0.9391	0.8908	0.8080	0.6697	0.5354	0.5779	0.7686	0.9090	0.9598	0.9760 (86)

Full SAP Calculation Printout



MIT	18.1298	18.4460	18.9332	19.6497	20.2442	20.7082	20.8875	20.8591	20.5305	19.7647	18.8902	18.1590 (87)
Th 2	19.5240	19.5349	19.5456	19.5963	19.6058	19.6508	19.6508	19.6592	19.6334	19.6058	19.5865	19.5664 (88)
util rest of house												
	0.9672	0.9510	0.9245	0.8630	0.7546	0.5739	0.3969	0.4421	0.6874	0.8801	0.9492	0.9706 (89)
MIT 2	16.2796	16.6843	17.3032	18.2175	18.9268	19.4530	19.6037	19.5943	19.2774	18.3802	17.2791	16.3387 (90)
Living area fraction									fLA = Living area / (4) =			0.3105 (91)
MIT	16.8541	17.2313	17.8093	18.6622	19.3358	19.8427	20.0023	19.9870	19.6665	18.8101	17.7794	16.9039 (92)
Temperature adjustment												0.0000
adjusted MIT	16.8541	17.2313	17.8093	18.6622	19.3358	19.8427	20.0023	19.9870	19.6665	18.8101	17.7794	16.9039 (93)

8. Space heating requirement

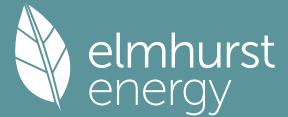
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9502	0.9301	0.9002	0.8394	0.7423	0.5891	0.4359	0.4784	0.6898	0.8582	0.9294	0.9552 (94)	
Useful gains	669.6645	757.4453	803.8402	826.6859	772.8668	606.5266	429.9616	441.6929	593.1429	658.8200	649.7582	643.6364 (95)	
Ext temp.	4.3000	4.9000	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													
	1895.3938	1845.3237	1677.6144	1388.2283	1077.0850	711.5076	461.7395	483.2568	766.9049	1158.0902	1531.1963	1852.3045 (97)	
Space heating kWh													
	911.9426	731.0543	650.0880	404.3105	226.3383	0.0000	0.0000	0.0000	0.0000	371.4570	634.6354	899.2491 (98a)	
Space heating requirement - total per year (kWh/year)												4829.0753	
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													
	911.9426	731.0543	650.0880	404.3105	226.3383	0.0000	0.0000	0.0000	0.0000	371.4570	634.6354	899.2491 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												4829.0753	
Space heating per m2											(98c) / (4) =	55.1264 (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													
	911.9426	731.0543	650.0880	404.3105	226.3383	0.0000	0.0000	0.0000	0.0000	371.4570	634.6354	899.2491 (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)													
	415.8425	333.3581	296.4378	184.3641	103.2095	0.0000	0.0000	0.0000	0.0000	169.3831	289.3914	410.0543 (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													
	274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483 (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													
	144.1143	127.4915	135.4436	118.9682	115.2713	103.8019	102.3427	106.4071	107.5861	120.0594	127.7917	142.5148 (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	30.2106	24.2360	21.8219	15.9876	12.3493	10.0895	11.2655	14.6433	19.0201	24.9555	28.1871	31.0502 (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													2202.0407 (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													1451.7927 (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)													243.8166 (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													3897.6500 (238)

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

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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2202.0407	0.1544	340.0354 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1451.7927	0.1409	204.5543 (264)
Space and water heating			544.5897 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	243.8166	0.1443	35.1903 (268)
Total CO2, kg/year			579.7800 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.6200 (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	2202.0407	1.5717	3460.9342 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1451.7927	1.5210	2208.1604 (278)
Space and water heating			5669.0945 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	243.8166	1.5338	373.9740 (282)
Total Primary energy kWh/year			6043.0686 (286)
Dwelling Primary energy Rate (DPER)			68.9800 (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	87.6000 (1b)	x 2.6000 (2b)	= 227.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 227.7600 (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) =	0.1317 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3817	(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) =		0.3245 (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	0.4137	0.4056	0.3975	0.3569	0.3488	0.3082	0.3082	0.3001	0.3245	0.3488	0.3650	0.3812 (22b)
Effective ac	0.5856	0.5822	0.5790	0.5637	0.5608	0.5475	0.5475	0.5450	0.5526	0.5608	0.5666	0.5727 (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)			13.8800	1.1450	15.8931		(27)
Floor Over Communal			10.6000	0.1300	1.3780		(28b)
Existing Ext Wall	59.8000	9.5600	50.2400	0.1800	9.0432		(29a)
New Ext Wall	19.2400	6.2100	13.0300	0.1800	2.3454		(29a)
Flat Roof	87.6000		87.6000	0.1100	9.6360		(30)
Total net area of external elements Aum(A, m2)			177.2400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.1857		(33)
Party Wall			36.4000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							148.2017 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							8.8620 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	49.0477 (37)

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

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(38)m	44.0118	43.7620	43.5172	42.3675	42.1523	41.1509	41.1509	40.9655	41.5366	42.1523	42.5875	43.0425 (38)
Heat transfer coeff	93.0595	92.8098	92.5650	91.4152	91.2001	90.1986	90.1986	90.0132	90.5844	91.2001	91.6353	92.0902 (39)
Average = Sum(39)m / 12 =												91.4142
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0623	1.0595	1.0567	1.0436	1.0411	1.0297	1.0297	1.0275	1.0341	1.0411	1.0461	1.0513 (40)
HLP (average)												1.0435
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5914 (42)
Hot water usage for mixer showers	67.6694	66.6525	65.1706	62.3353	60.2429	57.9095	56.5832	58.0538	59.6660	62.1713	65.0675	67.4101 (42a)
Hot water usage for baths	29.2233	28.7893	28.1781	27.0512	26.2074	25.2718	24.7664	25.3733	26.0341	27.0352	28.1853	29.1245 (42b)
Hot water usage for other uses	41.1688	39.6717	38.1747	36.6776	35.1806	33.6835	33.6835	35.1806	36.6776	38.1747	39.6717	41.1688 (42c)
Average daily hot water use (litres/day)												126.9097 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	138.0615	135.1135	131.5234	126.0641	121.6309	116.8648	115.0331	118.6077	122.3777	127.3813	132.9246	137.7034 (44)
Energy content (annual)	218.6556	192.3998	202.1465	172.5755	163.7386	143.6989	139.1225	146.8611	150.9039	172.8552	189.3755	215.6103 (45)
Distribution loss (46)m = 0.15 x (45)m	32.7983	28.8600	30.3220	25.8863	24.5608	21.5548	20.8684	22.0292	22.6356	25.9283	28.4063	32.3415 (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	270.4022	239.1386	253.8931	222.6528	215.4851	193.7762	190.8691	198.6077	200.9812	224.6018	239.4528	267.3568 (62)
WWHRS	-30.9356	-27.3597	-28.6495	-23.7229	-22.1089	-18.9188	-17.7333	-18.8576	-19.5741	-23.0757	-26.1420	-30.3627 (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	239.4666	211.7789	225.2436	198.9299	193.3762	174.8575	173.1358	179.7501	181.4072	201.5261	213.3109	236.9941 (64)
12Total per year (kWh/year)												2429.7768 (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	2430 (64)
												0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	114.1003	101.3640	108.6110	97.4432	95.8403	87.8418	87.6555	90.2286	90.2374	98.8716	103.0292	113.0877 (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	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.6851	136.9370	123.6851	127.8079	123.6851	127.8079	123.6851	123.6851	127.8079	123.6851	127.8079	123.6851 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	234.5924	237.0267	230.8923	217.8328	201.3475	185.8537	175.5028	173.0685	179.2029	192.2624	208.7477	224.2416 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571 (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)	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570 (71)
Water heating gains (Table 5)	153.3606	150.8393	145.9825	135.3378	128.8177	122.0024	117.8166	121.2750	125.3298	132.8920	143.0961	151.9996 (72)
Total internal gains	576.5094	589.6745	565.4312	545.8499	518.7216	497.5354	478.8758	479.8999	494.2120	513.7108	544.5231	564.7976 (73)

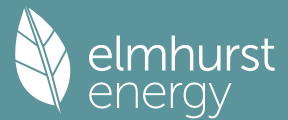
6. Solar gains

[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				3.7800	36.7938	0.6300	0.7000	0.7700	42.5049 (77)			
Southwest				4.3200	36.7938	0.6300	0.7000	0.7700	48.5770 (79)			
Northwest				5.7800	11.2829	0.6300	0.7000	0.7700	19.9307 (81)			
Solar gains	111.0125	195.7156	285.3709	383.0625	455.9644	464.5006	442.9036	386.7064	318.9171	221.0486	134.1730	94.2235 (83)
Total gains	687.5219	785.3900	850.8022	928.9123	974.6860	962.0360	921.7794	866.6063	813.1291	734.7594	678.6962	659.0211 (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	38.7520	38.8563	38.9590	39.4490	39.5421	39.9811	39.9811	40.0635	39.8109	39.5421	39.3543	39.1599
alpha	3.5835	3.5904	3.5973	3.6299	3.6361	3.6654	3.6654	3.6709	3.6541	3.6361	3.6236	3.6107
util living area												
	0.9693	0.9503	0.9190	0.8467	0.7268	0.5594	0.4192	0.4607	0.6724	0.8717	0.9495	0.9731 (86)

