

Summary for Input Data



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

SAP Rating	65 D	DER	8.10	TER	8.39
Environmental	93 A	% DER < TER			3.46
CO ₂ Emissions (t/year)	0.68	DFEE	86.19	TFEE	40.00
Compliance Check	See BREL	% DFEE < TFEE			-115.49
% DPER < TPER	-85.43	DPER	84.13	TPER	45.37

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

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

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

kJ/m²K

7.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	30.60 m	94.80 m²	2.60 m
1st Storey:	0.00 m	0.00 m²	0.00 m
2nd Storey:	0.00 m	0.00 m²	0.00 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	35.60	m²
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9.0 External Walls	Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
	Existing Ext Wall	Cavity Wall	Cavity wall : dense plaster, dense block, filled cavity, any outside structure	0.55	190.00	37.96	32.29	0.00	None	5.67	Enter Gross Area
	New Ext Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	41.60	34.31	0.00	None	7.29	Enter Gross Area

9.1 Party Walls	Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
	Party Wall	Filled Cavity with Edge Sealing	Steel frame	0.00	20.00	27.82	0.00	None
	Party Wall to Adjacent	Solid Wall	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	180.00	9.10	0.00	None

9.2 Internal Walls	Description	Construction	Kappa (kJ/m²K)	Area (m²)
	Internal Wall	Plasterboard on timber frame	9.00	177.55

Summary for Input Data

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.16	9.00	94.80	94.80	None	0.00	Calculate Wall Area	0.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Floor Over Commercial	Exposed Floor - Timber	Lowest occupied	Timber exposed floor, insulation between joists	0.25	None	0.00	20.00	94.80

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	1.60
Patio Doors	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.60
Bifold Doors	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.60

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Entrance Door	Entrance Door	New Ext Wall	North West	1.89	0
Patio Doors	Patio Doors	Existing Ext Wall	South West	3.78	0
Rear Elevation	Windows	Existing Ext Wall	South East	1.89	0
Bifolds	Bifold Doors	New Ext Wall	South East	5.40	0

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

Y-value

 W/m²K

18.0 Pressure Testing

Designed AP₅₀

 m³/(h.m²) @ 50 Pa

Property Tested?

Test Method

As Built AP₅₀

 m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

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

24.0 Main Heating 1

Percentage of Heat

 %

Database Ref. No.

Fuel Type

SAP Code

In Winter

In Summer

Controls SAP Code

PCDF Controls

Delayed Start Stat

HETAS approved System

Summary for Input Data

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

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

28.0 Water Heating

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

28.1 Showers

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

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

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

Summary for Input Data



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

31.0 Thermal Store

Thermal Store	None
Thermal Store Pipework	within a single casing

34.0 Small-scale Hydro

Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

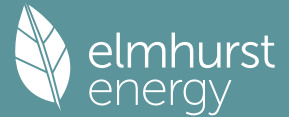
Lower cost measures

None

Further measures to achieve even higher standards

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

Full SAP Calculation Printout



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% DPER < TPER	-85.43	DPER	84.13	TPER	45.37
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	94.8000 (1b)	2.6000 (2b)	246.4800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000		246.4800 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	246.4800 (5)

2. Ventilation rate

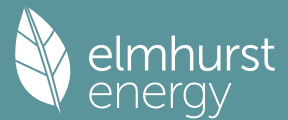
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1623 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9123 (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) = 0.7754 (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	0.9887	0.9693	0.9499	0.8530	0.8336	0.7367	0.7367	0.7173	0.7754	0.8336	0.8724	0.9111 (22b)
Effective ac	0.9888	0.9698	0.9512	0.8638	0.8474	0.7713	0.7713	0.7572	0.8007	0.8474	0.8805	0.9151 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			1.8900	1.5038	2.8421		(27)
Patio Doors (Uw = 1.60)			3.7800	1.5038	5.6842		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.5500	17.7595	190.0000	6135.1000 (29a)
New Ext Wall	41.6000	7.2900	34.3100	0.1800	6.1758	9.0000	308.7900 (29a)
Flat Roof	94.8000		94.8000	0.1600	15.1680	9.0000	853.2000 (30)
Total net area of external elements Aum(A, m ²)			269.1600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	81.3399		(33)
Party Wall			27.8200	0.0000	0.0000	20.0000	556.4000 (32)
Party Wall to Adjacent			9.1000	0.0000	0.0000	180.0000	1638.0000 (32)
Internal Wall			177.5500			9.0000	1597.9500 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	12985.4400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							136.9772 (35)
Thermal bridges (Default value 0.200 * total exposed area)							53.8320 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	135.1719 (37)

Full SAP Calculation Printout



Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 80.4236	Feb 78.8799	Mar 77.3667	Apr 70.2595	May 68.9298	Jun 62.7397	Jul 62.7397	Aug 61.5934	Sep 65.1240	Oct 68.9298	Nov 71.6198	Dec 74.4321 (38)
Heat transfer coeff	215.5955	214.0518	212.5386	205.4315	204.1017	197.9116	197.9116	196.7653	200.2959	204.1017	206.7918	209.6041 (39)
Average = Sum(39)m / 12 =												205.4251
HLP	Jan 2.2742	Feb 2.2579	Mar 2.2420	Apr 2.1670	May 2.1530	Jun 2.0877	Jul 2.0877	Aug 2.0756	Sep 2.1128	Oct 2.1530	Nov 2.1813	Dec 2.2110 (40)
HLP (average)												2.1669
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

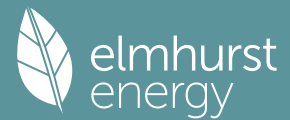
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.6859 (42)
Hot water usage for mixer showers												
	69.2534	68.2126	66.6961	63.7944	61.6530	59.2650	57.9076	59.4127	61.0626	63.6266	66.5906	68.9880 (42a)
Hot water usage for baths												
	29.9044	29.4603	28.8349	27.6817	26.8183	25.8608	25.3436	25.9647	26.6409	27.6654	28.8423	29.8033 (42b)
Hot water usage for other uses												
	42.1362	40.6040	39.0718	37.5396	36.0073	34.4751	34.4751	36.0073	37.5396	39.0718	40.6040	42.1362 (42c)
Average daily hot water use (litres/day)												129.8811 (43)
Daily hot water use	Jan 141.2940	Feb 138.2770	Mar 134.6027	Apr 129.0157	May 124.4786	Jun 119.6009	Jul 117.7264	Aug 121.3847	Sep 125.2430	Oct 130.3638	Nov 136.0369	Dec 140.9276 (44)
Energy conte	223.7752	196.9045	206.8794	176.6160	167.5721	147.0633	142.3799	150.2997	154.4372	176.9024	193.8095	220.6586 (45)
Energy content (annual)										Total = Sum(45)m =		2157.2978
Distribution loss (46)m = 0.15 x (45)m												
	33.5663	29.5357	31.0319	26.4924	25.1358	22.0595	21.3570	22.5449	23.1656	26.5354	29.0714	33.0988 (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												
	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966 (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												
	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2813.5678 (64)
Electric shower(s)												2814 (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												
	118.9957	105.7460	113.3778	101.8768	100.3081	92.0505	91.9317	94.5650	94.5024	103.4105	107.5937	117.9594 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan 134.2947	Feb 134.2947	Mar 134.2947	Apr 134.2947	May 134.2947	Jun 134.2947	Jul 134.2947	Aug 134.2947	Sep 134.2947	Oct 134.2947	Nov 134.2947	Dec 134.2947 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	135.4134	149.9220	135.4134	139.9272	135.4134	139.9272	135.4134	135.4134	139.9272	135.4134	139.9272	135.4134 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	247.6369	250.2066	243.7310	229.9454	212.5434	196.1880	185.2616	182.6919	189.1675	202.9532	220.3551	236.7105 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295 (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)												
	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357 (71)
Water heating gains (Table 5)												
	159.9404	157.3601	152.3895	141.4956	134.8228	127.8480	123.5641	127.1035	131.2533	138.9925	149.4356	158.5476 (72)
Total internal gains												
	609.2791	623.7771	597.8224	577.6566	549.0680	527.2516	507.5276	508.4973	523.6364	543.6476	576.0064	596.9599 (73)

6. Solar gains												
[Jan]												
		Area m2		Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast		1.8900		36.7938		0.6300		0.8000		0.7700		24.2885 (77)
Southwest		3.7800		36.7938		0.6300		0.8000		0.7700		48.5770 (79)
Southeast		5.4000		36.7938		0.6300		0.8000		0.7700		69.3957 (77)
Solar gains	142.2612	242.3234	331.5575	410.8158	460.1479	456.8204	440.4236	403.6196	359.0066	267.8190	170.3961	121.7459 (83)
Total gains	751.5403	866.1005	929.3799	988.4724	1009.2159	984.0720	947.9512	912.1169	882.6430	811.4666	746.4025	718.7058 (84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan 16.7307	Feb 16.8514	Mar 16.9713	Apr 17.5585	May 17.6729	Jun 18.2256	Jul 18.2256	Aug 18.3318	Sep 18.0087	Oct 17.6729	Nov 17.4430	Dec 17.2090
alpha	2.1154	2.1234	2.1314	2.1706	2.1782	2.2150	2.2150	2.2221	2.2006	2.1782	2.1629	2.1473
util living area												

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	0.9710	0.9596	0.9444	0.9140	0.8634	0.7705	0.6593	0.6870	0.8232	0.9202	0.9594	0.9736 (86)
MIT	17.1692	17.4980	18.0383	18.8387	19.5931	20.2933	20.6582	20.6118	20.0939	19.1147	18.0611	17.1828 (87)
Th 2	19.1568	19.1669	19.1769	19.2243	19.2333	19.2755	19.2755	19.2834	19.2592	19.2333	19.2152	19.1964 (88)
util rest of house												
	0.9640	0.9497	0.9297	0.8883	0.8138	0.6675	0.4784	0.5175	0.7398	0.8911	0.9477	0.9672 (89)
MIT 2	14.9321	15.3491	16.0335	17.0514	17.9770	18.7973	19.1401	19.1131	18.5856	17.4109	16.0826	14.9608 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	15.7722	16.1560	16.7863	17.7226	18.5839	19.3591	19.7102	19.6759	19.1520	18.0507	16.8256	15.7953 (92)
Temperature adjustment												0.0000
adjusted MIT	15.7722	16.1560	16.7863	17.7226	18.5839	19.3591	19.7102	19.6759	19.1520	18.0507	16.8256	15.7953 (93)

