

Summary for Input Data

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

SAP Rating	67 D	DER	7.60	TER	8.39
Environmental	93 A	% DER < TER			9.42
CO ₂ Emissions (t/year)	0.63	DFEE	78.37	TFEE	40.00
Compliance Check	See BREL	% DFEE < TFEE			-95.94
% DPER < TPER	-74.15	DPER	79.01	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 m ²	0.00 m
Ground floor:	30.60 m	94.80 m ²	2.60 m
1st Storey:	0.00 m	0.00 m ²	0.00 m
2nd Storey:	0.00 m	0.00 m ²	0.00 m
3rd Storey:	0.00 m	0.00 m ²	0.00 m
4th Storey:	0.00 m	0.00 m ²	0.00 m
5th Storey:	0.00 m	0.00 m ²	0.00 m
6th Storey:	0.00 m	0.00 m ²	0.00 m
7th Storey:	0.00 m	0.00 m ²	0.00 m

8.0 Living Area	35.60	m ²
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9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
	Existing Ext Wall	Cavity Wall	Cavity wall : dense plaster, dense block, filled cavity, any outside structure	0.18	190.00	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/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
	Party Wall	Filled Cavity with Edge Sealing	Steel frame	0.00	20.00	27.82	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/m ² K)	Area (m ²)
	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	0.14	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	1.20
Patio Doors	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.20
Bifold Doors	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
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

26.0 Heat Networks

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

28.0 Water Heating

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

28.1 Showers

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

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

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

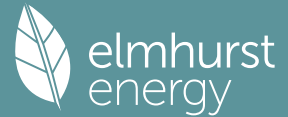
Lower cost measures

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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Compliance Check	See BREL		% DFEE < TFEE				-95.94	
% DPER < TPER	-74.15		DPER	79.01		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

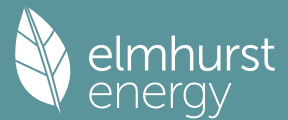
			m3 per hour	
Number of open chimneys		0 * 80 =	0.0000	(6a)
Number of open flues		0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000	(6d)
Number of flues attached to other heater		0 * 35 =	0.0000	(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)
			Air changes per hour	
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 = 1.20)			1.8900	1.1450	2.1641		(27)
Patio Doors (Uw = 1.20)			3.7800	1.1450	4.3282		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.1800	5.8122	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	0.1400	13.2720	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) =	63.5256		(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) =			117.3576 (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	197.7811	196.2374	194.7243	187.6171	186.2874	180.0973	180.0973	178.9509	182.4816	186.2874	188.9774	191.7897	(39)
Average = Sum(39)m / 12 =												187.6107	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0863	2.0700	2.0541	1.9791	1.9651	1.8998	1.8998	1.8877	1.9249	1.9651	1.9934	2.0231	(40)
HLP (average)												1.9790	
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	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)												2813.5678	(64)
Electric shower(s)												2814	(64a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	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	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)

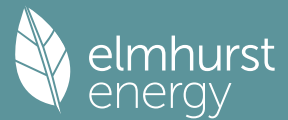
6. Solar gains

[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	
South-east				1.8900	36.7938	0.6300	0.8000		0.7700		24.2885 (77)	
South-west				3.7800	36.7938	0.6300	0.8000		0.7700		48.5770 (79)	
South-east				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 from living area, nil,m (see Table 9a)													
tau	18.2377	18.3811	18.5240	19.2257	19.3629	20.0284	20.0284	20.1567	19.7667	19.3629	19.0873	18.8074	
alpha	2.2158	2.2254	2.2349	2.2817	2.2909	2.3352	2.3352	2.3438	2.3178	2.2909	2.2725	2.2538	
util living area													