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MIT	19.3594	19.6167	19.9629	20.4062	20.7402	20.9270	20.9804	20.9723	20.8542	20.4274	19.8318	19.3208 (87)
Th 2	20.0317	20.0341	20.0364	20.0472	20.0492	20.0587	20.0587	20.0604	20.0550	20.0492	20.0451	20.0408 (88)
util rest of house												
	0.9635	0.9412	0.9041	0.8187	0.6791	0.4894	0.3342	0.3734	0.6049	0.8420	0.9388	0.9681 (89)
MIT 2	18.1308	18.4550	18.8872	19.4310	19.8117	20.0070	20.0493	20.0462	19.9413	19.4694	18.7371	18.0883 (90)
Living area fraction									fLA = Living area / (4) =			0.3105 (91)
MIT	18.5123	18.8157	19.2212	19.7338	20.1000	20.2927	20.3384	20.3338	20.2248	19.7668	19.0770	18.4710 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5123	18.8157	19.2212	19.7338	20.1000	20.2927	20.3384	20.3338	20.2248	19.7668	19.0770	18.4710 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9515	0.9268	0.8889	0.8084	0.6818	0.5074	0.3599	0.3994	0.6178	0.8318	0.9250	0.9570 (94)	
Useful gains	654.2033	727.9297	756.2447	750.9286	664.5279	488.1492	331.7897	346.1347	502.3511	611.1966	627.7954	630.6654 (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													
	1322.5904	1291.5108	1177.5397	990.3765	766.0785	513.4739	337.2008	354.0925	554.8072	836.0166	1097.5176	1314.2218 (97)	
Space heating kWh	497.2800	378.7265	313.4434	172.4025	75.5536	0.0000	0.0000	0.0000	0.0000	167.2661	338.2000	508.5660 (98a)	
Space heating requirement - total per year (kWh/year)												2451.4382	
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	497.2800	378.7265	313.4434	172.4025	75.5536	0.0000	0.0000	0.0000	0.0000	167.2661	338.2000	508.5660 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2451.4382	
Space heating per m2												27.9845 (99)	
												(98c) / (4) =	

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	497.2800	378.7265	313.4434	172.4025	75.5536	0.0000	0.0000	0.0000	0.0000	167.2661	338.2000	508.5660 (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)	538.7649	410.3212	339.5920	186.7849	81.8566	0.0000	0.0000	0.0000	0.0000	181.2200	366.4139	550.9924 (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	239.4666	211.7789	225.2436	198.9299	193.3762	174.8575	173.1358	179.7501	181.4072	201.5261	213.3109	236.9941 (64)	
Efficiency of water heater (217)m	85.6599	85.3478	84.8010	83.7404	82.1388	79.8000	79.8000	79.8000	79.8000	83.6450	85.0883	79.8000 (216)	
Fuel for water heating, kWh/month	279.5551	248.1362	265.6145	237.5553	235.4261	219.1196	216.9622	225.2507	227.3273	240.9302	250.6934	276.4532 (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	25.6993	20.6169	18.5633	13.6002	10.5052	8.5829	9.5832	12.4566	16.1799	21.2289	23.9780	26.4136 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-66.7691	-87.3366	-116.5788	-121.4330	-123.3671	-112.5407	-111.0976	-108.4092	-102.8413	-94.9674	-70.9235	-58.5557 (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)	-61.4945	-125.6229	-243.1410	-356.1648	-462.6195	-461.8816	-456.4530	-390.1908	-291.0595	-176.4767	-81.0061	-48.9190 (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												2655.9460 (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												2923.0239 (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)												207.4082 (232)	
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-4329.8495 (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												1542.5286 (238)	

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

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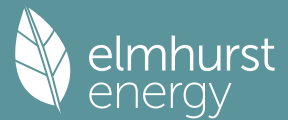


	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2655.9460	0.2100	557.7487 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2923.0239	0.2100	613.8350 (264)
Space and water heating			1171.5837 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	207.4082	0.1443	29.9354 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1174.8201	0.1362	-160.0379
PV Unit electricity exported	-3155.0294	0.1266	-399.5803
Total			-559.6183 (269)
Total CO2, kg/year			653.8301 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			7.4600 (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	2655.9460	1.1300	3001.2190 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2923.0239	1.1300	3303.0170 (278)
Space and water heating			6304.2360 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	207.4082	1.5338	318.1296 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1174.8201	1.5035	-1766.3975
PV Unit electricity exported	-3155.0294	0.4649	-1466.8391
Total			-3233.2366 (283)
Total Primary energy kWh/year			3519.2298 (286)
Target Primary Energy Rate (TPER)			40.1700 (287)

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Property Reference	Flat 2A				Issued on Date	01/02/2024
Assessment Reference	Be Lean		Prop Type Ref	Conversion		
Property						
SAP Rating	72 C	DER	6.62	TER	7.46	
Environmental	94 A	% DER < TER				11.26
CO ₂ Emissions (t/year)	0.5	DFEE	63.43	TFEE	34.50	
Compliance Check	See BREL	% DFEE < TFEE				-83.89
% DPER < TPER	-71.73	DPER	68.98	TPER	40.17	
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	87.6000 (1b)	2.6000 (2b)	227.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.6000		227.7600 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	227.7600 (5)

2. Ventilation rate

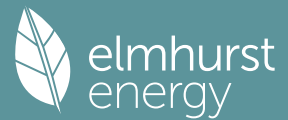
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1317 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8817 (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) = 0.7495 (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	0.9556	0.9368	0.9181	0.8244	0.8057	0.7120	0.7120	0.6933	0.7495	0.8057	0.8431	0.8806 (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	0.9565	0.9388	0.9214	0.8398	0.8246	0.7535	0.7535	0.7403	0.7808	0.8246	0.8554	0.8877 (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)			9.5600	1.1450	10.9466		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Communal			10.6000	0.2075	2.1992	20.0000	212.0000 (28b)
Existing Ext Wall	59.8000	9.5600	50.2400	0.1800	9.0432	190.0000	9545.6000 (29a)
New Ext Wall	19.2400	6.2100	13.0300	0.1800	2.3454	9.0000	117.2700 (29a)
Flat Roof	87.6000		87.6000	0.1400	12.2640	9.0000	788.4000 (30)
Total net area of external elements Aum(A, m ²)			177.2400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.6349		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Internal Wall			176.8000			9.0000	1591.2000 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	12982.4700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							148.2017 (35)
Thermal bridges (Default value 0.200 * total exposed area)							35.4480 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	79.0829 (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	71.8950	70.5625	69.2564	63.1217	61.9740	56.6309	56.6309	55.6414	58.6889	61.9740	64.2959	66.7234	(38)
Heat transfer coeff	150.9779	149.6454	148.3393	142.2046	141.0569	135.7138	135.7138	134.7243	137.7718	141.0569	143.3788	145.8063	(39)
Average = Sum(39)m / 12 =												142.1991	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.7235	1.7083	1.6934	1.6233	1.6102	1.5492	1.5492	1.5379	1.5727	1.6102	1.6367	1.6645	(40)
HLP (average)												1.6233	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5914 (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	29.2233	28.7893	28.1781	27.0512	26.2074	25.2718	24.7664	25.3733	26.0341	27.0352	28.1853	29.1245	(42b)
Hot water usage for other uses	41.1688	39.6717	38.1747	36.6776	35.1806	33.6835	33.6835	35.1806	36.6776	38.1747	39.6717	41.1688	(42c)
Average daily hot water use (litres/day)												64.5207	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	70.3921	68.4610	66.3528	63.7288	61.3880	58.9553	58.4499	60.5539	62.7117	65.2099	67.8571	70.2933	(44)
Energy conte	111.4838	97.4876	101.9818	87.2416	82.6400	72.4924	70.6901	74.9783	77.3298	88.4893	96.6748	110.0623	(45)
Energy content (annual)										Total = Sum(45)m =		1071.5518	
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	94.7612	82.8644	86.6845	74.1554	70.2440	61.6186	60.0866	63.7316	65.7303	75.2159	82.1736	93.5529	(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	94.7612	82.8644	86.6845	74.1554	70.2440	61.6186	60.0866	63.7316	65.7303	75.2159	82.1736	93.5529	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				910.8191	(64)
Electric shower(s)	54.1919	48.2854	52.7259	50.3156	51.2598	48.8969	50.5268	51.2598	50.3156	52.7259	51.7344	54.1919	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												616.4299	(64a)
Heat gains from water heating, kWh/month	37.2383	32.7875	34.8526	31.1178	30.3760	27.6289	27.6533	28.7478	29.0115	31.9854	33.4770	36.9362	(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	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	120.7371	133.6732	120.7371	124.7617	120.7371	124.7617	120.7371	120.7371	124.7617	120.7371	124.7617	120.7371	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	234.5924	237.0267	230.8923	217.8328	201.3475	185.8537	175.5028	173.0685	179.2029	192.2624	208.7477	224.2416	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	(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)	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	(71)
Water heating gains (Table 5)	50.0515	48.7909	46.8449	43.2191	40.8279	38.3734	37.1685	38.6396	40.2937	42.9912	46.4958	49.6454	(72)
Total internal gains	467.2524	481.3622	460.3457	447.6849	424.7839	410.8601	395.2798	394.3166	406.1297	417.8621	441.8766	456.4955	(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			3.7800		36.7938		0.6300		0.8000		0.7700		48.5770 (77)
Northwest			5.7800		11.2829		0.6300		0.8000		0.7700		22.7779 (81)
Southwest			4.3200		36.7938		0.6300		0.8000		0.7700		55.5166 (79)
Solar gains	126.8715	223.6749	326.1382	437.7857	521.1022	530.8579	506.1756	441.9501	364.4767	252.6270	153.3406	107.6840	(83)
Total gains	594.1238	705.0372	786.4839	885.4706	945.8861	941.7180	901.4553	836.2667	770.6064	670.4891	595.2172	564.1795	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	23.8859	24.0986	24.3108	25.3595	25.5659	26.5724	26.5724	26.7676	26.1755	25.5659	25.1518	24.7331	
alpha	2.5924	2.6066	2.6207	2.6906	2.7044	2.7715	2.7715	2.7845	2.7450	2.7044	2.6768	2.6489	
util living area	0.9819	0.9709	0.9534	0.9111	0.8360	0.7045	0.5718	0.6183	0.8045	0.9309	0.9721	0.9842	(86)
MIT	17.9695	18.2933	18.7935	19.5368	20.1631	20.6656	20.8669	20.8321	20.4642	19.6463	18.7427	17.9965	(87)
Th 2	19.5240	19.5349	19.5456	19.5963	19.6058	19.6508	19.6508	19.6592	19.6334	19.6058	19.5865	19.5664	(88)