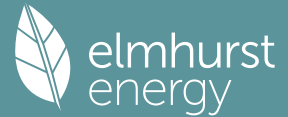
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9426	0.9239	0.9003	0.8572	0.7894	0.6737	0.5328	0.5643	0.7331	0.8626	0.9229	0.9474 (94)
Useful gains	708.3840	800.2216	836.7315	847.2870	796.6677	663.0048	505.0258	514.7511	647.0648	699.9661	688.8868	680.8955 (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												
	2473.3558	2409.3772	2186.2396	1812.4378	1405.0066	941.8746	615.5379	644.5868	1011.8957	1520.7022	2011.1736	2430.4126 (97)
Space heating kWh												
	1313.1390	1081.3526	1004.0340	694.9086	452.6042	0.0000	0.0000	0.0000	0.0000	610.6277	952.0465	1301.6407 (98a)
Space heating requirement - total per year (kWh/year)												7410.3532
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												
	1313.1390	1081.3526	1004.0340	694.9086	452.6042	0.0000	0.0000	0.0000	0.0000	610.6277	952.0465	1301.6407 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7410.3532
Space heating per m2												(98c) / (4) = 78.1683 (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												
	1313.1390	1081.3526	1004.0340	694.9086	452.6042	0.0000	0.0000	0.0000	0.0000	610.6277	952.0465	1301.6407 (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)												
	598.7866	493.0928	457.8358	316.8758	206.3858	0.0000	0.0000	0.0000	0.0000	278.4440	434.1297	593.5434 (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												
	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966 (64)
Efficiency of water heater (217)m												190.4000 (216)
	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000 (217)
Fuel for water heating, kWh/month												
	146.8032	129.8574	137.9293	121.0903	117.2847	105.5689	104.0535	108.2131	109.4418	122.1851	130.1205	145.1663 (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	34.4255	27.6174	24.8664	18.2182	14.0723	11.4972	12.8372	16.6863	21.6738	28.4372	32.1198	35.3823 (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												3379.0940 (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												1477.7142 (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)												277.8335 (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												5134.6417 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3379.0940	0.1537	519.2717 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1477.7142	0.1409	208.2242 (264)
Space and water heating			727.4959 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	277.8335	0.1443	40.1000 (268)
Total CO2, kg/year			767.5959 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			8.1000 (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	3379.0940	1.5689	5301.5528 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1477.7142	1.5210	2247.6527 (278)
Space and water heating			7549.2055 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	277.8335	1.5338	426.1503 (282)
Total Primary energy kWh/year			7975.3558 (286)
Dwelling Primary energy Rate (DPER)			84.1300 (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	94.8000 (1b)	x 2.6000 (2b)	= 246.4800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 246.4800 (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) = 0.1217 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3717 (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) = 0.3160 (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	0.4028	0.3949	0.3870	0.3476	0.3397	0.3002	0.3002	0.2923	0.3160	0.3397	0.3555	0.3712 (22b)
Effective ac	0.5811	0.5780	0.5749	0.5604	0.5577	0.5450	0.5450	0.5427	0.5499	0.5577	0.5632	0.5689 (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)			11.0700	1.1450	12.6756		(27)
Floor Over Commercial			94.8000	0.1300	12.3240		(28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.1800	5.8122		(29a)
New Ext Wall	41.6000	7.2900	34.3100	0.1800	6.1758		(29a)
Flat Roof	94.8000		94.8000	0.1100	10.4280		(30)
Total net area of external elements Aum(A, m2)			269.1600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.3056		(33)
Party Wall			27.8200	0.0000	0.0000		(32)
Party Wall to Adjacent			9.1000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							136.9772 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							13.4580 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	62.7636 (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	47.2692	47.0129	46.7617	45.5817	45.3610	44.3333	44.3333	44.1430	44.7292	45.3610	45.8076	46.2745	(38)
Heat transfer coeff	110.0327	109.7764	109.5252	108.3453	108.1246	107.0969	107.0969	106.9066	107.4927	108.1246	108.5711	109.0380	(39)
Average = Sum(39)m / 12 =												108.3443	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1607	1.1580	1.1553	1.1429	1.1406	1.1297	1.1297	1.1277	1.1339	1.1406	1.1453	1.1502	(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													2.6859	(42)
Hot water usage for mixer showers	69.2534	68.2126	66.6961	63.7944	61.6530	59.2650	57.9076	59.4127	61.0626	63.6266	66.5906	68.9880	(42a)	
Hot water usage for baths	29.9044	29.4603	28.8349	27.6817	26.8183	25.8608	25.3436	25.9647	26.6409	27.6654	28.8423	29.8033	(42b)	
Hot water usage for other uses	42.1362	40.6040	39.0718	37.5396	36.0073	34.4751	34.4751	36.0073	37.5396	39.0718	40.6040	42.1362	(42c)	
Average daily hot water use (litres/day)													129.8811	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	141.2940	138.2770	134.6027	129.0157	124.4786	119.6009	117.7264	121.3847	125.2430	130.3638	136.0369	140.9276	(44)	
Energy content (annual)	223.7752	196.9045	206.8794	176.6160	167.5721	147.0633	142.3799	150.2997	154.4372	176.9024	193.8095	220.6586	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =			2157.2978	
	33.5663	29.5357	31.0319	26.4924	25.1358	22.0595	21.3570	22.5449	23.1656	26.5354	29.0714	33.0988	(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														
	275.5218	243.6434	258.6260	226.6934	219.3187	197.1406	194.1264	202.0462	204.5145	228.6490	243.8869	272.4052	(62)	
WWHRS	-31.6598	-28.0001	-29.3201	-24.2782	-22.6264	-19.3616	-18.1484	-19.2990	-20.0323	-23.6158	-26.7539	-31.0735	(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														
	243.8621	215.6432	229.3059	202.4151	196.6923	177.7790	175.9780	182.7472	184.4823	205.0332	217.1330	241.3317	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			2472.4030	(64)
Electric shower(s)													2472	(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														
	115.8025	102.8618	110.1847	98.7867	97.1150	88.9604	88.7386	91.3719	91.4122	100.2173	104.5035	114.7662	(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	
134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
139.4774	154.4214	139.4774	144.1266	139.4774	144.1266	139.4774	144.1266	139.4774	144.1266	139.4774	144.1266	139.4774	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
247.6369	250.2066	243.7310	229.9454	212.5434	196.1880	185.2616	182.6919	189.1675	202.9532	220.3551	236.7105	236.7105	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	(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)													
-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	(71)
Water heating gains (Table 5)													
155.6486	153.0682	148.0977	137.2038	130.5309	123.5561	119.2723	122.8117	126.9614	134.7007	145.1438	154.2557	154.2557	(72)
Total internal gains													
609.0512	623.9846	597.5945	577.5641	548.8401	527.1592	507.2997	508.2694	523.5439	543.4196	575.9139	596.7320	596.7320	(73)

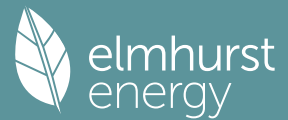
6. Solar gains

[Jan]																		
			Area			Solar flux			g			FF			Access			Gains
			m2			Table 6a			Specific data			Specific data			factor			W
						W/m2			or Table 6b			or Table 6c			Table 6d			
Southeast			7.2900			36.7938			0.6300			0.7000			0.7700			81.9737
Southwest			3.7800			36.7938			0.6300			0.7000			0.7700			42.5049
Solar gains	124.4785	212.0330	290.1128	359.4638	402.6294	399.7178	385.3706	353.1672	314.1308	234.3416	149.0966							106.5277
Total gains	733.5298	836.0176	887.7073	937.0279	951.4695	926.8770	892.6703	861.4366	837.6747	777.7613	725.0105							703.2597

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		
3.7818	3.28583	3.2937	3.2923	3.3603	3.36804	3.36804	3.36804	3.36804	3.36804	3.36804	3.36804	3.36804	3.36804	
alpha	3.1855	3.1906	3.1956	3.2195	3.2240	3.2454	3.2454	3.2454	3.2454	3.2454	3.2454	3.2454	3.2454	
util living area														

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	0.9671	0.9494	0.9247	0.8723	0.7839	0.6393	0.4943	0.5272	0.7156	0.8810	0.9484	0.9708 (86)
MIT	19.0208	19.2906	19.6519	20.1296	20.5418	20.8357	20.9470	20.9334	20.7485	20.2249	19.5525	18.9781 (87)
Th 2	19.9516	19.9538	19.9559	19.9660	19.9679	19.9766	19.9766	19.9783	19.9733	19.9679	19.9640	19.9601 (88)
util rest of house												
	0.9610	0.9404	0.9106	0.8472	0.7389	0.5634	0.3920	0.4258	0.6472	0.8527	0.9376	0.9655 (89)
MIT 2	17.6616	18.0019	18.4558	19.0494	19.5357	19.8548	19.9500	19.9426	19.7710	19.1761	18.3432	17.6131 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	18.1720	18.4859	18.9050	19.4551	19.9135	20.2232	20.3244	20.3147	20.1381	19.5699	18.7973	18.1257 (91)
Temperature adjustment												0.0000
adjusted MIT	18.1720	18.4859	18.9050	19.4551	19.9135	20.2232	20.3244	20.3147	20.1381	19.5699	18.7973	18.1257 (93)

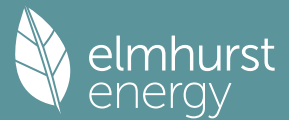
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9472	0.9240	0.8931	0.8327	0.7363	0.5829	0.4281	0.4607	0.6592	0.8397	0.9219	0.9526 (94)
Useful gains	694.8128	772.4431	792.8270	780.2712	700.5772	540.2367	382.1727	396.8874	552.1970	653.0679	668.3615	669.9262 (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	1526.3760	1491.4065	1358.6558	1143.5918	888.0826	602.2242	398.8731	418.5021	649.0505	969.8694	1269.9903	1518.4315 (97)
Space heating kWh	618.6831	483.1434	420.9766	261.5909	139.5041	0.0000	0.0000	0.0000	0.0000	235.7003	433.1728	631.2879 (98a)
Space heating requirement - total per year (kWh/year)												3224.0590
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	618.6831	483.1434	420.9766	261.5909	139.5041	0.0000	0.0000	0.0000	0.0000	235.7003	433.1728	631.2879 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3224.0590
Space heating per m2										(98c) / (4) =		34.0091 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	618.6831	483.1434	420.9766	261.5909	139.5041	0.0000	0.0000	0.0000	0.0000	235.7003	433.1728	631.2879 (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)	670.2959	523.4490	456.0960	283.4137	151.1420	0.0000	0.0000	0.0000	0.0000	255.3633	469.3096	683.9522 (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	243.8621	215.6432	229.3059	202.4151	196.6923	177.7790	175.9780	182.7472	184.4823	205.0332	217.1330	241.3317 (64)
Efficiency of water heater (217)m	86.0560	85.8133	85.4035	84.6360	83.3034	79.8000	79.8000	79.8000	79.8000	84.3732	85.5774	79.8000 (216)
Fuel for water heating, kWh/month	283.3760	251.2934	268.4969	239.1597	236.1156	222.7807	220.5238	229.0065	231.1808	243.0075	253.7270	280.2467 (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	28.9806	23.2493	20.9335	15.3367	11.8465	9.6787	10.8068	14.0471	18.2458	23.9395	27.0396	29.7861 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-71.7059	-93.5050	-124.3924	-129.0815	-130.7106	-119.0645	-117.5476	-114.9476	-109.4072	-101.4725	-76.0699	-62.9234 (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	-67.1000	-136.9581	-264.8934	-387.7709	-503.4393	-502.5706	-496.6510	-424.6332	-316.8690	-192.2820	-88.3471	-53.3848 (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												3493.0217 (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												2958.9148 (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)												233.8904 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-4685.7275 (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												2086.0994 (238)

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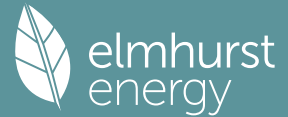
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3493.0217	0.2100	733.5346 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2958.9148	0.2100	621.3721 (264)
Space and water heating			1354.9067 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	233.8904	0.1443	33.7576 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1250.8282	0.1363	-170.4940
PV Unit electricity exported	-3434.8993	0.1267	-435.0958
Total			-605.5899 (269)
Total CO2, kg/year			795.0037 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.3900 (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	3493.0217	1.1300	3947.1145 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2958.9148	1.1300	3343.5738 (278)
Space and water heating			7290.6883 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	233.8904	1.5338	358.7488 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1250.8282	1.5039	-1881.0618
PV Unit electricity exported	-3434.8993	0.4650	-1597.2173
Total			-3478.2791 (283)
Total Primary energy kWh/year			4301.2588 (286)
Target Primary Energy Rate (TPER)			45.3700 (287)

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Property Reference	Flat 1E			Issued on Date	01/02/2024
Assessment Reference	Baseline	Prop Type Ref	Conversion		
Property					
SAP Rating	65 D	DER	8.10	TER	8.39
Environmental	93 A	% DER < TER			3.46
CO ₂ Emissions (t/year)	0.68	DFEE	86.19	TFEE	40.00
Compliance Check	See BREL	% DFEE < TFEE			-115.49
% DPER < TPER	-85.43	DPER	84.13	TPER	45.37
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	94.8000 (1b)	2.6000 (2b)	246.4800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000		246.4800 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	246.4800 (5)

2. Ventilation rate

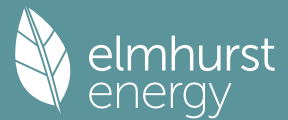
		m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)	
Number of open flues	0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =	0.0000 (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) =	0.1217 (8)	
Pressure test	No		
Pressure Test Method	Blower Door		
Measured/design AP50	15.0000	(17)	
Infiltration rate	0.8717	(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) =	0.7410 (21)	