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	0.9707	0.9586	0.9424	0.9094	0.8543	0.7533	0.6353	0.6642	0.8104	0.9161	0.9583	0.9734 (86)
MIT	17.4213	17.7492	18.2719	19.0462	19.7560	20.4031	20.7240	20.6837	20.2154	19.2932	18.2853	17.4418 (87)
Th 2	19.2764	19.2871	19.2975	19.3473	19.3567	19.4010	19.4010	19.4093	19.3839	19.3567	19.3377	19.3180 (88)
util rest of house												
	0.9638	0.9489	0.9279	0.8838	0.8052	0.6537	0.4672	0.5055	0.7288	0.8872	0.9468	0.9672 (89)
MIT 2	15.2888	15.7066	16.3711	17.3613	18.2312	18.9888	19.2863	19.2646	18.7897	17.6854	16.4122	15.3305 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	16.0896	16.4736	17.0849	17.9940	18.8038	19.5199	19.8262	19.7975	19.3251	18.2891	17.1156	16.1233 (92)
Temperature adjustment												0.0000
adjusted MIT	16.0896	16.4736	17.0849	17.9940	18.8038	19.5199	19.8262	19.7975	19.3251	18.2891	17.1156	16.1233 (93)

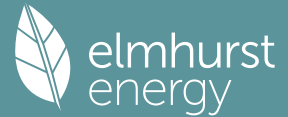
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9434	0.9242	0.8998	0.8547	0.7838	0.6627	0.5189	0.5509	0.7251	0.8606	0.9233	0.9483 (94)
Useful gains	708.9879	800.4706	836.2502	844.8581	790.9944	652.1121	491.9085	502.4548	639.9818	698.3379	689.1199	681.5587 (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	2331.7623	2271.1819	2061.1407	1706.1928	1323.3526	886.0642	581.0281	607.9944	953.4884	1432.3913	1892.7313	2286.7748 (97)
Space heating kWh	1207.3441	988.3179	911.3186	620.1610	396.0745	0.0000	0.0000	0.0000	0.0000	546.1357	866.6002	1194.2808 (98a)
Space heating requirement - total per year (kWh/year)												6730.2328
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	1207.3441	988.3179	911.3186	620.1610	396.0745	0.0000	0.0000	0.0000	0.0000	546.1357	866.6002	1194.2808 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6730.2328
Space heating per m2										(98c) / (4) =		70.9940 (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	1207.3441	988.3179	911.3186	620.1610	396.0745	0.0000	0.0000	0.0000	0.0000	546.1357	866.6002	1194.2808 (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)	550.5445	450.6694	415.5579	282.7911	180.6085	0.0000	0.0000	0.0000	0.0000	249.0359	395.1665	544.5877 (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												3068.9616 (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												4824.5093 (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	3068.9616	0.1538	472.0125 (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			680.2367 (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			720.3367 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.6000 (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	3068.9616	1.5694	4816.4569 (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			7064.1096 (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			7490.2599 (286)
Dwelling Primary energy Rate (DPER)			79.0100 (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 = $0.33 \times (25)m \times (5)$

	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)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	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)	
Distribution loss (46)m = 0.15 x (45)m	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)	
	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)												2472.4030	(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	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	(73)

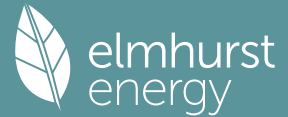
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast				7.2900	36.7938	0.6300	0.7000	0.7700	81.9737 (77)			
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	733.5298	836.0176	887.7073	937.0279	951.4695	926.8770	892.6703	861.4366	837.6747	777.7613	725.0105	703.2597 (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	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)

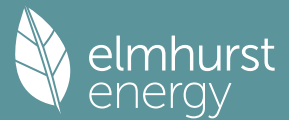
8. Space heating requirement

	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) =		

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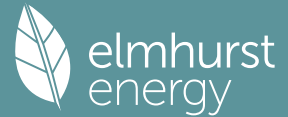
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	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	Be Lean		Prop Type Ref	Conversion		
Property						
SAP Rating	67 D	DER	7.60	TER	8.39	
Environmental	93 A	% DER < TER				9.42
CO ₂ Emissions (t/year)	0.63	DFEE	78.37	TFEE	40.00	
Compliance Check	See BREL	% DFEE < TFEE				-95.94
% DPER < TPER	-74.15	DPER	79.01	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)	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