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util rest of house	0.9776	0.9641	0.9417	0.8872	0.7870	0.6102	0.4289	0.4796	0.7290	0.9075	0.9644	0.9805 (89)
MIT 2	16.8380	17.1647	17.6644	18.4188	19.0104	19.4702	19.6062	19.5971	19.3084	18.5428	17.6453	16.8911 (90)
Living area fraction									FLA = Living area /	(4) =		0.3105 (91)
MIT	17.1894	17.5152	18.0150	18.7659	19.3683	19.8414	19.9976	19.9806	19.6672	18.8854	17.9861	17.2343 (92)
Temperature adjustment												0.0000
adjusted MIT	17.1894	17.5152	18.0150	18.7659	19.3683	19.8414	19.9976	19.9806	19.6672	18.8854	17.9861	17.2343 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9675	0.9505	0.9248	0.8691	0.7770	0.6253	0.4692	0.5166	0.7313	0.8913	0.9518	0.9715	(94)
Useful gains	574.8015	670.1362	727.3262	769.5943	734.9173	588.8532	422.9234	431.9943	563.5152	597.5754	566.5008	548.0910	(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	1946.0086	1887.8006	1708.1317	1402.9787	1081.6649	711.3292	461.1060	482.3873	767.0084	1168.7166	1560.8319	1900.4868	(97)
Space heating kWh	1020.1781	818.2705	729.7193	456.0368	257.9802	0.0000	0.0000	0.0000	0.0000	424.9290	715.9184	1006.1824	(98a)
Space heating requirement - total per year (kWh/year)												5429.2147	
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	1020.1781	818.2705	729.7193	456.0368	257.9802	0.0000	0.0000	0.0000	0.0000	424.9290	715.9184	1006.1824	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5429.2147	
Space heating per m2											(98c) / (4) =	61.9773	(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	1275.7093	1004.2818	1023.9047	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6606	0.7359	0.7008	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	842.6711	739.0437	717.5729	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1051.7827	1007.1300	933.3217	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	150.5603	199.4562	160.5171	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	37.6401	49.8640	40.1293	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												127.6334 (107)
Energy for space heating												61.9773 (99)
Energy for space cooling												1.4570 (108)
Total												63.4343 (109)
Fabric Energy Efficiency (DFEE)												63.4 (109)

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

1. Overall dwelling characteristics

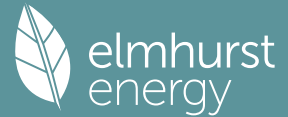
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	87.6000 (1b)	x 2.6000 (2b)	= 227.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 227.7600 (5)

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) = 0.1317 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3817 (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) = 0.3245 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)

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Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.4137	0.4056	0.3975	0.3569	0.3488	0.3082	0.3082	0.3001	0.3245	0.3488	0.3650	0.3812 (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	0.5856	0.5822	0.5790	0.5637	0.5608	0.5475	0.5475	0.5450	0.5526	0.5608	0.5666	0.5727 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.20)			13.8800	1.1450	15.8931		(27)
Floor Over Communal			10.6000	0.1300	1.3780		(28b)
Existing Ext Wall	59.8000	9.5600	50.2400	0.1800	9.0432		(29a)
New Ext Wall	19.2400	6.2100	13.0300	0.1800	2.3454		(29a)
Flat Roof	87.6000		87.6000	0.1100	9.6360		(30)
Total net area of external elements Aum (A, m ²)			177.2400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.1857		(33)
Party Wall			36.4000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							148.2017 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							8.8620 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	49.0477 (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	44.0118	43.7620	43.5172	42.3675	42.1523	41.1509	41.1509	40.9655	41.5366	42.1523	42.5875	43.0425 (38)
Average = Sum(39)m / 12 =	93.0595	92.8098	92.5650	91.4152	91.2001	90.1986	90.1986	90.0132	90.5844	91.2001	91.6353	92.0902 (39)
												91.4142
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0623	1.0595	1.0567	1.0436	1.0411	1.0297	1.0297	1.0275	1.0341	1.0411	1.0461	1.0513 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

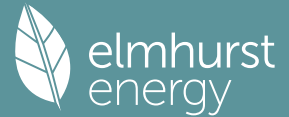
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5914 (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	29.2233	28.7893	28.1781	27.0512	26.2074	25.2718	24.7664	25.3733	26.0341	27.0352	28.1853	29.1245 (42b)
Hot water usage for other uses	41.1688	39.6717	38.1747	36.6776	35.1806	33.6835	33.6835	35.1806	36.6776	38.1747	39.6717	41.1688 (42c)
Average daily hot water use (litres/day)												64.5207 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	70.3921	68.4610	66.3528	63.7288	61.3880	58.9553	58.4499	60.5539	62.7117	65.2099	67.8571	70.2933 (44)
Energy content (annual)	111.4838	97.4876	101.9818	87.2416	82.6400	72.4924	70.6901	74.9783	77.3298	88.4893	96.6748	110.0623 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	94.7612	82.8644	86.6845	74.1554	70.2440	61.6186	60.0866	63.7316	65.7303	75.2159	82.1736	93.5529 (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	94.7612	82.8644	86.6845	74.1554	70.2440	61.6186	60.0866	63.7316	65.7303	75.2159	82.1736	93.5529 (64)
12Total per year (kWh/year)												910.8191 (64)
Electric shower(s)	54.1919	48.2854	52.7259	50.3156	51.2598	48.8969	50.5268	51.2598	50.3156	52.7259	51.7344	54.1919 (64a)
Heat gains from water heating, kWh/month	37.2383	32.7875	34.8526	31.1178	30.3760	27.6289	27.6533	28.7478	29.0115	31.9854	33.4770	36.9362 (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	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	123.6851	136.9370	123.6851	127.8079	123.6851	127.8079	123.6851	123.6851	127.8079	123.6851	127.8079	123.6851 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	234.5924	237.0267	230.8923	217.8328	201.3475	185.8537	175.5028	173.0685	179.2029	192.2624	208.7477	224.2416 (68)
Pumps, fans	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570 (71)
Total internal gains	50.0515	48.7909	46.8449	43.2191	40.8279	38.3734	37.1685	38.6396	40.2937	42.9912	46.4958	49.6454 (72)
	470.2003	484.6260	463.2936	450.7312	427.7318	413.9063	398.2277	397.2645	409.1759	420.8100	444.9228	459.4434 (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				3.7800	36.7938	0.6300	0.7000	0.7700	42.5049 (77)			
Southwest				4.3200	36.7938	0.6300	0.7000	0.7700	48.5770 (79)			
Northwest				5.7800	11.2829	0.6300	0.7000	0.7700	19.9307 (81)			
Solar gains	111.0125	195.7156	285.3709	383.0625	455.9644	464.5006	442.9036	386.7064	318.9171	221.0486	134.1730	94.2235 (83)
Total gains	581.2128	680.3416	748.6645	833.7936	883.6963	878.4070	841.1313	783.9708	728.0930	641.8586	579.0959	553.6669 (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	38.7520	38.8563	38.9590	39.4490	39.5421	39.9811	39.9811	40.0635	39.8109	39.5421	39.3543	39.1599
alpha	3.5835	3.5904	3.5973	3.6299	3.6361	3.6654	3.6654	3.6709	3.6541	3.6361	3.6236	3.6107
util living area	0.9813	0.9668	0.9419	0.8791	0.7679	0.6009	0.4555	0.5030	0.7216	0.9066	0.9678	0.9841 (86)
MIT	19.1819	19.4528	19.8208	20.3068	20.6848	20.9078	20.9743	20.9631	20.8145	20.3185	19.6758	19.1421 (87)
Th 2	20.0317	20.0341	20.0364	20.0472	20.0492	20.0587	20.0587	20.0604	20.0550	20.0492	20.0451	20.0408 (88)
util rest of house	0.9777	0.9604	0.9303	0.8549	0.7225	0.5289	0.3647	0.4100	0.6556	0.8826	0.9605	0.9810 (89)
MIT 2	18.3762	18.6447	19.0063	19.4784	19.8207	20.0069	20.0489	20.0454	19.9394	19.5004	18.8755	18.3434 (90)
Living area fraction	18.6264	18.8956	19.2592	19.7356	20.0890	20.2866	20.3363	20.3303	20.2111	19.7544	19.1240	18.5914 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6264	18.8956	19.2592	19.7356	20.0890	20.2866	20.3363	20.3303	20.2111	19.7544	19.1240	18.5914 (93)

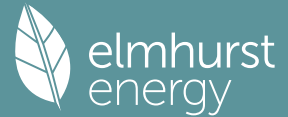
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9706	0.9508	0.9190	0.8459	0.7246	0.5471	0.3921	0.4376	0.6674	0.8738	0.9514	0.9746 (94)
Useful gains	564.0985	646.8412	688.0353	705.3283	640.3188	480.5904	329.8377	343.0615	485.9288	560.8794	550.9518	539.6229 (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	1333.2085	1298.9278	1181.0576	990.5398	765.0755	512.9230	337.0066	353.7831	553.5698	834.8821	1101.8251	1325.3094 (97)
Space heating kWh	572.2178	438.2022	366.8085	205.3523	92.8190	0.0000	0.0000	0.0000	0.0000	203.8580	396.6288	584.5508 (98a)
Space heating requirement - total per year (kWh/year)												2860.4375
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	572.2178	438.2022	366.8085	205.3523	92.8190	0.0000	0.0000	0.0000	0.0000	203.8580	396.6288	584.5508 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2860.4375
Space heating per m2										(98c) / (4) =		32.6534 (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	847.8673	667.4700	684.1003	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8367	0.8946	0.8686	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	709.3807	597.1328	594.2419	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	974.4802	933.4545	869.1133	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	190.8717	250.2234	204.5044	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	47.7179	62.5558	51.1261	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												161.3998 (107)
Energy for space heating												32.6534 (99)
Energy for space cooling												1.8425 (108)
Total												34.4959 (109)
Fabric Energy Efficiency (TFEE)												34.5 (109)

Full SAP Calculation Printout



Property Reference	Flat 2A				Issued on Date	01/02/2024
Assessment Reference	Be Lean		Prop Type Ref	Conversion		
Property						
SAP Rating	72 C	DER	6.62	TER	7.46	
Environmental	94 A	% DER < TER				11.26
CO ₂ Emissions (t/year)	0.5	DFEE	63.43	TFEE	34.50	
Compliance Check	See BREL	% DFEE < TFEE				-83.89
% DPER < TPER	-71.73	DPER	68.98	TPER	40.17	
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	87.6000	2.6000	227.7600
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.6000		
Dwelling volume			

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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) = 0.1317 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8817 (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) = 0.7495 (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	0.9556	0.9368	0.9181	0.8244	0.8057	0.7120	0.7120	0.6933	0.7495	0.8057	0.8431	0.8806 (22b)
Effective ac	0.9565	0.9388	0.9214	0.8398	0.8246	0.7535	0.7535	0.7403	0.7808	0.8246	0.8554	0.8877 (25)