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	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)
Adj infilt rate	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)
	0.9447	0.9262	0.9077	0.8151	0.7965	0.7039	0.7039	0.6854	0.7410	0.7965	0.8336	0.8706 (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	0.9462	0.9289	0.9119	0.8322	0.8172	0.7477	0.7477	0.7349	0.7745	0.8172	0.8474	0.8790 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			1.8900	1.5038	2.8421		(27)
Patio Doors (Uw = 1.60)			3.7800	1.5038	5.6842		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.5500	17.7595	190.0000	6135.1000 (29a)
New Ext Wall	41.6000	7.2900	34.3100	0.1800	6.1758	9.0000	308.7900 (29a)
Flat Roof	94.8000		94.8000	0.1600	15.1680	9.0000	853.2000 (30)
Total net area of external elements Aum(A, m ²)			269.1600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	81.3399		(33)
Party Wall			27.8200	0.0000	0.0000	20.0000	556.4000 (32)
Party Wall to Adjacent			9.1000	0.0000	0.0000	180.0000	1638.0000 (32)
Internal Wall			177.5500			9.0000	1597.9500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12985.4400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							136.9772 (35)
Thermal bridges (Default value 0.200 * total exposed area)							53.8320 (36)
Point Thermal bridges						(36a) =	0.0000

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Total fabric heat loss

(33) + (36) + (36a) = 135.1719 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	76.9663	75.5568	74.1753	67.6862	66.4721	60.8203	60.8203	59.7737	62.9973	66.4721	68.9282	71.4959	(38)
Heat transfer coeff	212.1382	210.7287	209.3472	202.8581	201.6440	195.9922	195.9922	194.9456	198.1692	201.6440	204.1001	206.6678	(39)
Average = Sum(39)m / 12 =												202.8523	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.2377	2.2229	2.2083	2.1399	2.1270	2.0674	2.0674	2.0564	2.0904	2.1270	2.1530	2.1800	(40)
HLP (average)												2.1398	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6859 (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	0.0000	(42a)
Hot water usage for baths													
29.9044	29.4603	28.8349	27.6817	26.8183	25.8608	25.3436	25.9647	26.6409	27.6654	28.8423	29.8033	29.8033	(42b)
Hot water usage for other uses													
42.1362	40.6040	39.0718	37.5396	36.0073	34.4751	34.4751	36.0073	37.5396	39.0718	40.6040	42.1362	42.1362	(42c)
Average daily hot water use (litres/day)												66.0318	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	72.0407	70.0643	67.9067	65.2213	62.8256	60.3359	59.8187	61.9720	64.1804	66.7372	69.4463	71.9396	(44)
Energy conte	114.0948	99.7707	104.3700	89.2847	84.5753	74.1900	72.3456	76.7343	79.1409	90.5617	98.9390	112.6400	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
96.9806	84.8051	88.7145	75.8920	71.8890	63.0615	61.4938	65.2242	67.2698	76.9775	84.0982	95.7440	95.7440	(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													
96.9806	84.8051	88.7145	75.8920	71.8890	63.0615	61.4938	65.2242	67.2698	76.9775	84.0982	95.7440	95.7440	(64)
12Total per year (kWh/year)													
Electric shower(s)													
55.4604	49.4157	53.9600	51.4934	52.4597	50.0414	51.7095	52.4597	51.4934	53.9600	52.9454	55.4604	55.4604	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												630.8589	(64a)
Heat gains from water heating, kWh/month													
38.1103	33.5552	35.6686	31.8463	31.0872	28.2757	28.3008	29.4210	29.6908	32.7344	34.2609	37.8011	37.8011	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
135.4134	149.9220	135.4134	139.9272	135.4134	139.9272	135.4134	139.9272	135.4134	139.9272	135.4134	139.9272	135.4134	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
247.6369	250.2066	243.7310	229.9454	212.5434	196.1880	185.2616	182.6919	189.1675	202.9532	220.3551	236.7105	236.7105	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	(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)													
-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	(71)
Water heating gains (Table 5)													
51.2235	49.9333	47.9417	44.2310	41.7838	39.2719	38.0387	39.5443	41.2372	43.9978	47.5846	50.8079	50.8079	(72)
Total internal gains													
497.5622	513.3503	490.3746	477.3920	453.0291	438.6755	422.0022	420.9381	433.6203	445.6528	471.1553	486.2203	486.2203	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast				1.8900	36.7938	0.6300	0.8000	0.7700	24.2885 (77)			
Southwest				3.7800	36.7938	0.6300	0.8000	0.7700	48.5770 (79)			
Southeast				5.4000	36.7938	0.6300	0.8000	0.7700	69.3957 (77)			
Solar gains	142.2612	242.3234	331.5575	410.8158	460.1479	456.8204	440.4236	403.6196	359.0066	267.8190	170.3961	121.7459 (83)
Total gains	639.8234	755.6738	821.9321	888.2078	913.1770	895.4959	862.4258	824.5577	792.6270	713.4718	641.5514	607.9662 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	17.0034	17.1171	17.2301	17.7812	17.8883	18.4041	18.4041	18.5029	18.2020	17.8883	17.6730	17.4535	
alpha	2.1336	2.1411	2.1487	2.1854	2.1926	2.2269	2.2269	2.2335	2.2135	2.1926	2.1782	2.1636	
util living area													
0.9786	0.9685	0.9552	0.9280	0.8822	0.7962	0.6901	0.7192	0.8479	0.9359	0.9694	0.9809	0.9809	(86)

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MIT	17.0773	17.4096	17.9538	18.7597	19.5260	20.2440	20.6268	20.5748	20.0340	19.0303	17.9650	17.0833 (87)
Th 2	19.1795	19.1889	19.1981	19.2417	19.2500	19.2888	19.2888	19.2960	19.2738	19.2500	19.2333	19.2160 (88)
util rest of house												
	0.9734	0.9607	0.9431	0.9058	0.8378	0.6990	0.5113	0.5535	0.7719	0.9117	0.9604	0.9762 (89)
MIT 2	15.7717	16.1055	16.6490	17.4644	18.2063	18.8795	19.1687	19.1446	18.6993	17.7427	16.6844	15.7976 (90)
Living area fraction									fLA = Living area / (4) =			0.3755 (91)
MIT	16.2620	16.5952	17.1390	17.9508	18.7019	19.3920	19.7163	19.6817	19.2005	18.2262	17.1653	16.2804 (92)
Temperature adjustment												0.0000
adjusted MIT	16.2620	16.5952	17.1390	17.9508	18.7019	19.3920	19.7163	19.6817	19.2005	18.2262	17.1653	16.2804 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9599	0.9434	0.9226	0.8828	0.8191	0.7064	0.5655	0.5996	0.7676	0.8911	0.9441	0.9640	(94)
Useful gains	614.1742	712.9396	758.2743	784.1178	748.0155	632.5595	487.6864	494.4347	608.4110	635.7688	605.6945	586.0687	(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													
	2537.5878	2464.5193	2227.2474	1836.0343	1411.8886	939.1855	610.7628	639.7433	1010.7625	1537.7848	2054.3287	2496.6311	(97)
Space heating kWh													
	1431.0198	1177.0616	1092.9160	757.3798	493.9216	0.0000	0.0000	0.0000	0.0000	671.0999	1043.0166	1421.4584	(98a)
Space heating requirement - total per year (kWh/year)												8087.8738	
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													
	1431.0198	1177.0616	1092.9160	757.3798	493.9216	0.0000	0.0000	0.0000	0.0000	671.0999	1043.0166	1421.4584	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												8087.8738	
Space heating per m2													
											(98c) / (4) =	85.3151	(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	1842.3267	1450.3423	1481.5864	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.4637	0.5366	0.5129	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	854.2215	778.2712	759.8934	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	985.4030	949.6509	908.1421	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	94.4507	127.5065	110.2970	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	23.6127	31.8766	27.5743	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement													83.0636 (107)
Energy for space heating													85.3151 (99)
Energy for space cooling													0.8762 (108)
Total													86.1913 (109)
Fabric Energy Efficiency (DFEE)													86.2 (109)

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

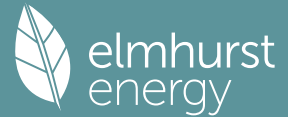
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	94.8000 (1b)	x 2.6000 (2b)	= 246.4800 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	246.4800 (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)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1217 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3717	(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) =	0.3160 (21)

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Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4028	0.3949	0.3870	0.3476	0.3397	0.3002	0.3002	0.2923	0.3160	0.3397	0.3555	0.3712	(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	0.5811	0.5780	0.5749	0.5604	0.5577	0.5450	0.5450	0.5427	0.5499	0.5577	0.5632	0.5689	(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)			11.0700	1.1450	12.6756		(27)
Floor Over Commercial			94.8000	0.1300	12.3240		(28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.1800	5.8122		(29a)
New Ext Wall	41.6000	7.2900	34.3100	0.1800	6.1758		(29a)
Flat Roof	94.8000		94.8000	0.1100	10.4280		(30)
Total net area of external elements Aum(A, m2)			269.1600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	49.3056		(33)
Party Wall			27.8200	0.0000	0.0000		(32)
Party Wall to Adjacent			9.1000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							136.9772 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							13.4580 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 62.7636 (37)

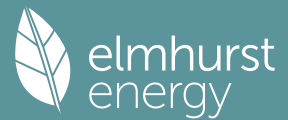
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6859 (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	29.9044	29.4603	28.8349	27.6817	26.8183	25.8608	25.3436	25.9647	26.6409	27.6654	28.8423	29.8033	(42b)
Hot water usage for other uses	42.1362	40.6040	39.0718	37.5396	36.0073	34.4751	34.4751	36.0073	37.5396	39.0718	40.6040	42.1362	(42c)
Average daily hot water use (litres/day)												66.0318	(43)
Daily hot water use	Jan 72.0407	Feb 70.0643	Mar 67.9067	Apr 65.2213	May 62.8256	Jun 60.3359	Jul 59.8187	Aug 61.9720	Sep 64.1804	Oct 66.7372	Nov 69.4463	Dec 71.9396	(44)
Energy conte	114.0948	99.7707	104.3700	89.2847	84.5753	74.1900	72.3456	76.7343	79.1409	90.5617	98.9390	112.6400	(45)
Energy content (annual)										Total = Sum(45)m =		1096.6471	
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													
WWHRS	96.9806	84.8051	88.7145	75.8920	71.8890	63.0615	61.4938	65.2242	67.2698	76.9775	84.0982	95.7440	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	96.9806	84.8051	88.7145	75.8920	71.8890	63.0615	61.4938	65.2242	67.2698	76.9775	84.0982	95.7440	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				932.1500	(64)
Electric shower(s)	55.4604	49.4157	53.9600	51.4934	52.4597	50.0414	51.7095	52.4597	51.4934	53.9600	52.9454	55.4604	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												630.8589	(64a)
Heat gains from water heating, kWh/month	38.1103	33.5552	35.6686	31.8463	31.0872	28.2757	28.3008	29.4210	29.6908	32.7344	34.2609	37.8011	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 134.2947	Feb 134.2947	Mar 134.2947	Apr 134.2947	May 134.2947	Jun 134.2947	Jul 134.2947	Aug 134.2947	Sep 134.2947	Oct 134.2947	Nov 134.2947	Dec 134.2947	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	139.4774	154.4214	139.4774	144.1266	139.4774	144.1266	139.4774	139.4774	144.1266	139.4774	144.1266	139.4774	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	247.6369	250.2066	243.7310	229.9454	212.5434	196.1880	185.2616	182.6919	189.1675	202.9532	220.3551	236.7105	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	(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)	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	(71)
Water heating gains (Table 5)	51.2235	49.9333	47.9417	44.2310	41.7838	39.2719	38.0387	39.5443	41.2372	43.9978	47.5846	50.8079	(72)
Total internal gains	501.6261	517.8497	494.4385	481.5914	457.0930	442.8749	426.0661	425.0020	437.8197	449.7167	475.3547	490.2842	(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				7.2900	36.7938	0.6300	0.7000	0.7700		81.9737 (77)		
Southwest				3.7800	36.7938	0.6300	0.7000	0.7700		42.5049 (79)		
Solar gains	124.4785	212.0330	290.1128	359.4638	402.6294	399.7178	385.3706	353.1672	314.1308	234.3416	149.0966	106.5277 (83)
Total gains	626.1046	729.8827	784.5513	841.0552	859.7224	842.5927	811.4368	778.1691	751.9505	684.0584	624.4513	596.8119 (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	32.7818	32.8583	32.9337	33.2923	33.3603	33.6804	33.6804	33.7404	33.5564	33.3603	33.2231	33.0808	
alpha	3.1855	3.1906	3.1956	3.2195	3.2240	3.2454	3.2454	3.2494	3.2371	3.2240	3.2149	3.2054	
util living area	0.9784	0.9642	0.9439	0.8985	0.8192	0.6805	0.5344	0.5709	0.7587	0.9101	0.9648	0.9813 (86)	
MIT	18.8510	19.1325	19.5109	20.0210	20.4685	20.8016	20.9334	20.9159	20.6974	20.1144	19.4024	18.8073 (87)	
Th 2	19.9516	19.9538	19.9559	19.9660	19.9679	19.9766	19.9766	19.9783	19.9733	19.9679	19.9640	19.9601 (88)	
util rest of house	0.9743	0.9574	0.9329	0.8771	0.7779	0.6049	0.4271	0.4654	0.6935	0.8869	0.9570	0.9777 (89)	
MIT 2	18.0004	18.2793	18.6524	19.1527	19.5706	19.8596	19.9500	19.9422	19.7790	19.2511	18.5560	17.9631 (90)	
Living area fraction									fLA = Living area / (4) =				0.3755 (91)
MIT	18.3198	18.5997	18.9748	19.4788	19.9078	20.2134	20.3193	20.3079	20.1239	19.5753	18.8739	18.2801 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.3198	18.5997	18.9748	19.4788	19.9078	20.2134	20.3193	20.3079	20.1239	19.5753	18.8739	18.2801 (93)	