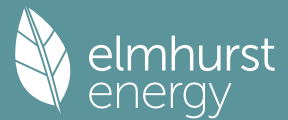
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9447	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 = 1.20)			1.8900	1.1450	2.1641		(27)
Patio Doors (Uw = 1.20)			3.7800	1.1450	4.3282		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.1800	5.8122	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	0.1400	13.2720	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) =	63.5256		(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) = 117.3576 (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	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)
Average = Sum(39)m / 12 =	194.3238	192.9144	191.5328	185.0437	183.8297	178.1779	178.1779	177.1312	180.3548	183.8297	186.2857	188.8535	(39)
												185.0379	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0498	2.0350	2.0204	1.9519	1.9391	1.8795	1.8795	1.8685	1.9025	1.9391	1.9650	1.9921	(40)
HLP (average)												1.9519	
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	(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	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)										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	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)
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	(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	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	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	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	497.5622	513.3503	490.3746	477.3920	453.0291	438.6755	422.0022	420.9381	433.6203	445.6528	471.1553	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	18.5621	18.6978	18.8326	19.4930	19.6218	20.2442	20.2442	20.3638	19.9998	19.6218	19.3631	19.0998	
alpha	2.2375	2.2465	2.2555	2.2995	2.3081	2.3496	2.3496	2.3576	2.3333	2.3081	2.2909	2.2733	
util living area	0.9787	0.9681	0.9539	0.9245	0.8747	0.7807	0.6674	0.6980	0.8370	0.9330	0.9689	0.9810	(86)

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MIT	17.3279	17.6597	18.1868	18.9670	19.6902	20.3567	20.6961	20.6502	20.1574	19.2080	18.1872	17.3401 (87)
Th 2	19.3003	19.3101	19.3198	19.3656	19.3742	19.4149	19.4149	19.4225	19.3991	19.3742	19.3567	19.3386 (88)
util rest of house												
	0.9736	0.9604	0.9420	0.9024	0.8306	0.6863	0.5002	0.5418	0.7624	0.9090	0.9601	0.9765 (89)
MIT 2	16.0868	16.4203	16.9469	17.7381	18.4362	19.0600	19.3126	19.2929	18.8894	17.9874	16.9735	16.1206 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	16.5529	16.8858	17.4125	18.1996	18.9071	19.5470	19.8321	19.8026	19.3656	18.4458	17.4293	16.5785 (92)
Temperature adjustment												0.0000
adjusted MIT	16.5529	16.8858	17.4125	18.1996	18.9071	19.5470	19.8321	19.8026	19.3656	18.4458	17.4293	16.5785 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9608	0.9439	0.9224	0.8808	0.8141	0.6959	0.5519	0.5866	0.7604	0.8897	0.9447	0.9649	(94)
Useful gains	614.7379	713.3088	758.1146	782.3508	743.4039	623.1660	475.9764	483.7074	602.6741	634.7780	606.0572	586.6509	(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	2381.0214	2312.2239	2090.1023	1720.8330	1324.8786	881.4389	575.8930	602.7077	949.6693	1442.2820	1924.1928	2337.7315	(97)
Space heating kWh	1314.1149	1074.4709	990.9989	675.7072	432.6172	0.0000	0.0000	0.0000	0.0000	600.7830	949.0576	1302.8040	(98a)
Space heating requirement - total per year (kWh/year)												7340.5537	
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	1314.1149	1074.4709	990.9989	675.7072	432.6172	0.0000	0.0000	0.0000	0.0000	600.7830	949.0576	1302.8040	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7340.5537	
Space heating per m2												77.4320	(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	1674.8719	1318.5162	1346.1974	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5045	0.5805	0.5563	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	845.0031	765.3905	748.8317	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	101.0879	137.0898	118.5270	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fC = cooled area / (4) =				(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	25.2720	34.2724	29.6317	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												89.1762	(107)
Energy for space heating												77.4320	(99)
Energy for space cooling												0.9407	(108)
Total												78.3727	(109)
Fabric Energy Efficiency (DFEE)												78.4	(109)