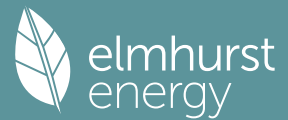
3. Heat losses and heat loss parameter

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)			9.5600	1.1450	10.9466		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Communal			10.6000	0.2075	2.1992	20.0000	212.0000 (28b)
Existing Ext Wall	59.8000	9.5600	50.2400	0.1800	9.0432	190.0000	9545.6000 (29a)
New Ext Wall	19.2400	6.2100	13.0300	0.1800	2.3454	9.0000	117.2700 (29a)
Flat Roof	87.6000		87.6000	0.1400	12.2640	9.0000	788.4000 (30)
Total net area of external elements Aum(A, m ²)			177.2400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.6349		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Internal Wall			176.8000			9.0000	1591.2000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12982.4700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							148.2017 (35)
Thermal bridges (Default value 0.200 * total exposed area)							35.4480 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	79.0829 (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
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(38)m	71.8950	70.5625	69.2564	63.1217	61.9740	56.6309	56.6309	55.6414	58.6889	61.9740	64.2959	66.7234 (38)
Heat transfer coeff	150.9779	149.6454	148.3393	142.2046	141.0569	135.7138	135.7138	134.7243	137.7718	141.0569	143.3788	145.8063 (39)
Average = Sum(39)m / 12 =												142.1991
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.7235	1.7083	1.6934	1.6233	1.6102	1.5492	1.5492	1.5379	1.5727	1.6102	1.6367	1.6645 (40)
HLP (average)												1.6233
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5914 (42)
Hot water usage for mixer showers												
67.6694	66.6525	65.1706	62.3353	60.2429	57.9095	56.5832	58.0538	59.6660	62.1713	65.0675	67.4101 (42a)	
Hot water usage for baths												
29.2233	28.7893	28.1781	27.0512	26.2074	25.2718	24.7664	25.3733	26.0341	27.0352	28.1853	29.1245 (42b)	
Hot water usage for other uses												
41.1688	39.6717	38.1747	36.6776	35.1806	33.6835	33.6835	35.1806	36.6776	38.1747	39.6717	41.1688 (42c)	
Average daily hot water use (litres/day)												126.9097 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
138.0615	135.1135	131.5234	126.0641	121.6309	116.8648	115.0331	118.6077	122.3777	127.3813	132.9246	137.7034 (44)	
Energy content (annual)												
218.6556	192.3998	202.1465	172.5755	163.7386	143.6989	139.1225	146.8611	150.9039	172.8552	189.3755	215.6103 (45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2107.9433
32.7983	28.8600	30.3220	25.8863	24.5608	21.5548	20.8684	22.0292	22.6356	25.9283	28.4063	32.3415 (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 (61)	
Total heat required for water heating calculated for each month												
274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483 (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												
274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483 (64)	
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2764.2133 (64)
Electric shower(s)												2764 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
117.2934	104.2481	111.8041	100.5334	99.0335	90.9319	90.8486	93.4217	93.3275	102.0647	106.1193	116.2808 (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	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	120.7371	133.6732	120.7371	124.7617	120.7371	124.7617	120.7371	120.7371	124.7617	120.7371	124.7617	120.7371 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	234.5924	237.0267	230.8923	217.8328	201.3475	185.8537	175.5028	173.0685	179.2029	192.2624	208.7477	224.2416 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571 (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)	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570 (71)
Water heating gains (Table 5)	157.6524	155.1311	150.2744	139.6297	133.1095	126.2943	122.1084	125.5668	129.6216	137.1838	147.3880	156.2914 (72)
Total internal gains	577.8533	590.7025	566.7751	547.0955	520.0655	498.7810	480.2197	481.2438	495.4576	515.0547	545.7688	566.1415 (73)

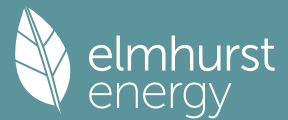
6. Solar gains

[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			3.7800	36.7938		0.6300		0.8000		0.7700		48.5770 (77)
Northwest			5.7800	11.2829		0.6300		0.8000		0.7700		22.7779 (81)
Southwest			4.3200	36.7938		0.6300		0.8000		0.7700		55.5166 (79)
Solar gains	126.8715	223.6749	326.1382	437.7857	521.1022	530.8579	506.1756	441.9501	364.4767	252.6270	153.3406	107.6840 (83)
Total gains	704.7248	814.3774	892.9133	984.8812	1041.1677	1029.6389	986.3953	923.1939	859.9343	767.6817	699.1094	673.8254 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	23.8859	24.0986	24.3108	25.3595	25.5659	26.5724	26.5724	26.7676	26.1755	25.5659	25.1518	24.7331
alpha	2.5924	2.6066	2.6207	2.6906	2.7044	2.7715	2.7715	2.7845	2.7450	2.7044	2.6768	2.6489
util living area												
	0.9733	0.9600	0.9391	0.8908	0.8080	0.6697	0.5354	0.5779	0.7686	0.9090	0.9598	0.9760 (86)

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MIT	18.1298	18.4460	18.9332	19.6497	20.2442	20.7082	20.8875	20.8591	20.5305	19.7647	18.8902	18.1590 (87)
Th 2	19.5240	19.5349	19.5456	19.5963	19.6058	19.6508	19.6508	19.6592	19.6334	19.6058	19.5865	19.5664 (88)
util rest of house												
	0.9672	0.9510	0.9245	0.8630	0.7546	0.5739	0.3969	0.4421	0.6874	0.8801	0.9492	0.9706 (89)
MIT 2	16.2796	16.6843	17.3032	18.2175	18.9268	19.4530	19.6037	19.5943	19.2774	18.3802	17.2791	16.3387 (90)
Living area fraction									fLA = Living area / (4) =			0.3105 (91)
MIT	16.8541	17.2313	17.8093	18.6622	19.3358	19.8427	20.0023	19.9870	19.6665	18.8101	17.7794	16.9039 (92)
Temperature adjustment												0.0000
adjusted MIT	16.8541	17.2313	17.8093	18.6622	19.3358	19.8427	20.0023	19.9870	19.6665	18.8101	17.7794	16.9039 (93)

8. Space heating requirement

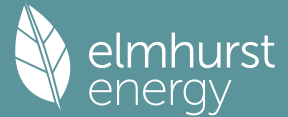
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9502	0.9301	0.9002	0.8394	0.7423	0.5891	0.4359	0.4784	0.6898	0.8582	0.9294	0.9552 (94)	
Useful gains	669.6645	757.4453	803.8402	826.6859	772.8668	606.5266	429.9616	441.6929	593.1429	658.8200	649.7582	643.6364 (95)	
Ext temp.	4.3000	4.9000	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													
	1895.3938	1845.3237	1677.6144	1388.2283	1077.0850	711.5076	461.7395	483.2568	766.9049	1158.0902	1531.1963	1852.3045 (97)	
Space heating kWh													
	911.9426	731.0543	650.0880	404.3105	226.3383	0.0000	0.0000	0.0000	0.0000	371.4570	634.6354	899.2491 (98a)	
Space heating requirement - total per year (kWh/year)												4829.0753	
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													
	911.9426	731.0543	650.0880	404.3105	226.3383	0.0000	0.0000	0.0000	0.0000	371.4570	634.6354	899.2491 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												4829.0753	
Space heating per m2											(98c) / (4) =	55.1264 (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													
	911.9426	731.0543	650.0880	404.3105	226.3383	0.0000	0.0000	0.0000	0.0000	371.4570	634.6354	899.2491 (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)													
	415.8425	333.3581	296.4378	184.3641	103.2095	0.0000	0.0000	0.0000	0.0000	169.3831	289.3914	410.0543 (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													
	274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483 (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													
	144.1143	127.4915	135.4436	118.9682	115.2713	103.8019	102.3427	106.4071	107.5861	120.0594	127.7917	142.5148 (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	30.2106	24.2360	21.8219	15.9876	12.3493	10.0895	11.2655	14.6433	19.0201	24.9555	28.1871	31.0502 (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													2202.0407 (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													1451.7927 (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)													243.8166 (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													3897.6500 (238)

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

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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2202.0407	0.1544	340.0354 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1451.7927	0.1409	204.5543 (264)
Space and water heating			544.5897 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	243.8166	0.1443	35.1903 (268)
Total CO2, kg/year			579.7800 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.6200 (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	2202.0407	1.5717	3460.9342 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1451.7927	1.5210	2208.1604 (278)
Space and water heating			5669.0945 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	243.8166	1.5338	373.9740 (282)
Total Primary energy kWh/year			6043.0686 (286)
Dwelling Primary energy Rate (DPER)			68.9800 (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	87.6000 (1b)	x 2.6000 (2b)	= 227.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 227.7600 (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) =	0.1317 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3817	(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) =		0.3245 (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	0.4137	0.4056	0.3975	0.3569	0.3488	0.3082	0.3082	0.3001	0.3245	0.3488	0.3650	0.3812 (22b)
Effective ac	0.5856	0.5822	0.5790	0.5637	0.5608	0.5475	0.5475	0.5450	0.5526	0.5608	0.5666	0.5727 (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)			13.8800	1.1450	15.8931		(27)
Floor Over Communal			10.6000	0.1300	1.3780		(28b)
Existing Ext Wall	59.8000	9.5600	50.2400	0.1800	9.0432		(29a)
New Ext Wall	19.2400	6.2100	13.0300	0.1800	2.3454		(29a)
Flat Roof	87.6000		87.6000	0.1100	9.6360		(30)
Total net area of external elements Aum(A, m2)			177.2400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.1857		(33)
Party Wall			36.4000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							148.2017 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							8.8620 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	49.0477 (37)