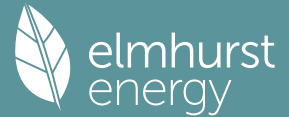
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9656	0.9461	0.9199	0.8652	0.7752	0.6237	0.4648	0.5014	0.7041	0.8762	0.9463	0.9699 (94)
Useful gains	604.5699	690.5663	721.6751	727.6910	666.4845	525.5462	377.1491	390.1742	529.4219	599.3448	590.8913	578.8234 (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	1542.6393	1503.9067	1366.3033	1146.1613	887.4628	601.1730	398.3280	417.7767	647.5233	970.4498	1278.3035	1535.2654 (97)
Space heating kWh	697.9236	546.5648	479.6034	301.2986	164.4078	0.0000	0.0000	0.0000	0.0000	276.1021	494.9368	711.5929 (98a)
Space heating requirement - total per year (kWh/year)												3672.4300
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	697.9236	546.5648	479.6034	301.2986	164.4078	0.0000	0.0000	0.0000	0.0000	276.1021	494.9368	711.5929 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3672.4300
Space heating per m2										(98c) / (4) =		38.7387 (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	1006.7106	792.5169	812.4899	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7285	0.8050	0.7815	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	733.3957	638.0037	634.9464	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	919.0153	885.6875	849.6711	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	133.6461	184.2768	159.7552	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	33.4115	46.0692	39.9388	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												119.4195 (107)
Energy for space heating												38.7387 (99)
Energy for space cooling												1.2597 (108)
Total												39.9984 (109)
Fabric Energy Efficiency (TFEE)												40.0 (109)

Full SAP Calculation Printout



Property Reference	Flat 1E			Issued on Date	01/02/2024
Assessment Reference	Baseline	Prop Type Ref	Conversion		
Property					
SAP Rating	65 D	DER	8.10	TER	8.39
Environmental	93 A	% DER < TER			3.46
CO ₂ Emissions (t/year)	0.68	DFEE	86.19	TFEE	40.00
Compliance Check	See BREL	% DFEE < TFEE			-115.49
% DPER < TPER	-85.43	DPER	84.13	TPER	45.37
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	94.8000 (1b)	2.6000 (2b)	246.4800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000		246.4800 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	246.4800 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1623 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9123 (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) = 0.7754 (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	0.9887	0.9693	0.9499	0.8530	0.8336	0.7367	0.7367	0.7173	0.7754	0.8336	0.8724	0.9111 (22b)
Effective ac	0.9888	0.9698	0.9512	0.8638	0.8474	0.7713	0.7713	0.7572	0.8007	0.8474	0.8805	0.9151 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			1.8900	1.5038	2.8421		(27)
Patio Doors (Uw = 1.60)			3.7800	1.5038	5.6842		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.5500	17.7595	190.0000	6135.1000 (29a)
New Ext Wall	41.6000	7.2900	34.3100	0.1800	6.1758	9.0000	308.7900 (29a)
Flat Roof	94.8000		94.8000	0.1600	15.1680	9.0000	853.2000 (30)
Total net area of external elements Aum(A, m ²)			269.1600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	81.3399		(33)
Party Wall			27.8200	0.0000	0.0000	20.0000	556.4000 (32)
Party Wall to Adjacent			9.1000	0.0000	0.0000	180.0000	1638.0000 (32)
Internal Wall			177.5500			9.0000	1597.9500 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	12985.4400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							136.9772 (35)
Thermal bridges (Default value 0.200 * total exposed area)							53.8320 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	135.1719 (37)

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Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	80.4236	78.8799	77.3667	70.2595	68.9298	62.7397	62.7397	61.5934	65.1240	68.9298	71.6198	74.4321
Average = Sum(39)m / 12 =	215.5955	214.0518	212.5386	205.4315	204.1017	197.9116	197.9116	196.7653	200.2959	204.1017	206.7918	209.6041
												205.4251

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.2742	2.2579	2.2420	2.1670	2.1530	2.0877	2.0877	2.0756	2.1128	2.1530	2.1813	2.2110
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.6859 (42)											
Hot water usage for mixer showers	69.2534	68.2126	66.6961	63.7944	61.6530	59.2650	57.9076	59.4127	61.0626	63.6266	66.5906	68.9880
Hot water usage for baths	29.9044	29.4603	28.8349	27.6817	26.8183	25.8608	25.3436	25.9647	26.6409	27.6654	28.8423	29.8033
Hot water usage for other uses	42.1362	40.6040	39.0718	37.5396	36.0073	34.4751	34.4751	36.0073	37.5396	39.0718	40.6040	42.1362
Average daily hot water use (litres/day)												129.8811
												(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	141.2940	138.2770	134.6027	129.0157	124.4786	119.6009	117.7264	121.3847	125.2430	130.3638	136.0369	140.9276
Energy content (annual)	223.7752	196.9045	206.8794	176.6160	167.5721	147.0633	142.3799	150.2997	154.4372	176.9024	193.8095	220.6586
Distribution loss (46)m = 0.15 x (45)m	33.5663	29.5357	31.0319	26.4924	25.1358	22.0595	21.3570	22.5449	23.1656	26.5354	29.0714	33.0988
Water storage loss:												
Store volume												210.0000
a) If manufacturer declared loss factor is known (kWh/day):												1.9400
Temperature factor from Table 2b												0.5400
Enter (49) or (54) in (55)												1.0476
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
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
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
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966
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
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966
12Total per year (kWh/year)												2813.5678
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000
Heat gains from water heating, kWh/month	118.9957	105.7460	113.3778	101.8768	100.3081	92.0505	91.9317	94.5650	94.5024	103.4105	107.5937	117.9594

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	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	135.4134	149.9220	135.4134	139.9272	135.4134	139.9272	135.4134	135.4134	139.9272	135.4134	139.9272	135.4134
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	247.6369	250.2066	243.7310	229.9454	212.5434	196.1880	185.2616	182.6919	189.1675	202.9532	220.3551	236.7105
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295
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
Losses e.g. evaporation (negative values) (Table 5)	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357
Water heating gains (Table 5)	159.9404	157.3601	152.3895	141.4956	134.8228	127.8480	123.5641	127.1035	131.2533	138.9925	149.4356	158.5476
Total internal gains	609.2791	623.7771	597.8224	577.6566	549.0680	527.2516	507.5276	508.4973	523.6364	543.6476	576.0064	596.9599

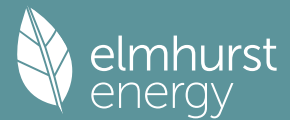
6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Southeast	1.8900	36.7938	0.6300	0.8000	0.7700	24.2885
Southwest	3.7800	36.7938	0.6300	0.8000	0.7700	48.5770
Southeast	5.4000	36.7938	0.6300	0.8000	0.7700	69.3957
Solar gains	142.2612	242.3234	331.5575	410.8158	460.1479	456.8204
Total gains	751.5403	866.1005	929.3799	988.4724	1009.2159	984.0720

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)											
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	16.7307	16.8514	16.9713	17.5585	17.6729	18.2256	18.2256	18.3318	18.0087	17.6729	17.4430	17.2090
alpha	2.1154	2.1234	2.1314	2.1706	2.1782	2.2150	2.2150	2.2221	2.2006	2.1782	2.1629	2.1473
util living area												