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

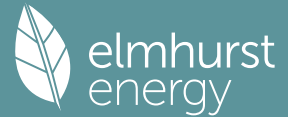
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	94.8000 (1b)	x	2.6000 (2b)	=
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.8000		246.4800 (1b) - (3b)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	246.4800 (4)	(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) =	
Pressure test	30.0000 / (5) =	
Pressure Test Method	Yes	
Measured/design AP50	Blower Door	
Infiltration rate	5.0000 (17)	
Number of sides sheltered	0.3717 (18)	
	2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =	
Infiltration rate adjusted to include shelter factor	0.8500 (20)	
	(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 m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.20)			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, m ²)			269.1600				(31)
Fabric heat loss, W/K = Sum (A x U)					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/m ² K							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)

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

(38)m	Jan 47.2692	Feb 47.0129	Mar 46.7617	Apr 45.5817	May 45.3610	Jun 44.3333	Jul 44.3333	Aug 44.1430	Sep 44.7292	Oct 45.3610	Nov 45.8076	Dec 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 1.1607	Feb 1.1580	Mar 1.1553	Apr 1.1429	May 1.1406	Jun 1.1297	Jul 1.1297	Aug 1.1277	Sep 1.1339	Oct 1.1406	Nov 1.1453	Dec 1.1502	(40)
HLP (average)												1.1429	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

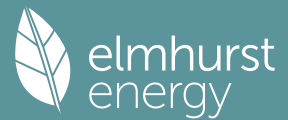
4. Water heating energy requirements (kWh/year)

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	(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)

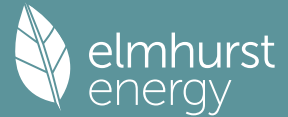
8. Space heating requirement

	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	Be Lean		Prop Type Ref	Conversion		
Property						
SAP Rating	67 D	DER	7.60	TER	8.39	
Environmental	93 A	% DER < TER				9.42
CO ₂ Emissions (t/year)	0.63	DFEE	78.37	TFEE	40.00	
Compliance Check	See BREL	% DFEE < TFEE				-95.94
% DPER < TPER	-74.15	DPER	79.01	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)	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

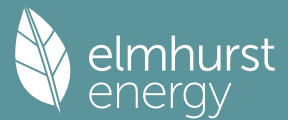
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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)

	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 = 1.20)			1.8900	1.1450	2.1641		(27)
Patio Doors (Uw = 1.20)			3.7800	1.1450	4.3282		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.1800	5.8122	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	0.1400	13.2720	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) =	63.5256		(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) =	117.3576 (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	197.7811	196.2374	194.7243	187.6171	186.2874	180.0973	180.0973	178.9509	182.4816	186.2874	188.9774	191.7897	(39)
Average = Sum(39)m / 12 =												187.6107	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0863	2.0700	2.0541	1.9791	1.9651	1.8998	1.8998	1.8877	1.9249	1.9651	1.9934	2.0231	(40)
HLP (average)												1.9790	
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	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)												2813.5678	(64)
Electric shower(s)												2814	(64a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	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	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)

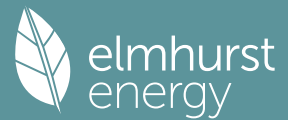
6. Solar gains

[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)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	18.2377	18.3811	18.5240	19.2257	19.3629	20.0284	20.0284	20.1567	19.7667	19.3629	19.0873	18.8074	
alpha	2.2158	2.2254	2.2349	2.2817	2.2909	2.3352	2.3352	2.3438	2.3178	2.2909	2.2725	2.2538	
util living area													