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

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(38)m	44.0118	43.7620	43.5172	42.3675	42.1523	41.1509	41.1509	40.9655	41.5366	42.1523	42.5875	43.0425 (38)
Heat transfer coeff	93.0595	92.8098	92.5650	91.4152	91.2001	90.1986	90.1986	90.0132	90.5844	91.2001	91.6353	92.0902 (39)
Average = Sum(39)m / 12 =												91.4142
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0623	1.0595	1.0567	1.0436	1.0411	1.0297	1.0297	1.0275	1.0341	1.0411	1.0461	1.0513 (40)
HLP (average)												1.0435
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5914 (42)
Hot water usage for mixer showers	67.6694	66.6525	65.1706	62.3353	60.2429	57.9095	56.5832	58.0538	59.6660	62.1713	65.0675	67.4101 (42a)
Hot water usage for baths	29.2233	28.7893	28.1781	27.0512	26.2074	25.2718	24.7664	25.3733	26.0341	27.0352	28.1853	29.1245 (42b)
Hot water usage for other uses	41.1688	39.6717	38.1747	36.6776	35.1806	33.6835	33.6835	35.1806	36.6776	38.1747	39.6717	41.1688 (42c)
Average daily hot water use (litres/day)												126.9097 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	138.0615	135.1135	131.5234	126.0641	121.6309	116.8648	115.0331	118.6077	122.3777	127.3813	132.9246	137.7034 (44)
Energy content (annual)	218.6556	192.3998	202.1465	172.5755	163.7386	143.6989	139.1225	146.8611	150.9039	172.8552	189.3755	215.6103 (45)
Distribution loss (46)m = 0.15 x (45)m	32.7983	28.8600	30.3220	25.8863	24.5608	21.5548	20.8684	22.0292	22.6356	25.9283	28.4063	32.3415 (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	270.4022	239.1386	253.8931	222.6528	215.4851	193.7762	190.8691	198.6077	200.9812	224.6018	239.4528	267.3568 (62)
WWHRS	-30.9356	-27.3597	-28.6495	-23.7229	-22.1089	-18.9188	-17.7333	-18.8576	-19.5741	-23.0757	-26.1420	-30.3627 (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	239.4666	211.7789	225.2436	198.9299	193.3762	174.8575	173.1358	179.7501	181.4072	201.5261	213.3109	236.9941 (64)
12Total per year (kWh/year)												2429.7768 (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)
												2430 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	114.1003	101.3640	108.6110	97.4432	95.8403	87.8418	87.6555	90.2286	90.2374	98.8716	103.0292	113.0877 (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	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712	129.5712 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.6851	136.9370	123.6851	127.8079	123.6851	127.8079	123.6851	123.6851	127.8079	123.6851	127.8079	123.6851 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	234.5924	237.0267	230.8923	217.8328	201.3475	185.8537	175.5028	173.0685	179.2029	192.2624	208.7477	224.2416 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571	35.9571 (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)	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570 (71)
Water heating gains (Table 5)	153.3606	150.8393	145.9825	135.3378	128.8177	122.0024	117.8166	121.2750	125.3298	132.8920	143.0961	151.9996 (72)
Total internal gains	576.5094	589.6745	565.4312	545.8499	518.7216	497.5354	478.8758	479.8999	494.2120	513.7108	544.5231	564.7976 (73)

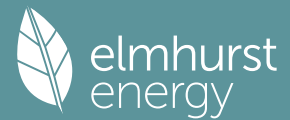
6. Solar gains

[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				3.7800	36.7938	0.6300	0.7000	0.7700	42.5049 (77)			
Southwest				4.3200	36.7938	0.6300	0.7000	0.7700	48.5770 (79)			
Northwest				5.7800	11.2829	0.6300	0.7000	0.7700	19.9307 (81)			
Solar gains	111.0125	195.7156	285.3709	383.0625	455.9644	464.5006	442.9036	386.7064	318.9171	221.0486	134.1730	94.2235 (83)
Total gains	687.5219	785.3900	850.8022	928.9123	974.6860	962.0360	921.7794	866.6063	813.1291	734.7594	678.6962	659.0211 (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	38.7520	38.8563	38.9590	39.4490	39.5421	39.9811	39.9811	40.0635	39.8109	39.5421	39.3543	39.1599
alpha	3.5835	3.5904	3.5973	3.6299	3.6361	3.6654	3.6654	3.6709	3.6541	3.6361	3.6236	3.6107
util living area												
	0.9693	0.9503	0.9190	0.8467	0.7268	0.5594	0.4192	0.4607	0.6724	0.8717	0.9495	0.9731 (86)

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MIT	19.3594	19.6167	19.9629	20.4062	20.7402	20.9270	20.9804	20.9723	20.8542	20.4274	19.8318	19.3208 (87)
Th 2	20.0317	20.0341	20.0364	20.0472	20.0492	20.0587	20.0587	20.0604	20.0550	20.0492	20.0451	20.0408 (88)
util rest of house												
	0.9635	0.9412	0.9041	0.8187	0.6791	0.4894	0.3342	0.3734	0.6049	0.8420	0.9388	0.9681 (89)
MIT 2	18.1308	18.4550	18.8872	19.4310	19.8117	20.0070	20.0493	20.0462	19.9413	19.4694	18.7371	18.0883 (90)
Living area fraction									fLA = Living area / (4) =			0.3105 (91)
MIT	18.5123	18.8157	19.2212	19.7338	20.1000	20.2927	20.3384	20.3338	20.2248	19.7668	19.0770	18.4710 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5123	18.8157	19.2212	19.7338	20.1000	20.2927	20.3384	20.3338	20.2248	19.7668	19.0770	18.4710 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9515	0.9268	0.8889	0.8084	0.6818	0.5074	0.3599	0.3994	0.6178	0.8318	0.9250	0.9570 (94)	
Useful gains	654.2033	727.9297	756.2447	750.9286	664.5279	488.1492	331.7897	346.1347	502.3511	611.1966	627.7954	630.6654 (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													
	1322.5904	1291.5108	1177.5397	990.3765	766.0785	513.4739	337.2008	354.0925	554.8072	836.0166	1097.5176	1314.2218 (97)	
Space heating kWh	497.2800	378.7265	313.4434	172.4025	75.5536	0.0000	0.0000	0.0000	0.0000	167.2661	338.2000	508.5660 (98a)	
Space heating requirement - total per year (kWh/year)												2451.4382	
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	497.2800	378.7265	313.4434	172.4025	75.5536	0.0000	0.0000	0.0000	0.0000	167.2661	338.2000	508.5660 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2451.4382	
Space heating per m2												27.9845 (99)	
										(98c) / (4) =			

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	497.2800	378.7265	313.4434	172.4025	75.5536	0.0000	0.0000	0.0000	0.0000	167.2661	338.2000	508.5660 (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)	538.7649	410.3212	339.5920	186.7849	81.8566	0.0000	0.0000	0.0000	0.0000	181.2200	366.4139	550.9924 (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	239.4666	211.7789	225.2436	198.9299	193.3762	174.8575	173.1358	179.7501	181.4072	201.5261	213.3109	236.9941 (64)	
Efficiency of water heater (217)m	85.6599	85.3478	84.8010	83.7404	82.1388	79.8000	79.8000	79.8000	79.8000	83.6450	85.0883	79.8000 (216)	
Fuel for water heating, kWh/month	279.5551	248.1362	265.6145	237.5553	235.4261	219.1196	216.9622	225.2507	227.3273	240.9302	250.6934	276.4532 (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	25.6993	20.6169	18.5633	13.6002	10.5052	8.5829	9.5832	12.4566	16.1799	21.2289	23.9780	26.4136 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-66.7691	-87.3366	-116.5788	-121.4330	-123.3671	-112.5407	-111.0976	-108.4092	-102.8413	-94.9674	-70.9235	-58.5557 (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)	-61.4945	-125.6229	-243.1410	-356.1648	-462.6195	-461.8816	-456.4530	-390.1908	-291.0595	-176.4767	-81.0061	-48.9190 (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												2655.9460 (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												2923.0239 (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)												207.4082 (232)	
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-4329.8495 (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												1542.5286 (238)	

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

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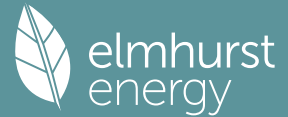


	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2655.9460	0.2100	557.7487 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2923.0239	0.2100	613.8350 (264)
Space and water heating			1171.5837 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	207.4082	0.1443	29.9354 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1174.8201	0.1362	-160.0379
PV Unit electricity exported	-3155.0294	0.1266	-399.5803
Total			-559.6183 (269)
Total CO2, kg/year			653.8301 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			7.4600 (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	2655.9460	1.1300	3001.2190 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2923.0239	1.1300	3303.0170 (278)
Space and water heating			6304.2360 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	207.4082	1.5338	318.1296 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1174.8201	1.5035	-1766.3975
PV Unit electricity exported	-3155.0294	0.4649	-1466.8391
Total			-3233.2366 (283)
Total Primary energy kWh/year			3519.2298 (286)
Target Primary Energy Rate (TPER)			40.1700 (287)

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Property Reference	Flat 2A				Issued on Date	01/02/2024
Assessment Reference	Be Lean		Prop Type Ref	Conversion		
Property						
SAP Rating	72 C	DER	6.62	TER	7.46	
Environmental	94 A	% DER < TER				11.26
CO ₂ Emissions (t/year)	0.5	DFEE	63.43	TFEE	34.50	
Compliance Check	See BREL	% DFEE < TFEE				-83.89
% DPER < TPER	-71.73	DPER	68.98	TPER	40.17	
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	87.6000 (1b)	2.6000 (2b)	227.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.6000		227.7600 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	227.7600 (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) = 0.1317 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8817 (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) = 0.7495 (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	0.9556	0.9368	0.9181	0.8244	0.8057	0.7120	0.7120	0.6933	0.7495	0.8057	0.8431	0.8806 (22b)
Effective ac	0.9565	0.9388	0.9214	0.8398	0.8246	0.7535	0.7535	0.7403	0.7808	0.8246	0.8554	0.8877 (25)