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	0.9710	0.9596	0.9444	0.9140	0.8634	0.7705	0.6593	0.6870	0.8232	0.9202	0.9594	0.9736 (86)
MIT	17.1692	17.4980	18.0383	18.8387	19.5931	20.2933	20.6582	20.6118	20.0939	19.1147	18.0611	17.1828 (87)
Th 2	19.1568	19.1669	19.1769	19.2243	19.2333	19.2755	19.2755	19.2834	19.2592	19.2333	19.2152	19.1964 (88)
util rest of house												
	0.9640	0.9497	0.9297	0.8883	0.8138	0.6675	0.4784	0.5175	0.7398	0.8911	0.9477	0.9672 (89)
MIT 2	14.9321	15.3491	16.0335	17.0514	17.9770	18.7973	19.1401	19.1131	18.5856	17.4109	16.0826	14.9608 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	15.7722	16.1560	16.7863	17.7226	18.5839	19.3591	19.7102	19.6759	19.1520	18.0507	16.8256	15.7953 (92)
Temperature adjustment												0.0000
adjusted MIT	15.7722	16.1560	16.7863	17.7226	18.5839	19.3591	19.7102	19.6759	19.1520	18.0507	16.8256	15.7953 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9426	0.9239	0.9003	0.8572	0.7894	0.6737	0.5328	0.5643	0.7331	0.8626	0.9229	0.9474 (94)
Useful gains	708.3840	800.2216	836.7315	847.2870	796.6677	663.0048	505.0258	514.7511	647.0648	699.9661	688.8868	680.8955 (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												
	2473.3558	2409.3772	2186.2396	1812.4378	1405.0066	941.8746	615.5379	644.5868	1011.8957	1520.7022	2011.1736	2430.4126 (97)
Space heating kWh												
	1313.1390	1081.3526	1004.0340	694.9086	452.6042	0.0000	0.0000	0.0000	0.0000	610.6277	952.0465	1301.6407 (98a)
Space heating requirement - total per year (kWh/year)												7410.3532
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												
	1313.1390	1081.3526	1004.0340	694.9086	452.6042	0.0000	0.0000	0.0000	0.0000	610.6277	952.0465	1301.6407 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7410.3532
Space heating per m2												(98c) / (4) = 78.1683 (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												
	1313.1390	1081.3526	1004.0340	694.9086	452.6042	0.0000	0.0000	0.0000	0.0000	610.6277	952.0465	1301.6407 (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)												
	598.7866	493.0928	457.8358	316.8758	206.3858	0.0000	0.0000	0.0000	0.0000	278.4440	434.1297	593.5434 (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												
	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966 (64)
Efficiency of water heater (217)m												190.4000 (216)
	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000 (217)
Fuel for water heating, kWh/month												
	146.8032	129.8574	137.9293	121.0903	117.2847	105.5689	104.0535	108.2131	109.4418	122.1851	130.1205	145.1663 (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	34.4255	27.6174	24.8664	18.2182	14.0723	11.4972	12.8372	16.6863	21.6738	28.4372	32.1198	35.3823 (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												3379.0940 (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												1477.7142 (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)												277.8335 (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												5134.6417 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3379.0940	0.1537	519.2717 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1477.7142	0.1409	208.2242 (264)
Space and water heating			727.4959 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	277.8335	0.1443	40.1000 (268)
Total CO2, kg/year			767.5959 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			8.1000 (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	3379.0940	1.5689	5301.5528 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1477.7142	1.5210	2247.6527 (278)
Space and water heating			7549.2055 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	277.8335	1.5338	426.1503 (282)
Total Primary energy kWh/year			7975.3558 (286)
Dwelling Primary energy Rate (DPER)			84.1300 (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	94.8000 (1b)	x 2.6000 (2b)	= 246.4800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	246.4800 (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) = 0.1217 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3717 (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) = 0.3160 (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	0.4028	0.3949	0.3870	0.3476	0.3397	0.3002	0.3002	0.2923	0.3160	0.3397	0.3555	0.3712 (22b)
Effective ac	0.5811	0.5780	0.5749	0.5604	0.5577	0.5450	0.5450	0.5427	0.5499	0.5577	0.5632	0.5689 (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)			11.0700	1.1450	12.6756		(27)
Floor Over Commercial			94.8000	0.1300	12.3240		(28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.1800	5.8122		(29a)
New Ext Wall	41.6000	7.2900	34.3100	0.1800	6.1758		(29a)
Flat Roof	94.8000		94.8000	0.1100	10.4280		(30)
Total net area of external elements Aum(A, m2)			269.1600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.3056		(33)
Party Wall			27.8200	0.0000	0.0000		(32)
Party Wall to Adjacent			9.1000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							136.9772 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							13.4580 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	62.7636 (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	47.2692	47.0129	46.7617	45.5817	45.3610	44.3333	44.3333	44.1430	44.7292	45.3610	45.8076	46.2745	(38)
Heat transfer coeff	110.0327	109.7764	109.5252	108.3453	108.1246	107.0969	107.0969	106.9066	107.4927	108.1246	108.5711	109.0380	(39)
Average = Sum(39)m / 12 =												108.3443	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1607	1.1580	1.1553	1.1429	1.1406	1.1297	1.1297	1.1277	1.1339	1.1406	1.1453	1.1502	(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													2.6859	(42)
Hot water usage for mixer showers	69.2534	68.2126	66.6961	63.7944	61.6530	59.2650	57.9076	59.4127	61.0626	63.6266	66.5906	68.9880	(42a)	
Hot water usage for baths	29.9044	29.4603	28.8349	27.6817	26.8183	25.8608	25.3436	25.9647	26.6409	27.6654	28.8423	29.8033	(42b)	
Hot water usage for other uses	42.1362	40.6040	39.0718	37.5396	36.0073	34.4751	34.4751	36.0073	37.5396	39.0718	40.6040	42.1362	(42c)	
Average daily hot water use (litres/day)												129.8811	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	141.2940	138.2770	134.6027	129.0157	124.4786	119.6009	117.7264	121.3847	125.2430	130.3638	136.0369	140.9276	(44)	
Energy content (annual)	223.7752	196.9045	206.8794	176.6160	167.5721	147.0633	142.3799	150.2997	154.4372	176.9024	193.8095	220.6586	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2157.2978		
	33.5663	29.5357	31.0319	26.4924	25.1358	22.0595	21.3570	22.5449	23.1656	26.5354	29.0714	33.0988	(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														
	275.5218	243.6434	258.6260	226.6934	219.3187	197.1406	194.1264	202.0462	204.5145	228.6490	243.8869	272.4052	(62)	
WWHRS	-31.6598	-28.0001	-29.3201	-24.2782	-22.6264	-19.3616	-18.1484	-19.2990	-20.0323	-23.6158	-26.7539	-31.0735	(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	243.8621	215.6432	229.3059	202.4151	196.6923	177.7790	175.9780	182.7472	184.4823	205.0332	217.1330	241.3317	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2472.4030	(64)	
Electric shower(s)												2472	(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														
	115.8025	102.8618	110.1847	98.7867	97.1150	88.9604	88.7386	91.3719	91.4122	100.2173	104.5035	114.7662	(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	
134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	134.2947	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
139.4774	154.4214	139.4774	144.1266	139.4774	144.1266	139.4774	144.1266	139.4774	144.1266	139.4774	144.1266	139.4774	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
247.6369	250.2066	243.7310	229.9454	212.5434	196.1880	185.2616	182.6919	189.1675	202.9532	220.3551	236.7105	236.7105	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	36.4295	(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)													
-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	(71)
Water heating gains (Table 5)													
155.6486	153.0682	148.0977	137.2038	130.5309	123.5561	119.2723	122.8117	126.9614	134.7007	145.1438	154.2557	154.2557	(72)
Total internal gains													
609.0512	623.9846	597.5945	577.5641	548.8401	527.1592	507.2997	508.2694	523.5439	543.4196	575.9139	596.7320	596.7320	(73)

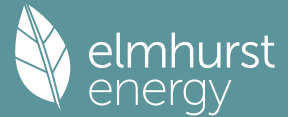
6. Solar gains

[Jan]																		
			Area			Solar flux			g			FF			Access			Gains
			m2			Table 6a			Specific data			Specific data			factor			W
						W/m2			or Table 6b			or Table 6c			Table 6d			
Southeast			7.2900			36.7938			0.6300			0.7000			0.7700			81.9737
Southwest			3.7800			36.7938			0.6300			0.7000			0.7700			42.5049
Solar gains	124.4785	212.0330	290.1128	359.4638	402.6294	399.7178	385.3706	353.1672	314.1308	234.3416	149.0966							106.5277
Total gains	733.5298	836.0176	887.7073	937.0279	951.4695	926.8770	892.6703	861.4366	837.6747	777.7613	725.0105							703.2597

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		
3.7818	3.28583	3.2937	3.2923	3.3603	3.3604	3.3604	3.3604	3.3604	3.3604	3.3603	3.2231	3.3608		
alpha	3.1855	3.1906	3.1956	3.2195	3.2240	3.2454	3.2454	3.2494	3.2371	3.2240	3.2149	3.2054		
util living area														

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	0.9671	0.9494	0.9247	0.8723	0.7839	0.6393	0.4943	0.5272	0.7156	0.8810	0.9484	0.9708 (86)
MIT	19.0208	19.2906	19.6519	20.1296	20.5418	20.8357	20.9470	20.9334	20.7485	20.2249	19.5525	18.9781 (87)
Th 2	19.9516	19.9538	19.9559	19.9660	19.9679	19.9766	19.9766	19.9783	19.9733	19.9679	19.9640	19.9601 (88)
util rest of house												
	0.9610	0.9404	0.9106	0.8472	0.7389	0.5634	0.3920	0.4258	0.6472	0.8527	0.9376	0.9655 (89)
MIT 2	17.6616	18.0019	18.4558	19.0494	19.5357	19.8548	19.9500	19.9426	19.7710	19.1761	18.3432	17.6131 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	18.1720	18.4859	18.9050	19.4551	19.9135	20.2232	20.3244	20.3147	20.1381	19.5699	18.7973	18.1257 (91)
Temperature adjustment												0.0000
adjusted MIT	18.1720	18.4859	18.9050	19.4551	19.9135	20.2232	20.3244	20.3147	20.1381	19.5699	18.7973	18.1257 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9472	0.9240	0.8931	0.8327	0.7363	0.5829	0.4281	0.4607	0.6592	0.8397	0.9219	0.9526 (94)
Useful gains	694.8128	772.4431	792.8270	780.2712	700.5772	540.2367	382.1727	396.8874	552.1970	653.0679	668.3615	669.9262 (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	1526.3760	1491.4065	1358.6558	1143.5918	888.0826	602.2242	398.8731	418.5021	649.0505	969.8694	1269.9903	1518.4315 (97)
Space heating kWh	618.6831	483.1434	420.9766	261.5909	139.5041	0.0000	0.0000	0.0000	0.0000	235.7003	433.1728	631.2879 (98a)
Space heating requirement - total per year (kWh/year)												3224.0590
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	618.6831	483.1434	420.9766	261.5909	139.5041	0.0000	0.0000	0.0000	0.0000	235.7003	433.1728	631.2879 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3224.0590
Space heating per m2										(98c) / (4) =		34.0091 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	618.6831	483.1434	420.9766	261.5909	139.5041	0.0000	0.0000	0.0000	0.0000	235.7003	433.1728	631.2879 (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)	670.2959	523.4490	456.0960	283.4137	151.1420	0.0000	0.0000	0.0000	0.0000	255.3633	469.3096	683.9522 (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	243.8621	215.6432	229.3059	202.4151	196.6923	177.7790	175.9780	182.7472	184.4823	205.0332	217.1330	241.3317 (64)
Efficiency of water heater (217)m	86.0560	85.8133	85.4035	84.6360	83.3034	79.8000	79.8000	79.8000	79.8000	84.3732	85.5774	79.8000 (216)
Fuel for water heating, kWh/month	283.3760	251.2934	268.4969	239.1597	236.1156	222.7807	220.5238	229.0065	231.1808	243.0075	253.7270	280.2467 (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	28.9806	23.2493	20.9335	15.3367	11.8465	9.6787	10.8068	14.0471	18.2458	23.9395	27.0396	29.7861 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-71.7059	-93.5050	-124.3924	-129.0815	-130.7106	-119.0645	-117.5476	-114.9476	-109.4072	-101.4725	-76.0699	-62.9234 (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	-67.1000	-136.9581	-264.8934	-387.7709	-503.4393	-502.5706	-496.6510	-424.6332	-316.8690	-192.2820	-88.3471	-53.3848 (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												3493.0217 (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												2958.9148 (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)												233.8904 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-4685.7275 (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												2086.0994 (238)

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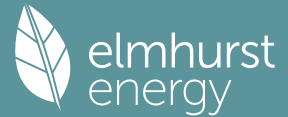
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3493.0217	0.2100	733.5346 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2958.9148	0.2100	621.3721 (264)
Space and water heating			1354.9067 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	233.8904	0.1443	33.7576 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1250.8282	0.1363	-170.4940
PV Unit electricity exported	-3434.8993	0.1267	-435.0958
Total			-605.5899 (269)
Total CO2, kg/year			795.0037 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.3900 (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	3493.0217	1.1300	3947.1145 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2958.9148	1.1300	3343.5738 (278)
Space and water heating			7290.6883 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	233.8904	1.5338	358.7488 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1250.8282	1.5039	-1881.0618
PV Unit electricity exported	-3434.8993	0.4650	-1597.2173
Total			-3478.2791 (283)
Total Primary energy kWh/year			4301.2588 (286)
Target Primary Energy Rate (TPER)			45.3700 (287)

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Property Reference	Flat 1E			Issued on Date	01/02/2024
Assessment Reference	Baseline	Prop Type Ref	Conversion		
Property					
SAP Rating	65 D	DER	8.10	TER	8.39
Environmental	93 A	% DER < TER			3.46
CO ₂ Emissions (t/year)	0.68	DFEE	86.19	TFEE	40.00
Compliance Check	See BREL	% DFEE < TFEE			-115.49
% DPER < TPER	-85.43	DPER	84.13	TPER	45.37
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	94.8000 (1b)	x 2.6000 (2b)	= 246.4800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 246.4800 (5)