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	0.9707	0.9586	0.9424	0.9094	0.8543	0.7533	0.6353	0.6642	0.8104	0.9161	0.9583	0.9734 (86)
MIT	17.4213	17.7492	18.2719	19.0462	19.7560	20.4031	20.7240	20.6837	20.2154	19.2932	18.2853	17.4418 (87)
Th 2	19.2764	19.2871	19.2975	19.3473	19.3567	19.4010	19.4010	19.4093	19.3839	19.3567	19.3377	19.3180 (88)
util rest of house												
	0.9638	0.9489	0.9279	0.8838	0.8052	0.6537	0.4672	0.5055	0.7288	0.8872	0.9468	0.9672 (89)
MIT 2	15.2888	15.7066	16.3711	17.3613	18.2312	18.9888	19.2863	19.2646	18.7897	17.6854	16.4122	15.3305 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	16.0896	16.4736	17.0849	17.9940	18.8038	19.5199	19.8262	19.7975	19.3251	18.2891	17.1156	16.1233 (92)
Temperature adjustment												0.0000
adjusted MIT	16.0896	16.4736	17.0849	17.9940	18.8038	19.5199	19.8262	19.7975	19.3251	18.2891	17.1156	16.1233 (93)

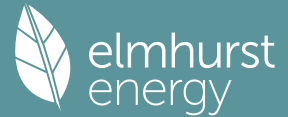
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9434	0.9242	0.8998	0.8547	0.7838	0.6627	0.5189	0.5509	0.7251	0.8606	0.9233	0.9483 (94)
Useful gains	708.9879	800.4706	836.2502	844.8581	790.9944	652.1121	491.9085	502.4548	639.9818	698.3379	689.1199	681.5587 (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												
	2331.7623	2271.1819	2061.1407	1706.1928	1323.3526	886.0642	581.0281	607.9944	953.4884	1432.3913	1892.7313	2286.7748 (97)
Space heating kWh												
	1207.3441	988.3179	911.3186	620.1610	396.0745	0.0000	0.0000	0.0000	0.0000	546.1357	866.6002	1194.2808 (98a)
Space heating requirement - total per year (kWh/year)												6730.2328
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												
	1207.3441	988.3179	911.3186	620.1610	396.0745	0.0000	0.0000	0.0000	0.0000	546.1357	866.6002	1194.2808 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6730.2328
Space heating per m2										(98c) / (4) =		
												70.9940 (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	1207.3441	988.3179	911.3186	620.1610	396.0745	0.0000	0.0000	0.0000	0.0000	546.1357	866.6002	1194.2808 (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)	550.5445	450.6694	415.5579	282.7911	180.6085	0.0000	0.0000	0.0000	0.0000	249.0359	395.1665	544.5877 (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)	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												3068.9616 (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												4824.5093 (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	3068.9616	0.1538	472.0125 (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			680.2367 (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			720.3367 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.6000 (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	3068.9616	1.5694	4816.4569 (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			7064.1096 (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			7490.2599 (286)
Dwelling Primary energy Rate (DPER)			79.0100 (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	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	(73)

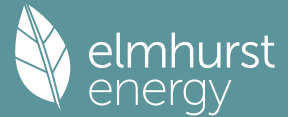
6. Solar gains

[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	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														

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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)

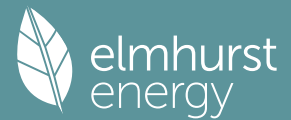
8. Space heating requirement

	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												79.8000 (216)
	86.0560	85.8133	85.4035	84.6360	83.3034	79.8000	79.8000	79.8000	79.8000	84.3732	85.5774	86.1140 (217)
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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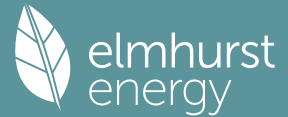
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	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	Be Lean		Prop Type Ref	Conversion		
Property						
SAP Rating	67 D	DER	7.60	TER	8.39	
Environmental	93 A	% DER < TER				9.42
CO ₂ Emissions (t/year)	0.63	DFEE	78.37	TFEE	40.00	
Compliance Check	See BREL	% DFEE < TFEE				-95.94
% DPER < TPER	-74.15	DPER	79.01	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

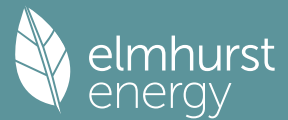
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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)