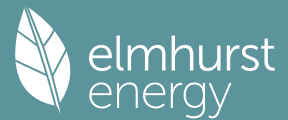
3. Heat losses and heat loss parameter

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)			9.5600	1.1450	10.9466		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Communal			10.6000	0.2075	2.1992	20.0000	212.0000 (28b)
Existing Ext Wall	59.8000	9.5600	50.2400	0.1800	9.0432	190.0000	9545.6000 (29a)
New Ext Wall	19.2400	6.2100	13.0300	0.1800	2.3454	9.0000	117.2700 (29a)
Flat Roof	87.6000		87.6000	0.1400	12.2640	9.0000	788.4000 (30)
Total net area of external elements Aum(A, m ²)			177.2400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.6349		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Internal Wall			176.8000			9.0000	1591.2000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12982.4700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							148.2017 (35)
Thermal bridges (Default value 0.200 * total exposed area)							35.4480 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	79.0829 (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
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(38)m	71.8950	70.5625	69.2564	63.1217	61.9740	56.6309	56.6309	55.6414	58.6889	61.9740	64.2959	66.7234	(38)
Heat transfer coeff	150.9779	149.6454	148.3393	142.2046	141.0569	135.7138	135.7138	134.7243	137.7718	141.0569	143.3788	145.8063	(39)
Average = Sum(39)m / 12 =												142.1991	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.7235	1.7083	1.6934	1.6233	1.6102	1.5492	1.5492	1.5379	1.5727	1.6102	1.6367	1.6645	(40)
HLP (average)												1.6233	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5914	(42)
Hot water usage for mixer showers														
67.6694	66.6525	65.1706	62.3353	60.2429	57.9095	56.5832	58.0538	59.6660	62.1713	65.0675	67.4101	67.4101	(42a)	
Hot water usage for baths														
29.2233	28.7893	28.1781	27.0512	26.2074	25.2718	24.7664	25.3733	26.0341	27.0352	28.1853	29.1245	29.1245	(42b)	
Hot water usage for other uses														
41.1688	39.6717	38.1747	36.6776	35.1806	33.6835	33.6835	35.1806	36.6776	38.1747	39.6717	41.1688	41.1688	(42c)	
Average daily hot water use (litres/day)												126.9097	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
138.0615	135.1135	131.5234	126.0641	121.6309	116.8648	115.0331	118.6077	122.3777	127.3813	132.9246	137.7034	137.7034	(44)	
Energy content (annual)	218.6556	192.3998	202.1465	172.5755	163.7386	143.6989	139.1225	146.8611	150.9039	172.8552	189.3755	215.6103	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2107.9433		
32.7983	28.8600	30.3220	25.8863	24.5608	21.5548	20.8684	22.0292	22.6356	25.9283	28.4063	32.3415	(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														
274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483	(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														
274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483	(64)		
	Total per year (kWh/year) = Sum(64)m =											2764.2133	(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														
117.2934	104.2481	111.8041	100.5334	99.0335	90.9319	90.8486	93.4217	93.3275	102.0647	106.1193	116.2808	(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	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	34.5148	30.6557	24.9309	18.8743	14.1088	11.9112	12.8705	16.7295	22.4543	28.5109	33.2765	35.4740	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	350.1379	353.7713	344.6154	325.1236	300.5187	277.3935	261.9445	258.3112	267.4671	286.9589	311.5638	334.6889	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	(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)	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	(71)
Water heating gains (Table 5)	157.6524	155.1311	150.2744	139.6297	133.1095	126.2943	122.1084	125.5668	129.6216	137.1838	147.3880	156.2914	(72)
Total internal gains	650.2736	647.5266	627.7891	591.5960	555.7054	520.5675	501.8918	505.5760	524.5115	560.6221	600.1967	634.4228	(73)

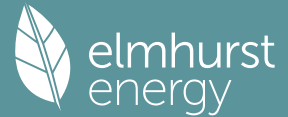
6. Solar gains

[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				3.7800	36.7938	0.6300	0.8000	0.7700	48.5770 (77)				
Northwest				5.7800	11.2829	0.6300	0.8000	0.7700	22.7779 (81)				
Southwest				4.3200	36.7938	0.6300	0.8000	0.7700	55.5166 (79)				
Solar gains	126.8715	223.6749	326.1382	437.7857	521.1022	530.8579	506.1756	441.9501	364.4767	252.6270	153.3406	107.6840	(83)
Total gains	777.1450	871.2015	953.9273	1029.3816	1076.8076	1051.4254	1008.0674	947.5261	888.9881	813.2490	753.5373	742.1068	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	23.8859	24.0986	24.3108	25.3595	25.5659	26.5724	26.5724	26.7676	26.1755	25.5659	25.1518	24.7331
alpha	2.5924	2.6066	2.6207	2.6906	2.7044	2.7715	2.7715	2.7845	2.7450	2.7044	2.6768	2.6489
util living area	0.9668	0.9538	0.9302	0.8813	0.7975	0.6613	0.5267	0.5673	0.7570	0.8982	0.9526	0.9701 (86)
MIT	18.2322	18.5231	19.0102	19.6976	20.2723	20.7177	20.8921	20.8656	20.5501	19.8170	18.9650	18.2577 (87)

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Th 2	19.5240	19.5349	19.5456	19.5963	19.6058	19.6508	19.6508	19.6592	19.6334	19.6058	19.5865	19.5664 (88)
util rest of house	0.9594	0.9435	0.9139	0.8519	0.7427	0.5654	0.3894	0.4325	0.6745	0.8668	0.9404	0.9635 (89)
MIT 2	16.4080	16.7800	17.3968	18.2729	18.9558	19.4604	19.6059	19.5978	19.2949	18.4405	17.3713	16.4628 (90)
Living area fraction									FLA = Living area / (4) =			0.3105 (91)
MIT	16.9744	17.3212	17.8978	18.7153	19.3646	19.8508	20.0052	19.9915	19.6847	18.8679	17.8662	17.0201 (92)
Temperature adjustment												0.0000
adjusted MIT	16.9744	17.3212	17.8978	18.7153	19.3646	19.8508	20.0052	19.9915	19.6847	18.8679	17.8662	17.0201 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9402	0.9212	0.8887	0.8286	0.7315	0.5812	0.4283	0.4689	0.6781	0.8451	0.9191	0.9460	(94)
Useful gains	730.6834	802.5244	847.8005	852.9284	787.6998	611.0474	431.7147	444.3048	602.8046	687.2578	692.6056	701.9987	(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	1913.5556	1858.7811	1690.7406	1395.7798	1081.1395	712.6030	462.1389	483.8556	769.4086	1166.2470	1543.6396	1869.2524	(97)
Space heating kWh	880.0569	709.8045	627.1474	390.8530	218.3191	0.0000	0.0000	0.0000	0.0000	356.3680	612.7445	868.4367	(98a)
Space heating requirement - total per year (kWh/year)												4663.7302	
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	880.0569	709.8045	627.1474	390.8530	218.3191	0.0000	0.0000	0.0000	0.0000	356.3680	612.7445	868.4367	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4663.7302	
Space heating per m2											(98c) / (4) =	53.2389	(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	880.0569	709.8045	627.1474	390.8530	218.3191	0.0000	0.0000	0.0000	0.0000	356.3680	612.7445	868.4367	(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)	401.3027	323.6683	285.9769	178.2275	99.5527	0.0000	0.0000	0.0000	0.0000	162.5025	279.4092	396.0040	(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	274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483	(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	144.1143	127.4915	135.4436	118.9682	115.2713	103.8019	102.3427	106.4071	107.5861	120.0594	127.7917	142.5148	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	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	30.2106	24.2360	21.8219	15.9876	12.3493	10.0895	11.2655	14.6433	19.0201	24.9555	28.1871	31.0502	(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												2126.6439	(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												1451.7927	(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)												243.8166	(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												3822.2532	(238)

10a. Fuel costs - using Table 12 prices

Fuel	Fuel price	Fuel cost
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	kWh/year	p/kWh	£/year
Space heating - main system 1	2126.6439	16.4900	350.6836 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1451.7927	16.4900	239.4006 (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	243.8166	16.4900	40.2054 (250)
Additional standing charges			0.0000 (251)
Total energy cost			630.2896 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.7112 (257)
SAP value		72.2616
SAP rating (Section 12)		72 (258)
SAP band		C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2126.6439	0.1544	328.4210 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1451.7927	0.1409	204.5543 (264)
Space and water heating			532.9753 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	243.8166	0.1443	35.1903 (268)
Total CO2, kg/year			568.1656 (272)
CO2 emissions per m2			6.4900 (273)
EI value			94.2584
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	87.6000 (1b)	2.6000 (2b)	227.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	227.7600 (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) =	0.1317 (8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50			15.0000 (17)
Infiltration rate			0.8817 (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) =		0.7495 (21)

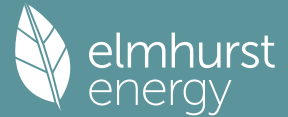
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate	0.7869	0.7495	0.7495	0.6933	0.6933	0.6183	0.6370	0.5996	0.6183	0.6558	0.6558	0.7120 (22b)
Effective ac	0.8096	0.7808	0.7808	0.7403	0.7403	0.6912	0.7029	0.6797	0.6912	0.7150	0.7150	0.7535 (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)			9.5600	1.1450	10.9466		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)

6. Solar gains						
[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W
Southeast	3.7800	40.4699	0.6300	0.8000	0.7700	53.4303 (77)
Northwest	5.7800	12.9236	0.6300	0.8000	0.7700	26.0900 (81)
Southwest	4.3200	40.4699	0.6300	0.8000	0.7700	61.0632 (79)