2. Ventilation rate

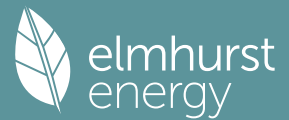
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1623 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.9123	(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) =	0.7754 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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	0.9887	0.9693	0.9499	0.8530	0.8336	0.7367	0.7367	0.7173	0.7754	0.8336	0.8724	0.9111 (22b)
Effective ac	0.9888	0.9698	0.9512	0.8638	0.8474	0.7713	0.7713	0.7572	0.8007	0.8474	0.8805	0.9151 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			1.8900	1.5038	2.8421		(27)
Patio Doors (Uw = 1.60)			3.7800	1.5038	5.6842		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.5500	17.7595	190.0000	6135.1000 (29a)
New Ext Wall	41.6000	7.2900	34.3100	0.1800	6.1758	9.0000	308.7900 (29a)
Flat Roof	94.8000		94.8000	0.1600	15.1680	9.0000	853.2000 (30)
Total net area of external elements Aum(A, m ²)			269.1600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	81.3399		(33)
Party Wall			27.8200	0.0000	0.0000	20.0000	556.4000 (32)
Party Wall to Adjacent			9.1000	0.0000	0.0000	180.0000	1638.0000 (32)
Internal Wall			177.5500			9.0000	1597.9500 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	12985.4400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							136.9772 (35)
Thermal bridges (Default value 0.200 * total exposed area)							53.8320 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	135.1719 (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	80.4236	78.8799	77.3667	70.2595	68.9298	62.7397	62.7397	61.5934	65.1240	68.9298	71.6198	74.4321	(38)
Heat transfer coeff	215.5955	214.0518	212.5386	205.4315	204.1017	197.9116	197.9116	196.7653	200.2959	204.1017	206.7918	209.6041	(39)
Average = Sum(39)m / 12 =												205.4251	
HLP	2.2742	2.2579	2.2420	2.1670	2.1530	2.0877	2.0877	2.0756	2.1128	2.1530	2.1813	2.2110	(40)
HLP (average)												2.1669	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6859 (42)
Hot water usage for mixer showers	69.2534	68.2126	66.6961	63.7944	61.6530	59.2650	57.9076	59.4127	61.0626	63.6266	66.5906	68.9880	(42a)
Hot water usage for baths	29.9044	29.4603	28.8349	27.6817	26.8183	25.8608	25.3436	25.9647	26.6409	27.6654	28.8423	29.8033	(42b)
Hot water usage for other uses	42.1362	40.6040	39.0718	37.5396	36.0073	34.4751	34.4751	36.0073	37.5396	39.0718	40.6040	42.1362	(42c)
Average daily hot water use (litres/day)												129.8811	(43)
Daily hot water use	141.2940	138.2770	134.6027	129.0157	124.4786	119.6009	117.7264	121.3847	125.2430	130.3638	136.0369	140.9276	(44)
Energy conte	223.7752	196.9045	206.8794	176.6160	167.5721	147.0633	142.3799	150.2997	154.4372	176.9024	193.8095	220.6586	(45)
Energy content (annual)										Total = Sum(45)m =		2157.2978	
Distribution loss (46)m = 0.15 x (45)m	33.5663	29.5357	31.0319	26.4924	25.1358	22.0595	21.3570	22.5449	23.1656	26.5354	29.0714	33.0988	(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	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966	(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	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966	(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	118.9957	105.7460	113.3778	101.8768	100.3081	92.0505	91.9317	94.5650	94.5024	103.4105	107.5937	117.9594	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	39.3302	34.9327	28.4092	21.5076	16.0772	13.5730	14.6661	19.0636	25.5871	32.4887	37.9192	40.4233	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	369.6073	373.4427	363.7777	343.2020	317.2290	292.8180	276.5099	272.6745	282.3396	302.9152	328.8883	353.2993	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	(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)	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	(71)
Water heating gains (Table 5)	159.9404	157.3601	152.3895	141.4956	134.8228	127.8480	123.5641	127.1035	131.2533	138.9925	149.4356	158.5476	(72)
Total internal gains	679.3970	676.2546	655.0955	616.7243	578.6480	541.7581	522.2593	526.3608	546.6991	584.9156	626.7622	662.7892	(73)

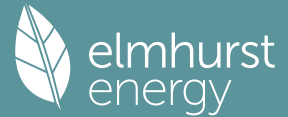
6. Solar gains

[Jan]												
				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast				1.8900	36.7938	0.6300	0.8000		0.7700		24.2885 (77)	
Southwest				3.7800	36.7938	0.6300	0.8000		0.7700		48.5770 (79)	
Southeast				5.4000	36.7938	0.6300	0.8000		0.7700		69.3957 (77)	
Solar gains	142.2612	242.3234	331.5575	410.8158	460.1479	456.8204	440.4236	403.6196	359.0066	267.8190	170.3961	121.7459 (83)
Total gains	821.6582	918.5780	986.6530	1027.5401	1038.7960	998.5785	962.6829	929.9804	905.7057	852.7346	797.1583	784.5352 (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	16.7307	16.8514	16.9713	17.5585	17.6729	18.2256	18.2256	18.3318	18.0087	17.6729	17.4430	17.2090	
alpha	2.1154	2.1234	2.1314	2.1706	2.1782	2.2150	2.2150	2.2221	2.2006	2.1782	2.1629	2.1473	
util living area	0.9658	0.9550	0.9383	0.9082	0.8572	0.7661	0.6538	0.6803	0.8166	0.9131	0.9541	0.9688	(86)

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MIT	17.2543	17.5598	18.1027	18.8794	19.6193	20.3027	20.6644	20.6201	20.1119	19.1585	18.1217	17.2644 (87)
Th 2	19.1568	19.1669	19.1769	19.2243	19.2333	19.2755	19.2755	19.2834	19.2592	19.2333	19.2152	19.1964 (88)
util rest of house	0.9576	0.9441	0.9222	0.8811	0.8062	0.6623	0.4729	0.5105	0.7316	0.8821	0.9411	0.9614 (89)
MIT 2	15.0384	15.4256	16.1121	17.0993	18.0053	18.8053	19.1432	19.1179	18.6026	17.4619	16.1573	15.0631 (90)
Living area fraction									fLA = Living area / (4) =			0.3755 (91)
MIT	15.8705	16.2271	16.8596	17.7677	18.6114	19.3676	19.7145	19.6821	19.1693	18.0990	16.8950	15.8898 (92)
Temperature adjustment												0.0000
adjusted MIT	15.8705	16.2271	16.8596	17.7677	18.6114	19.3676	19.7145	19.6821	19.1693	18.0990	16.8950	15.8898 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9339	0.9169	0.8915	0.8498	0.7823	0.6692	0.5276	0.5579	0.7259	0.8533	0.9148	0.9394	(94)
Useful gains	767.3597	842.2452	879.5907	873.1557	812.6744	668.2803	507.9341	518.8303	657.4146	727.6205	729.2772	736.9792	(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	2494.5521	2424.5783	2201.8257	1821.7128	1410.6285	943.5719	616.3883	645.7954	1015.3692	1530.5590	2025.5258	2450.2206	(97)
Space heating kWh	1285.0311	1063.3279	983.7429	682.9612	444.8778	0.0000	0.0000	0.0000	0.0000	597.3863	933.2990	1274.6516	(98a)
Space heating requirement - total per year (kWh/year)												7265.2778	
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	1285.0311	1063.3279	983.7429	682.9612	444.8778	0.0000	0.0000	0.0000	0.0000	597.3863	933.2990	1274.6516	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7265.2778	
Space heating per m2										(98c) / (4) =		76.6380	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													219.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	1285.0311	1063.3279	983.7429	682.9612	444.8778	0.0000	0.0000	0.0000	0.0000	597.3863	933.2990	1274.6516	(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)	585.9695	484.8736	448.5832	311.4278	202.8627	0.0000	0.0000	0.0000	0.0000	272.4060	425.5810	581.2365	(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	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966	(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	146.8032	129.8574	137.9293	121.0903	117.2847	105.5689	104.0535	108.2131	109.4418	122.1851	130.1205	145.1663	(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	34.4255	27.6174	24.8664	18.2182	14.0723	11.4972	12.8372	16.6863	21.6738	28.4372	32.1198	35.3823	(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												3312.9402	(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												1477.7142	(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)												277.8335	(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												5068.4878	(238)

10a. Fuel costs - using Table 12 prices

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	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3312.9402	16.4900	546.3038 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1477.7142	16.4900	243.6751 (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	277.8335	16.4900	45.8147 (250)
Additional standing charges			0.0000 (251)
Total energy cost			835.7936 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.1523 (257)
SAP value		65.1119
SAP rating (Section 12)		65 (258)
SAP band		D

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3312.9402	0.1537	509.0896 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1477.7142	0.1409	208.2242 (264)
Space and water heating			717.3138 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	277.8335	0.1443	40.1000 (268)
Total CO2, kg/year			757.4138 (272)
CO2 emissions per m2			7.9900 (273)
EI value			92.7401
EI rating			93 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	94.8000 (1b)	x 2.6000 (2b)	= 246.4800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 246.4800 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

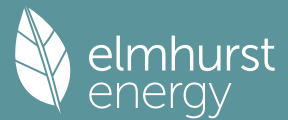
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1623 (8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.9123	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.7754 (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	0.8142	0.7754	0.7754	0.7173	0.7173	0.6397	0.6591	0.6204	0.6397	0.6785	0.6785	0.7367 (22b)
Effective ac	0.8315	0.8007	0.8007	0.7572	0.7572	0.7046	0.7172	0.6924	0.7046	0.7302	0.7302	0.7713 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)

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Windows (Uw = 1.60)			1.8900	1.5038	2.8421			(27)
Patio Doors (Uw = 1.60)			3.7800	1.5038	5.6842			(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203			(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000	(28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.5500	17.7595	190.0000	6135.1000	(29a)
New Ext Wall	41.6000	7.2900	34.3100	0.1800	6.1758	9.0000	308.7900	(29a)
Flat Roof	94.8000		94.8000	0.1600	15.1680	9.0000	853.2000	(30)
Total net area of external elements Aum(A, m2)			269.1600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	81.3399				(33)
Party Wall			27.8200	0.0000	0.0000	20.0000	556.4000	(32)
Party Wall to Adjacent			9.1000	0.0000	0.0000	180.0000	1638.0000	(32)
Internal Wall			177.5500			9.0000	1597.9500	(32c)

Heat capacity Cm = Sum(A x k)			(28) ... (30) + (32) + (32a) ... (32e) =	12985.4400				(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				136.9772				(35)
Thermal bridges (Default value 0.200 * total exposed area)				53.8320				(36)
Point Thermal bridges				(36a) =	0.0000			
Total fabric heat loss			(33) + (36) + (36a) =	135.1719				(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	67.6306	65.1240	65.1240	61.5934	61.5934	57.3138	58.3378	56.3203	57.3138	59.3924	59.3924	62.7397	(38)
Average = Sum(39)m / 12 =	202.8026	200.2959	200.2959	196.7653	196.7653	192.4857	193.5097	191.4922	192.4857	194.5643	194.5643	197.9116	(39)
												196.1615	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.1393	2.1128	2.1128	2.0756	2.0756	2.0304	2.0412	2.0200	2.0304	2.0524	2.0524	2.0877	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												2.0692	
												31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6859	(42)
Hot water usage for mixer showers														
	69.2534	68.2126	66.6961	63.7944	61.6530	59.2650	57.9076	59.4127	61.0626	63.6266	66.5906	68.9880	(42a)	
Hot water usage for baths														
	29.9044	29.4603	28.8349	27.6817	26.8183	25.8608	25.3436	25.9647	26.6409	27.6654	28.8423	29.8033	(42b)	
Hot water usage for other uses														
	42.1362	40.6040	39.0718	37.5396	36.0073	34.4751	34.4751	36.0073	37.5396	39.0718	40.6040	42.1362	(42c)	
Average daily hot water use (litres/day)													129.8811	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	141.2940	138.2770	134.6027	129.0157	124.4786	119.6009	117.7264	121.3847	125.2430	130.3638	136.0369	140.9276	(44)	
Energy conte	223.7752	196.9045	206.8794	176.6160	167.5721	147.0633	142.3799	150.2997	154.4372	176.9024	193.8095	220.6586	(45)	
Energy content (annual)													Total = Sum(45)m =	2157.2978
Distribution loss (46)m = 0.15 x (45)m														
	33.5663	29.5357	31.0319	26.4924	25.1358	22.0595	21.3570	22.5449	23.1656	26.5354	29.0714	33.0988	(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														
	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966	(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														
	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966	(64)	
													Total per year (kWh/year) = Sum(64)m =	2813.5678
Electric shower(s)														
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
													0.0000	(64a)
Heat gains from water heating, kWh/month														
	118.9957	105.7460	113.3778	101.8768	100.3081	92.0505	91.9317	94.5650	94.5024	103.4105	107.5937	117.9594	(65)	

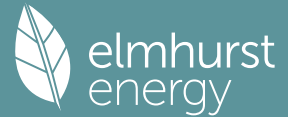
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
	39.3302	34.9327	28.4092	21.5076	16.0772	13.5730	14.6661	19.0636	25.5871	32.4887	37.9192	40.4233	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
	369.6073	373.4427	363.7777	343.2020	317.2290	292.8180	276.5099	272.6745	282.3396	302.9152	328.8883	353.2993	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	(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)														
	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	(71)	
Water heating gains (Table 5)														
	159.9404	157.3601	152.3895	141.4956	134.8228	127.8480	123.5641	127.1035	131.2533	138.9925	149.4356	158.5476	(72)	
Total internal gains														
	679.3970	676.2546	655.0955	616.7243	578.6480	541.7581	522.2593	526.3608	546.6991	584.9156	626.7622	662.7892	(73)	

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Southeast	1.8900	40.4699	0.6300	0.8000	0.7700	26.7152 (77)