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Solar gains	140.5835	223.4824	323.3143	449.8009	523.5961	571.5763	538.8208	479.7534	392.5456	269.8909	174.1581	118.1217 (83)
Total gains	790.8571	871.0090	951.1033	1041.3969	1079.3014	1092.1438	1040.7126	985.3293	917.0570	830.5129	774.3548	752.5445 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	25.7707	26.1755	26.1755	26.7676	26.7676	27.5222	27.3378	27.7035	27.5222	27.1504	27.1504	26.5724
alpha	2.7180	2.7450	2.7450	2.7845	2.7845	2.8348	2.8225	2.8469	2.8348	2.8100	2.8100	2.7715
util living area	0.9604	0.9469	0.9169	0.8514	0.7353	0.5343	0.3754	0.4009	0.6664	0.8650	0.9392	0.9642 (86)
MIT	18.6392	18.8982	19.3767	20.0050	20.5355	20.8817	20.9699	20.9644	20.7542	20.1289	19.3579	18.6656 (87)
Th 2	19.6152	19.6334	19.6334	19.6592	19.6592	19.6907	19.6831	19.6980	19.6907	19.6753	19.6753	19.6508 (88)
util rest of house	0.9515	0.9352	0.8974	0.8146	0.6646	0.4172	0.2234	0.2471	0.5617	0.8233	0.9234	0.9561 (89)
MIT 2	16.9719	17.3066	17.9034	18.6810	19.2820	19.6314	19.6773	19.6903	19.5353	18.8556	17.9135	17.0257 (90)
Living area fraction	17.4896	17.8008	18.3608	19.0921	19.6712	20.0196	20.0786	20.0859	19.9138	19.2510	18.3620	0.3105 (91)
MIT	17.4896	17.8008	18.3608	19.0921	19.6712	20.0196	20.0786	20.0859	19.9138	19.2510	18.3620	17.5349 (92)
Temperature adjustment												0.0000
adjusted MIT	17.4896	17.8008	18.3608	19.0921	19.6712	20.0196	20.0786	20.0859	19.9138	19.2510	18.3620	17.5349 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9319	0.9133	0.8736	0.7958	0.6653	0.4486	0.2708	0.2950	0.5816	0.8068	0.9022	0.9380 (94)
Useful gains	737.0124	795.5291	830.8451	828.7591	718.0875	489.9453	281.8486	290.6244	533.3732	670.0557	698.6057	705.8568 (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	1733.7448	1680.9323	1510.0958	1238.3965	898.7740	526.6859	287.3941	297.5653	617.6520	1016.2387	1376.3246	1687.5848 (97)
Space heating kWh	741.5689	594.9910	505.3625	294.9389	134.4308	0.0000	0.0000	0.0000	0.0000	257.5602	487.9576	730.4056 (98a)
Space heating requirement - total per year (kWh/year)												3747.2155
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	741.5689	594.9910	505.3625	294.9389	134.4308	0.0000	0.0000	0.0000	0.0000	257.5602	487.9576	730.4056 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3747.2155
Space heating per m2										(98c) / (4) =		42.7764 (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	741.5689	594.9910	505.3625	294.9389	134.4308	0.0000	0.0000	0.0000	0.0000	257.5602	487.9576	730.4056 (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)	338.1527	271.3137	230.4435	134.4911	61.2999	0.0000	0.0000	0.0000	0.0000	117.4465	222.5069	333.0623 (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	274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483 (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	144.1143	127.4915	135.4436	118.9682	115.2713	103.8019	102.3427	106.4071	107.5861	120.0594	127.7917	142.5148 (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	30.2106	24.2360	21.8219	15.9876	12.3493	10.0895	11.2655	14.6433	19.0201	24.9555	28.1871	31.0502 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1708.7166 (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												1451.7927 (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)												243.8166 (232)

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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	3404.3259 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1708.7166	25.1600	429.9131 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1451.7927	25.1600	365.2710 (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	243.8166	25.1600	61.3443 (250)
Additional standing charges			0.0000 (251)
Total energy cost			856.5284 (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	1708.7166	0.1551	264.9712 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1451.7927	0.1409	204.5543 (264)
Space and water heating			469.5255 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	243.8166	0.1443	35.1903 (268)
Total CO2, kg/year			504.7158 (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	1708.7166	1.5741	2689.7203 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1451.7927	1.5210	2208.1604 (278)
Space and water heating			4897.8806 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	243.8166	1.5338	373.9740 (282)
Total Primary energy kWh/year			5271.8546 (286)

SAP 10 EPC IMPROVEMENTS

Be Lean

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

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

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

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

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

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

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

	Current £857	Potential £857	£0	Saving
Electricity				
Space heating	£430	£430	£0	
Water heating	£365	£365	£0	
Lighting	£61	£61	£0	
Total cost of fuels	£857	£857	£0	
Total cost of uses	£856	£856	£0	
Delivered energy	39 kWh/m²	39 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	60 kWh/m²	60 kWh/m²	0 kWh/m²	

Full SAP Calculation Printout



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	87.6000 (1b)	x 2.6000 (2b)	= 227.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 227.7600 (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) = 0.1317 (8)											
Pressure test	No											
Pressure Test Method	Blower Door											
Measured/design AP50	15.0000 (17)											
Infiltration rate	0.8817 (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) = 0.7495 (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	0.9556	0.9368	0.9181	0.8244	0.8057	0.7120	0.7120	0.6933	0.7495	0.8057	0.8431	0.8806 (22b)
Effective ac	0.9565	0.9388	0.9214	0.8398	0.8246	0.7535	0.7535	0.7403	0.7808	0.8246	0.8554	0.8877 (25)

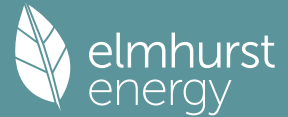
3. Heat losses and heat loss parameter

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)			9.5600	1.1450	10.9466		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Communal			10.6000	0.2075	2.1992	20.0000	212.0000 (28b)
Existing Ext Wall	59.8000	9.5600	50.2400	0.1800	9.0432	190.0000	9545.6000 (29a)
New Ext Wall	19.2400	6.2100	13.0300	0.1800	2.3454	9.0000	117.2700 (29a)
Flat Roof	87.6000		87.6000	0.1400	12.2640	9.0000	788.4000 (30)
Total net area of external elements Aum(A, m2)			177.2400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	43.6349		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Internal Wall			176.8000			9.0000	1591.2000 (32c)
Heat capacity Cm = Sum (A x k)					(28)... (30) + (32) + (32a)... (32e) =		12982.4700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							148.2017 (35)
Thermal bridges (Default value 0.200 * total exposed area)							35.4480 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		79.0829 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.5914 (42)											
Hot water usage for mixer showers	67.4101 (42a)											
Hot water usage for baths	29.1245 (42b)											
Hot water usage for other uses	41.1688 (42c)											
Average daily hot water use (litres/day)	126.9097 (43)											
Daily hot water use	Jan 138.0615	Feb 135.1135	Mar 131.5234	Apr 126.0641	May 121.6309	Jun 116.8648	Jul 115.0331	Aug 118.6077	Sep 122.3777	Oct 127.3813	Nov 132.9246	Dec 137.7034 (44)

Full SAP Calculation Printout



Energy content (annual)	218.6556	192.3998	202.1465	172.5755	163.7386	143.6989	139.1225	146.8611	150.9039	172.8552	189.3755	215.6103	(45)
Distribution loss (46)m = 0.15 x (45)m	32.7983	28.8600	30.3220	25.8863	24.5608	21.5548	20.8684	22.0292	22.6356	25.9283	28.4063	32.3415	(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	274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483	(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	274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483	(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	117.2934	104.2481	111.8041	100.5334	99.0335	90.9319	90.8486	93.4217	93.3275	102.0647	106.1193	116.2808	(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	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	34.5148	30.6557	24.9309	18.8743	14.1088	11.9112	12.8705	16.7295	22.4543	28.5109	33.2765	35.4740	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	350.1379	353.7713	344.6154	325.1236	300.5187	277.3935	261.9445	258.3112	267.4671	286.9589	311.5638	334.6889	(68)
Pumps, fans	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	(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)	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	(71)
Total internal gains	157.6524	155.1311	150.2744	139.6297	133.1095	126.2943	122.1084	125.5668	129.6216	137.1838	147.3880	156.2914	(72)
	650.2736	647.5266	627.7891	591.5960	555.7054	520.5675	501.8918	505.5760	524.5115	560.6221	600.1967	634.4228	(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

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
alpha	23.8859	24.0986	24.3108	25.3595	25.5659	26.5724	26.5724	26.7676	26.1755	25.5659	25.1518	24.7331		
util living area	2.5924	2.6066	2.6207	2.6906	2.7044	2.7715	2.7715	2.7845	2.7450	2.7044	2.6768	2.6489		
MIT	0.9668	0.9538	0.9302	0.8813	0.7975	0.6613	0.5267	0.5673	0.7570	0.8982	0.9526	0.9701	(86)	
Th 2	18.2322	18.5231	19.0102	19.6976	20.2723	20.7177	20.8921	20.8656	20.5501	19.8170	18.9650	18.2577	(87)	
util rest of house	19.5240	19.5349	19.5456	19.5963	19.6058	19.6508	19.6508	19.6592	19.6334	19.6058	19.5865	19.5664	(88)	
Living area fraction	0.9594	0.9435	0.9139	0.8519	0.7427	0.5654	0.3894	0.4325	0.6745	0.8668	0.9404	0.9635	(89)	
MIT 2	16.4080	16.7800	17.3968	18.2729	18.9558	19.4604	19.6059	19.5978	19.2949	18.4405	17.3713	16.4628	(90)	
Temperature adjustment	16.9744	17.3212	17.8978	18.7153	19.3646	19.8508	20.0052	19.9915	19.6847	18.8679	17.8662	17.0201	(92)	
adjusted MIT	16.9744	17.3212	17.8978	18.7153	19.3646	19.8508	20.0052	19.9915	19.6847	18.8679	17.8662	17.0201	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9402	0.9212	0.8887	0.8286	0.7315	0.5812	0.4283	0.4689	0.6781	0.8451	0.9191	0.9460	(94)
Ext temp.	730.6834	802.5244	847.8005	852.9284	787.6998	611.0474	431.7147	444.3048	602.8046	687.2578	692.6056	701.9987	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Space heating kWh	1913.5556	1858.7811	1690.7406	1395.7798	1081.1395	712.6030	462.1389	483.8556	769.4086	1166.2470	1543.6396	1869.2524	(97)
Space heating requirement - total per year (kWh/year)	880.0569	709.8045	627.1474	390.8530	218.3191	0.0000	0.0000	0.0000	0.0000	356.3680	612.7445	868.4367	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													

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880.0569	709.8045	627.1474	390.8530	218.3191	0.0000	0.0000	0.0000	0.0000	356.3680	612.7445	868.4367 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)											4663.7302
Space heating per m2											(98c) / (4) = 53.2389 (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	880.0569	709.8045	627.1474	390.8530	218.3191	0.0000	0.0000	0.0000	0.0000	356.3680	612.7445	868.4367	(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)	401.3027	323.6683	285.9769	178.2275	99.5527	0.0000	0.0000	0.0000	0.0000	162.5025	279.4092	396.0040	(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	274.3936 242.7438 257.8845 226.5155 219.4766 197.6389 194.8605 202.5991 204.8439 228.5932 243.3155 271.3483 (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	144.1143 127.4915 135.4436 118.9682 115.2713 103.8019 102.3427 106.4071 107.5861 120.0594 127.7917 142.5148 (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	30.2106 24.2360 21.8219 15.9876 12.3493 10.0895 11.2655 14.6433 19.0201 24.9555 28.1871 31.0502 (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	2126.6439 (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	1451.7927 (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)	243.8166 (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	3822.2532 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2126.6439	16.4900	350.6836	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1451.7927	16.4900	239.4006	(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	243.8166	16.4900	40.2054	(250)
Additional standing charges			0.0000	(251)
Total energy cost			630.2896	(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] =	1.7112 (257)
SAP value		72.2616
SAP rating (Section 12)		72 (258)
SAP band		C

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

Energy	Emission factor	Emissions
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Space heating - main system 1	kWh/year	kg CO2/kWh	kg CO2/year
Total CO2 associated with community systems	2126.6439	0.1544	328.4210 (261)
Water heating (other fuel)			0.0000 (373)
Space and water heating	1451.7927	0.1409	204.5543 (264)
Pumps, fans and electric keep-hot			532.9753 (265)
Energy for lighting	0.0000	0.0000	0.0000 (267)
Total CO2, kg/year	243.8166	0.1443	35.1903 (268)
CO2 emissions per m2			568.1656 (272)
EI value			6.4900 (273)
EI rating			94.2584
EI band			94 (274)
			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	87.6000 (1b)	x 2.6000 (2b)	= 227.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	87.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 227.7600 (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) = 0.1317 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8817 (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) = 0.7495 (21)

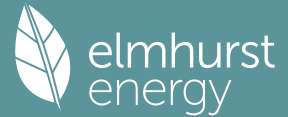
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate	0.7869	0.7495	0.7495	0.6933	0.6933	0.6183	0.6370	0.5996	0.6183	0.6558	0.6558	0.7120 (22b)
Effective ac	0.8096	0.7808	0.7808	0.7403	0.7403	0.6912	0.7029	0.6797	0.6912	0.7150	0.7150	0.7535 (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)			9.5600	1.1450	10.9466		(27)
Patio Doors (Uw = 1.20)			4.3200	1.1450	4.9466		(27)
Floor Over Communal			10.6000	0.2075	2.1992	20.0000	212.0000 (28b)
Existing Ext Wall	59.8000	9.5600	50.2400	0.1800	9.0432	190.0000	9545.6000 (29a)
New Ext Wall	19.2400	6.2100	13.0300	0.1800	2.3454	9.0000	117.2700 (29a)
Flat Roof	87.6000		87.6000	0.1400	12.2640	9.0000	788.4000 (30)
Total net area of external elements Aum(A, m2)			177.2400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		43.6349		(33)
Party Wall			36.4000	0.0000	0.0000	20.0000	728.0000 (32)
Internal Wall			176.8000			9.0000	1591.2000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 12982.4700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							148.2017 (35)
Thermal bridges (Default value 0.200 * total exposed area)							35.4480 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 79.0829 (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	60.8526	58.6889	58.6889	55.6414	55.6414	51.9474	52.8313	51.0899	51.9474	53.7416	53.7416	56.6309 (38)
Average = Sum(39)m / 12 =	139.9355	137.7718	137.7718	134.7243	134.7243	131.0303	131.9142	130.1728	131.0303	132.8245	132.8245	135.7138 (39)
												134.2032
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.5974	1.5727	1.5727	1.5379	1.5379	1.4958	1.5059	1.4860	1.4958	1.5163	1.5163	1.5492 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5914 (42)
Hot water usage for mixer showers	67.6694	66.6525	65.1706	62.3353	60.2429	57.9095	56.5832	58.0538	59.6660	62.1713	65.0675	67.4101 (42a)
Hot water usage for baths	29.2233	28.7893	28.1781	27.0512	26.2074	25.2718	24.7664	25.3733	26.0341	27.0352	28.1853	29.1245 (42b)
Hot water usage for other uses	41.1688	39.6717	38.1747	36.6776	35.1806	33.6835	33.6835	35.1806	36.6776	38.1747	39.6717	41.1688 (42c)
Average daily hot water use (litres/day)												126.9097 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	138.0615	135.1135	131.5234	126.0641	121.6309	116.8648	115.0331	118.6077	122.3777	127.3813	132.9246	137.7034 (44)
Energy content (annual)	218.6556	192.3998	202.1465	172.5755	163.7386	143.6989	139.1225	146.8611	150.9039	172.8552	189.3755	215.6103 (45)
Distribution loss (46)m = 0.15 x (45)m	32.7983	28.8600	30.3220	25.8863	24.5608	21.5548	20.8684	22.0292	22.6356	25.9283	28.4063	32.3415 (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	274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483 (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	274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483 (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 per year (kWh/year) = Sum(64a)m =											2764.2133 (64)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	117.2934	104.2481	111.8041	100.5334	99.0335	90.9319	90.8486	93.4217	93.3275	102.0647	106.1193	116.2808 (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	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855	155.4855 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	34.5148	30.6557	24.9309	18.8743	14.1088	11.9112	12.8705	16.7295	22.4543	28.5109	33.2765	35.4740 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	350.1379	353.7713	344.6154	325.1236	300.5187	277.3935	261.9445	258.3112	267.4671	286.9589	311.5638	334.6889 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400	53.1400 (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)	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570	-103.6570 (71)
Water heating gains (Table 5)	157.6524	155.1311	150.2744	139.6297	133.1095	126.2943	122.1084	125.5668	129.6216	137.1838	147.3880	156.2914 (72)
Total internal gains	650.2736	647.5266	627.7891	591.5960	555.7054	520.5675	501.8918	505.5760	524.5115	560.6221	600.1967	634.4228 (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				3.7800	40.4699	0.6300	0.8000	0.7700	53.4303 (77)			
Northwest				5.7800	12.9236	0.6300	0.8000	0.7700	26.0900 (81)			
Southwest				4.3200	40.4699	0.6300	0.8000	0.7700	61.0632 (79)			
Solar gains	140.5835	223.4824	323.3143	449.8009	523.5961	571.5763	538.8208	479.7534	392.5456	269.8909	174.1581	118.1217 (83)
Total gains	790.8571	871.0090	951.1033	1041.3969	1079.3014	1092.1438	1040.7126	985.3293	917.0570	830.5129	774.3548	752.5445 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)											21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	25.7707	26.1755	26.1755	26.7676	26.7676	27.5222	27.3378	27.7035	27.5222	27.1504	27.1504	26.5724
alpha	2.7180	2.7450	2.7450	2.7845	2.7845	2.8348	2.8225	2.8469	2.8348	2.8100	2.8100	2.7715
util living area	0.9604	0.9469	0.9169	0.8514	0.7353	0.5343	0.3754	0.4009	0.6664	0.8650	0.9392	0.9642 (86)
MIT	18.6392	18.8982	19.3767	20.0050	20.5355	20.8817	20.9699	20.9644	20.7542	20.1289	19.3579	18.6656 (87)
Th 2	19.6152	19.6334	19.6334	19.6592	19.6592	19.6907	19.6831	19.6980	19.6907	19.6753	19.6753	19.6508 (88)
util rest of house	0.9515	0.9352	0.8974	0.8146	0.6646	0.4172	0.2234	0.2471	0.5617	0.8233	0.9234	0.9561 (89)
MIT 2	16.9719	17.3066	17.9034	18.6810	19.2820	19.6314	19.6773	19.6903	19.5353	18.8556	17.9135	17.0257 (90)
Living area fraction	17.4896	17.8008	18.3608	19.0921	19.6712	20.0196	20.0786	20.0859	fLA = Living area / (4) = 19.9138	19.2510	18.3620	0.3105 (91)
MIT	17.4896	17.8008	18.3608	19.0921	19.6712	20.0196	20.0786	20.0859	19.9138	19.2510	18.3620	17.5349 (92)
Temperature adjustment												0.0000
adjusted MIT	17.4896	17.8008	18.3608	19.0921	19.6712	20.0196	20.0786	20.0859	19.9138	19.2510	18.3620	17.5349 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9319	0.9133	0.8736	0.7958	0.6653	0.4486	0.2708	0.2950	0.5816	0.8068	0.9022	0.9380	(94)
Useful gains	737.0124	795.5291	830.8451	828.7591	718.0875	489.9453	281.8486	290.6244	533.3732	670.0557	698.6057	705.8568	(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	1733.7448	1680.9323	1510.0958	1238.3965	898.7740	526.6859	287.3941	297.5653	617.6520	1016.2387	1376.3246	1687.5848	(97)
Space heating kWh	741.5689	594.9910	505.3625	294.9389	134.4308	0.0000	0.0000	0.0000	0.0000	257.5602	487.9576	730.4056	(98a)
Space heating requirement - total per year (kWh/year)												3747.2155	
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	741.5689	594.9910	505.3625	294.9389	134.4308	0.0000	0.0000	0.0000	0.0000	257.5602	487.9576	730.4056	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3747.2155	
Space heating per m2											(98c) / (4) =	42.7764	(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	741.5689	594.9910	505.3625	294.9389	134.4308	0.0000	0.0000	0.0000	0.0000	257.5602	487.9576	730.4056	(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)	338.1527	271.3137	230.4435	134.4911	61.2999	0.0000	0.0000	0.0000	0.0000	117.4465	222.5069	333.0623	(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	274.3936	242.7438	257.8845	226.5155	219.4766	197.6389	194.8605	202.5991	204.8439	228.5932	243.3155	271.3483	(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	144.1143	127.4915	135.4436	118.9682	115.2713	103.8019	102.3427	106.4071	107.5861	120.0594	127.7917	142.5148	(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	30.2106	24.2360	21.8219	15.9876	12.3493	10.0895	11.2655	14.6433	19.0201	24.9555	28.1871	31.0502	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1708.7166	(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												1451.7927	(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)												243.8166	(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												3404.3259	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1708.7166	25.1600	429.9131	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1451.7927	25.1600	365.2710	(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	243.8166	25.1600	61.3443	(250)
Additional standing charges			0.0000	(251)
Total energy cost			856.5284	(255)

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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	1708.7166	0.1551	264.9712 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1451.7927	0.1409	204.5543 (264)
Space and water heating			469.5255 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	243.8166	0.1443	35.1903 (268)
Total CO2, kg/year			504.7158 (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	1708.7166	1.5741	2689.7203 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1451.7927	1.5210	2208.1604 (278)
Space and water heating			4897.8806 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	243.8166	1.5338	373.9740 (282)
Total Primary energy kWh/year			5271.8546 (286)

Overview Report

Dwelling Address	
Report Date	01/02/2024
Property Type	Flat, Semi-Detached
Floor Area [m ²]	88

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

Energy Rating

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

Most energy efficient - lower running costs

CURRENT

POTENTIAL

(92 plus)

A

(81-91)

B

(69-80)

C

(55-68)

D

(39-54)

E

(21-38)

F

(1-20)

G

72

72

Least energy efficient - higher running costs

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good
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Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.18 W/m ² K	Very Good
Roof	Average thermal transmittance 0.14 W/m ² K	Very Good
Floor	Average thermal transmittance 0.21 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 60 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

£857

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