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Southwest			3.7800		40.4699		0.6300		0.8000		0.7700		53.4303 (79)
Southeast			5.4000		40.4699		0.6300		0.8000		0.7700		76.3290 (77)

Solar gains	156.4745	239.7713	324.5899	416.5072	456.9517	486.7439	463.6727	432.5474	381.5759	283.0185	191.9747	132.6474 (83)
Total gains	835.8716	916.0259	979.6854	1033.2315	1035.5998	1028.5020	985.9320	958.9082	928.2750	867.9341	818.7368	795.4367 (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	17.7861	18.0087	18.0087	18.3318	18.3318	18.7394	18.6402	18.8366	18.7394	18.5392	18.5392	18.2256
alpha	2.1857	2.2006	2.2006	2.2221	2.2221	2.2493	2.2427	2.2558	2.2493	2.2359	2.2359	2.2150
util living area	0.9607	0.9504	0.9299	0.8903	0.8178	0.6690	0.5108	0.5296	0.7533	0.8910	0.9442	0.9640 (86)
MIT	17.6721	17.9394	18.4936	19.2377	19.9863	20.6136	20.8647	20.8518	20.4125	19.5208	18.5390	17.6914 (87)
Th 2	19.2421	19.2592	19.2592	19.2834	19.2834	19.3131	19.3060	19.3201	19.3131	19.2987	19.2987	19.2755 (88)
util rest of house	0.9512	0.9383	0.9111	0.8567	0.7482	0.5181	0.2646	0.2889	0.6356	0.8502	0.9281	0.9553 (89)
MIT 2	15.5941	15.9363	16.6334	17.5662	18.4589	19.1237	19.2859	19.2946	18.9489	17.9335	16.7146	15.6314 (90)
Living area fraction									fLA = Living area / (4) =			0.3755 (91)
MIT	16.3744	16.6885	17.3320	18.1939	19.0325	19.6832	19.8788	19.8794	19.4985	18.5296	17.3997	16.4050 (92)
Temperature adjustment												0.0000
adjusted MIT	16.3744	16.6885	17.3320	18.1939	19.0325	19.6832	19.8788	19.8794	19.4985	18.5296	17.3997	16.4050 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9267	0.9111	0.8809	0.8276	0.7352	0.5571	0.3585	0.3798	0.6516	0.8248	0.9011	0.9323 (94)
Useful gains	774.6001	834.5889	862.9750	855.1140	761.4028	572.9802	353.4621	364.1738	604.8402	715.8846	737.7508	741.6253 (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	2286.4852	2220.9896	1989.3388	1631.9566	1186.9819	708.9623	382.9147	398.1848	827.4066	1348.2480	1828.8486	2237.3827 (97)
Space heating kWh	1124.8425	931.6613	838.0147	559.3266	316.6308	0.0000	0.0000	0.0000	0.0000	470.4784	785.5904	1112.8435 (98a)
Space heating requirement - total per year (kWh/year)												6139.3883
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	1124.8425	931.6613	838.0147	559.3266	316.6308	0.0000	0.0000	0.0000	0.0000	470.4784	785.5904	1112.8435 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6139.3883
Space heating per m2										(98c) / (4) =		64.7615 (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	1124.8425	931.6613	838.0147	559.3266	316.6308	0.0000	0.0000	0.0000	0.0000	470.4784	785.5904	1112.8435 (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)	512.9241	424.8341	382.1317	255.0509	144.3825	0.0000	0.0000	0.0000	0.0000	214.5364	358.2264	507.4526 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating requirement	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966 (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	146.8032	129.8574	137.9293	121.0903	117.2847	105.5689	104.0535	108.2131	109.4418	122.1851	130.1205	145.1663 (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	34.4255	27.6174	24.8664	18.2182	14.0723	11.4972	12.8372	16.6863	21.6738	28.4372	32.1198	35.3823 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2799.5387 (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												1477.7142 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	277.8335 (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	4555.0863 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2799.5387	25.1600	704.3639 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1477.7142	25.1600	371.7929 (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	277.8335	25.1600	69.9029 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1146.0597 (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	2799.5387	0.1542	431.5609 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1477.7142	0.1409	208.2242 (264)
Space and water heating			639.7851 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	277.8335	0.1443	40.1000 (268)
Total CO2, kg/year			679.8851 (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	2799.5387	1.5707	4397.3057 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1477.7142	1.5210	2247.6527 (278)
Space and water heating			6644.9584 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	277.8335	1.5338	426.1503 (282)
Total Primary energy kWh/year			7071.1086 (286)

SAP 10 EPC IMPROVEMENTS

Baseline

Current energy efficiency rating:	D 65
Current environmental impact rating:	A 93

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

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

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

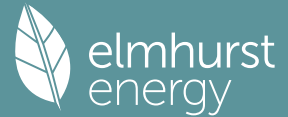
Potential energy efficiency rating:	D 65
Potential environmental impact rating:	A 93

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

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

	Current	Potential	Saving
Electricity	£1146	£1146	£0
Space heating	£704	£704	£0
Water heating	£372	£372	£0
Lighting	£70	£70	£0
Total cost of fuels	£1146	£1146	£0
Total cost of uses	£1146	£1146	£0
Delivered energy	48 kWh/m²	48 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.7 tonnes	0.7 tonnes	0.0 tonnes
CO2 emissions per m²	7 kg/m²	7 kg/m²	0 kg/m²
Primary energy	75 kWh/m²	75 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	94.8000 (1b)	x 2.6000 (2b)	= 246.4800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	246.4800 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 40.0000 / (5) = 0.1623 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9123 (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) = 0.7754 (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	0.9887	0.9693	0.9499	0.8530	0.8336	0.7367	0.7367	0.7173	0.7754	0.8336	0.8724	0.9111 (22b)
Effective ac	0.9888	0.9698	0.9512	0.8638	0.8474	0.7713	0.7713	0.7572	0.8007	0.8474	0.8805	0.9151 (25)

3. Heat losses and heat loss parameter

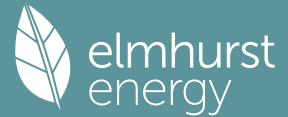
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			1.8900	1.5038	2.8421		(27)
Patio Doors (Uw = 1.60)			3.7800	1.5038	5.6842		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.5500	17.7595	190.0000	6135.1000 (29a)
New Ext Wall	41.6000	7.2900	34.3100	0.1800	6.1758	9.0000	308.7900 (29a)
Flat Roof	94.8000		94.8000	0.1600	15.1680	9.0000	853.2000 (30)
Total net area of external elements Aum(A, m ²)			269.1600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		81.3399		(33)
Party Wall			27.8200	0.0000	0.0000	20.0000	556.4000 (32)
Party Wall to Adjacent			9.1000	0.0000	0.0000	180.0000	1638.0000 (32)
Internal Wall			177.5500			9.0000	1597.9500 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12985.4400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							136.9772 (35)
Thermal bridges (Default value 0.200 * total exposed area)							53.8320 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	135.1719 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	80.4236	78.8799	77.3667	70.2595	68.9298	62.7397	62.7397	61.5934	65.1240	68.9298	71.6198	74.4321 (38)
Heat transfer coeff	215.5955	214.0518	212.5386	205.4315	204.1017	197.9116	197.9116	196.7653	200.2959	204.1017	206.7918	209.6041 (39)
Average = Sum(39)m / 12 =												205.4251
HLP	2.2742	2.2579	2.2420	2.1670	2.1530	2.0877	2.0877	2.0756	2.1128	2.1530	2.1813	2.2110 (40)
HLP (average)												2.1669
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy											2.6859 (42)	
Hot water usage for mixer showers	69.2534	68.2126	66.6961	63.7944	61.6530	59.2650	57.9076	59.4127	61.0626	63.6266	66.5906	68.9880 (42a)
Hot water usage for baths	29.9044	29.4603	28.8349	27.6817	26.8183	25.8608	25.3436	25.9647	26.6409	27.6654	28.8423	29.8033 (42b)
Hot water usage for other uses												

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	42.1362	40.6040	39.0718	37.5396	36.0073	34.4751	34.4751	36.0073	37.5396	39.0718	40.6040	42.1362 (42c)
Average daily hot water use (litres/day)												129.8811 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.2940	138.2770	134.6027	129.0157	124.4786	119.6009	117.7264	121.3847	125.2430	130.3638	136.0369	140.9276 (44)
Energy content (annual)	223.7752	196.9045	206.8794	176.6160	167.5721	147.0633	142.3799	150.2997	154.4372	176.9024	193.8095	220.6586 (45)
Energy content (annual)										Total =	Sum(45)m =	2157.2978
Distribution loss (46)m = 0.15 x (45)m	33.5663	29.5357	31.0319	26.4924	25.1358	22.0595	21.3570	22.5449	23.1656	26.5354	29.0714	33.0988 (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	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966 (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	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966 (64)
								Total per year (kWh/year) =	Sum(64)m =			2813.5678 (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	118.9957	105.7460	113.3778	101.8768	100.3081	92.0505	91.9317	94.5650	94.5024	103.4105	107.5937	117.9594 (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	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	39.3302	34.9327	28.4092	21.5076	16.0772	13.5730	14.6661	19.0636	25.5871	32.4887	37.9192	40.4233 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	369.6073	373.4427	363.7777	343.2020	317.2290	292.8180	276.5099	272.6745	282.3396	302.9152	328.8883	353.2993 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357 (71)
Water heating gains (Table 5)	159.9404	157.3601	152.3895	141.4956	134.8228	127.8480	123.5641	127.1035	131.2533	138.9925	149.4356	158.5476 (72)
Total internal gains	679.3970	676.2546	655.0955	616.7243	578.6480	541.7581	522.2593	526.3608	546.6991	584.9156	626.7622	662.7892 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast				1.8900	36.7938	0.6300	0.8000		0.7700		24.2885 (77)	
Southwest				3.7800	36.7938	0.6300	0.8000		0.7700		48.5770 (79)	
Southeast				5.4000	36.7938	0.6300	0.8000		0.7700		69.3957 (77)	
Solar gains	142.2612	242.3234	331.5575	410.8158	460.1479	456.8204	440.4236	403.6196	359.0066	267.8190	170.3961	121.7459 (83)
Total gains	821.6582	918.5780	986.6530	1027.5401	1038.7960	998.5785	962.6829	929.9804	905.7057	852.7346	797.1583	784.5352 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	16.7307	16.8514	16.9713	17.5585	17.6729	18.2256	18.2256	18.3318	18.0087	17.6729	17.4430	17.2090
alpha	2.1154	2.1234	2.1314	2.1706	2.1782	2.2150	2.2150	2.2221	2.2006	2.1782	2.1629	2.1473
util living area	0.9658	0.9550	0.9383	0.9082	0.8572	0.7661	0.6538	0.6803	0.8166	0.9131	0.9541	0.9688 (86)
MIT	17.2543	17.5598	18.1027	18.8794	19.6193	20.3027	20.6644	20.6201	20.1119	19.1585	18.1217	17.2644 (87)
Th 2	19.1568	19.1669	19.1769	19.2243	19.2333	19.2755	19.2755	19.2834	19.2592	19.2333	19.2152	19.1964 (88)
util rest of house	0.9576	0.9441	0.9222	0.8811	0.8062	0.6623	0.4729	0.5105	0.7316	0.8821	0.9411	0.9614 (89)
MIT 2	15.0384	15.4256	16.1121	17.0993	18.0053	18.8053	19.1432	19.1179	18.6026	17.4619	16.1573	15.0631 (90)
Living area fraction									fLA =	Living area / (4) =		0.3755 (91)
MIT	15.8705	16.2271	16.8596	17.7677	18.6114	19.3676	19.7145	19.6821	19.1693	18.0990	16.8950	15.8898 (92)
Temperature adjustment												0.0000
adjusted MIT	15.8705	16.2271	16.8596	17.7677	18.6114	19.3676	19.7145	19.6821	19.1693	18.0990	16.8950	15.8898 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9339	0.9169	0.8915	0.8498	0.7823	0.6692	0.5276	0.5579	0.7259	0.8533	0.9148	0.9394 (94)
Useful gains	767.3597	842.2452	879.5907	873.1557	812.6744	668.2803	507.9341	518.8303	657.4146	727.6205	729.2772	736.9792 (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	2494.5521	2424.5783	2201.8257	1821.7128	1410.6285	943.5719	616.3883	645.7954	1015.3692	1530.5590	2025.5258	2450.2206 (97)
Space heating kWh												

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Space heating requirement - total per year (kWh/year)	1285.0311	1063.3279	983.7429	682.9612	444.8778	0.0000	0.0000	0.0000	0.0000	597.3863	933.2990	1274.6516	(98a)
Solar heating kWh												7265.2778	
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Space heating kWh	1285.0311	1063.3279	983.7429	682.9612	444.8778	0.0000	0.0000	0.0000	0.0000	597.3863	933.2990	1274.6516	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7265.2778	
Space heating per m2										(98c) / (4) =		76.6380	(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	1285.0311	1063.3279	983.7429	682.9612	444.8778	0.0000	0.0000	0.0000	0.0000	597.3863	933.2990	1274.6516	(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)	585.9695	484.8736	448.5832	311.4278	202.8627	0.0000	0.0000	0.0000	0.0000	272.4060	425.5810	581.2365	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966	(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	146.8032	129.8574	137.9293	121.0903	117.2847	105.5689	104.0535	108.2131	109.4418	122.1851	130.1205	145.1663	(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	34.4255	27.6174	24.8664	18.2182	14.0723	11.4972	12.8372	16.6863	21.6738	28.4372	32.1198	35.3823	(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												3312.9402	(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												1477.7142	(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)												277.8335	(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												5068.4878	(238)

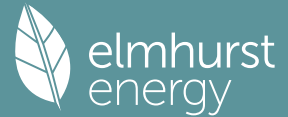
10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3312.9402	16.4900	546.3038	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1477.7142	16.4900	243.6751	(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	277.8335	16.4900	45.8147	(250)
Additional standing charges			0.0000	(251)
Total energy cost			835.7936	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		2.1523 (257)
SAP value	[(255) x (256)] / [(4) + 45.0] =	65.1119
SAP rating (Section 12)		65 (258)
SAP band		D

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3312.9402	0.1537	509.0896 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1477.7142	0.1409	208.2242 (264)
Space and water heating			717.3138 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	277.8335	0.1443	40.1000 (268)
Total CO2, kg/year			757.4138 (272)
CO2 emissions per m2			7.9900 (273)
EI value			92.7401
EI rating			93 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	94.8000 (1b)	x 2.6000 (2b)	= 246.4800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	246.4800 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 40.0000 / (5) = 0.1623 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9123 (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) = 0.7754 (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	0.8142	0.7754	0.7754	0.7173	0.7173	0.6397	0.6591	0.6204	0.6397	0.6785	0.6785	0.7367 (22b)
Effective ac	0.8315	0.8007	0.8007	0.7572	0.7572	0.7046	0.7172	0.6924	0.7046	0.7302	0.7302	0.7713 (25)

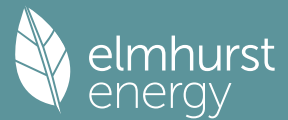
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			1.8900	1.5038	2.8421		(27)
Patio Doors (Uw = 1.60)			3.7800	1.5038	5.6842		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.5500	17.7595	190.0000	6135.1000 (29a)
New Ext Wall	41.6000	7.2900	34.3100	0.1800	6.1758	9.0000	308.7900 (29a)
Flat Roof	94.8000		94.8000	0.1600	15.1680	9.0000	853.2000 (30)
Total net area of external elements Aum(A, m2)			269.1600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	81.3399			(33)
Party Wall			27.8200	0.0000	0.0000	20.0000	556.4000 (32)
Party Wall to Adjacent			9.1000	0.0000	0.0000	180.0000	1638.0000 (32)
Internal Wall			177.5500			9.0000	1597.9500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12985.4400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		136.9772 (35)
Thermal bridges (Default value 0.200 * total exposed area)		53.8320 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	135.1719 (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	67.6306	65.1240	65.1240	61.5934	61.5934	57.3138	58.3378	56.3203	57.3138	59.3924	59.3924	62.7397 (38)
	202.8026	200.2959	200.2959	196.7653	196.7653	192.4857	193.5097	191.4922	192.4857	194.5643	194.5643	197.9116 (39)

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Average = Sum(39)m / 12 =

196.1615

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	2.1393	2.1128	2.1128	2.0756	2.0756	2.0304	2.0412	2.0200	2.0304	2.0524	2.0524	2.0877 (40)
HLP (average)												2.0692
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6859 (42)
Hot water usage for mixer showers												
69.2534	68.2126	66.6961	63.7944	61.6530	59.2650	57.9076	59.4127	61.0626	63.6266	66.5906	68.9880 (42a)	
Hot water usage for baths												
29.9044	29.4603	28.8349	27.6817	26.8183	25.8608	25.3436	25.9647	26.6409	27.6654	28.8423	29.8033 (42b)	
Hot water usage for other uses												
42.1362	40.6040	39.0718	37.5396	36.0073	34.4751	34.4751	36.0073	37.5396	39.0718	40.6040	42.1362 (42c)	
Average daily hot water use (litres/day)												129.8811 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
141.2940	138.2770	134.6027	129.0157	124.4786	119.6009	117.7264	121.3847	125.2430	130.3638	136.0369	140.9276 (44)	
Energy content	223.7752	196.9045	206.8794	176.6160	167.5721	147.0633	142.3799	150.2997	154.4372	176.9024	193.8095	220.6586 (45)
Energy content (annual)										Total = Sum (45)m =		2157.2978
Distribution loss (46)m = 0.15 x (45)m												
33.5663	29.5357	31.0319	26.4924	25.1358	22.0595	21.3570	22.5449	23.1656	26.5354	29.0714	33.0988 (46)	
Water storage loss:												
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.9400 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.0476 (55)
Total storage loss												
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756 (56)	
If cylinder contains dedicated solar storage												
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966 (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												
279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966 (64)	
												2813.5678 (64)
Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
												0.0000 (64a)
Heat gains from water heating, kWh/month												
118.9957	105.7460	113.3778	101.8768	100.3081	92.0505	91.9317	94.5650	94.5024	103.4105	107.5937	117.9594 (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	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536	161.1536 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	39.3302	34.9327	28.4092	21.5076	16.0772	13.5730	14.6661	19.0636	25.5871	32.4887	37.9192	40.4233 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	369.6073	373.4427	363.7777	343.2020	317.2290	292.8180	276.5099	272.6745	282.3396	302.9152	328.8883	353.2993 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013	53.8013 (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)	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357	-107.4357 (71)
Water heating gains (Table 5)	159.9404	157.3601	152.3895	141.4956	134.8228	127.8480	123.5641	127.1035	131.2533	138.9925	149.4356	158.5476 (72)
Total internal gains	679.3970	676.2546	655.0955	616.7243	578.6480	541.7581	522.2593	526.3608	546.6991	584.9156	626.7622	662.7892 (73)

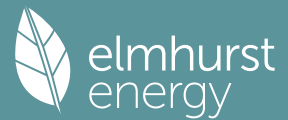
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast				1.8900	40.4699		0.6300		0.8000		0.7700		26.7152 (77)
Southwest				3.7800	40.4699		0.6300		0.8000		0.7700		53.4303 (79)
Southeast				5.4000	40.4699		0.6300		0.8000		0.7700		76.3290 (77)
Solar gains	156.4745	239.7713	324.5899	416.5072	456.9517	486.7439	463.6727	432.5474	381.5759	283.0185	191.9747	132.6474	(83)
Total gains	835.8716	916.0259	979.6854	1033.2315	1035.5998	1028.5020	985.9320	958.9082	928.2750	867.9341	818.7368	795.4367	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	17.7861	18.0087	18.0087	18.3318	18.3318	18.7394	18.6402	18.8366	18.7394	18.5392	18.5392	18.2256
alpha	2.1857	2.2006	2.2006	2.2221	2.2221	2.2493	2.2427	2.2558	2.2493	2.2359	2.2359	2.2150
util living area	0.9607	0.9504	0.9299	0.8903	0.8178	0.6690	0.5108	0.5296	0.7533	0.8910	0.9442	0.9640 (86)
MIT	17.6721	17.9394	18.4936	19.2377	19.9863	20.6136	20.8647	20.8518	20.4125	19.5208	18.5390	17.6914 (87)
Th 2	19.2421	19.2592	19.2592	19.2834	19.2834	19.3131	19.3060	19.3201	19.3201	19.2987	19.2987	19.2755 (88)
util rest of house	0.9512	0.9383	0.9111	0.8567	0.7482	0.5181	0.2646	0.2889	0.6356	0.8502	0.9281	0.9553 (89)

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MIT 2	15.5941	15.9363	16.6334	17.5662	18.4589	19.1237	19.2859	19.2946	18.9489	17.9335	16.7146	15.6314 (90)
Living area fraction									FLA = Living area / (4) =			0.3755 (91)
MIT	16.3744	16.6885	17.3320	18.1939	19.0325	19.6832	19.8788	19.8794	19.4985	18.5296	17.3997	16.4050 (92)
Temperature adjustment												0.0000
adjusted MIT	16.3744	16.6885	17.3320	18.1939	19.0325	19.6832	19.8788	19.8794	19.4985	18.5296	17.3997	16.4050 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9267	0.9111	0.8809	0.8276	0.7352	0.5571	0.3585	0.3798	0.6516	0.8248	0.9011	0.9323	(94)
Useful gains	774.6001	834.5889	862.9750	855.1140	761.4028	572.9802	353.4621	364.1738	604.8402	715.8846	737.7508	741.6253	(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	2286.4852	2220.9896	1989.3388	1631.9566	1186.9819	708.9623	382.9147	398.1848	827.4066	1348.2480	1828.8486	2237.3827	(97)
Space heating kWh	1124.8425	931.6613	838.0147	559.3266	316.6308	0.0000	0.0000	0.0000	0.0000	470.4784	785.5904	1112.8435	(98a)
Space heating requirement - total per year (kWh/year)												6139.3883	
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	1124.8425	931.6613	838.0147	559.3266	316.6308	0.0000	0.0000	0.0000	0.0000	470.4784	785.5904	1112.8435	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6139.3883	
Space heating per m2											(98c) / (4) =	64.7615	(99)

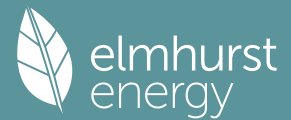
9a. Energy requirements - Individual heating systems, including micro-CHP

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	1124.8425	931.6613	838.0147	559.3266	316.6308	0.0000	0.0000	0.0000	0.0000	470.4784	785.5904	1112.8435 (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)	512.9241	424.8341	382.1317	255.0509	144.3825	0.0000	0.0000	0.0000	0.0000	214.5364	358.2264	507.4526 (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	279.5132	247.2485	262.6174	230.5560	223.3101	201.0033	198.1179	206.0377	208.3772	232.6404	247.7495	276.3966 (64)	
Efficiency of water heater												190.4000 (216)	
(217)m	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000 (217)	
Fuel for water heating, kWh/month	146.8032	129.8574	137.9293	121.0903	117.2847	105.5689	104.0535	108.2131	109.4418	122.1851	130.1205	145.1663 (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	34.4255	27.6174	24.8664	18.2182	14.0723	11.4972	12.8372	16.6863	21.6738	28.4372	32.1198	35.3823 (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													2799.5387 (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													1477.7142 (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)													277.8335 (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													4555.0863 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2799.5387	25.1600	704.3639 (240)	
Total CO2 associated with community systems			0.0000 (473)	

Full SAP Calculation Printout



Water heating (other fuel)	1477.7142	25.1600	371.7929 (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	277.8335	25.1600	69.9029 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1146.0597 (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	2799.5387	0.1542	431.5609 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1477.7142	0.1409	208.2242 (264)
Space and water heating			639.7851 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	277.8335	0.1443	40.1000 (268)
Total CO2, kg/year			679.8851 (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	2799.5387	1.5707	4397.3057 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1477.7142	1.5210	2247.6527 (278)
Space and water heating			6644.9584 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	277.8335	1.5338	426.1503 (282)
Total Primary energy kWh/year			7071.1086 (286)

Overview Report

Dwelling Address	
Report Date	01/02/2024
Property Type	Flat, Semi-Detached
Floor Area [m ²]	95

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

65

65

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

Primary Energy use

The primary energy use for this property per year is 75 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: **0.7** 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

£1146

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