	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 = 1.20)			1.8900	1.1450	2.1641		(27)
Patio Doors (Uw = 1.20)			3.7800	1.1450	4.3282		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.1800	5.8122	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	0.1400	13.2720	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) =	63.5256		(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) =	117.3576 (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	197.7811	196.2374	194.7243	187.6171	186.2874	180.0973	180.0973	178.9509	182.4816	186.2874	188.9774	191.7897	(39)
Average = Sum(39)m / 12 =												187.6107	
HLP	2.0863	2.0700	2.0541	1.9791	1.9651	1.8998	1.8998	1.8877	1.9249	1.9651	1.9934	2.0231	(40)
HLP (average)												1.9790	
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)

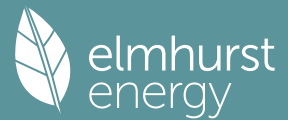
6. Solar gains

[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)													
tau	18.2377	18.3811	18.5240	19.2257	19.3629	20.0284	20.0284	20.1567	19.7667	19.3629	19.0873	18.8074	
alpha	2.2158	2.2254	2.2349	2.2817	2.2909	2.3352	2.3352	2.3438	2.3178	2.2909	2.2725	2.2538	
util living area	0.9652	0.9538	0.9358	0.9031	0.8476	0.7486	0.6296	0.6571	0.8033	0.9084	0.9527	0.9683	(86)

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MIT	17.5097	17.8131	18.3383	19.0876	19.7822	20.4121	20.7296	20.6914	20.2330	19.3379	18.3481	17.5266 (87)
Th 2	19.2764	19.2871	19.2975	19.3473	19.3567	19.4010	19.4010	19.4093	19.3839	19.3567	19.3377	19.3180 (88)
util rest of house	0.9571	0.9430	0.9198	0.8761	0.7971	0.6484	0.4616	0.4983	0.7201	0.8775	0.9399	0.9611 (89)
MIT 2	15.3994	15.7861	16.4523	17.4101	18.2595	18.9965	19.2892	19.2691	18.8063	17.7374	16.4897	15.4370 (90)
Living area fraction									fLA = Living area / (4) =			0.3755 (91)
MIT	16.1919	16.5473	17.1606	18.0400	18.8313	19.5281	19.8301	19.8032	19.3421	18.3385	17.1876	16.2217 (92)
Temperature adjustment												0.0000
adjusted MIT	16.1919	16.5473	17.1606	18.0400	18.8313	19.5281	19.8301	19.8032	19.3421	18.3385	17.1876	16.2217 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9345	0.9169	0.8906	0.8469	0.7763	0.6579	0.5136	0.5442	0.7174	0.8508	0.9149	0.9401	(94)
Useful gains	767.8338	842.2892	878.7214	870.2435	806.4333	656.9992	494.4698	506.0866	649.7929	725.5145	729.2921	737.5460	(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	2351.9896	2285.6339	2075.8737	1714.8264	1328.4699	887.5364	581.7327	609.0049	956.5820	1441.5770	1906.3257	2305.6419	(97)
Space heating kWh	1178.6119	969.9276	890.6813	608.0997	388.3952	0.0000	0.0000	0.0000	0.0000	532.7505	847.4642	1166.6634	(98a)
Space heating requirement - total per year (kWh/year)												6582.5939	
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	1178.6119	969.9276	890.6813	608.0997	388.3952	0.0000	0.0000	0.0000	0.0000	532.7505	847.4642	1166.6634	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6582.5939	
Space heating per m2										(98c) / (4) =		69.4366	(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	
	1178.6119	969.9276	890.6813	608.0997	388.3952	0.0000	0.0000	0.0000	0.0000	532.7505	847.4642	1166.6634	(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)	537.4427	442.2835	406.1474	277.2912	177.1068	0.0000	0.0000	0.0000	0.0000	242.9323	386.4406	531.9942	(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												3001.6388	(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												4757.1864	(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	3001.6388	16.4900	494.9702 (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			784.4600 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.0201 (257)
SAP value		67.2547
SAP rating (Section 12)		67 (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	3001.6388	0.1538	461.6462 (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			669.8704 (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			709.9704 (272)
CO2 emissions per m2			7.4900 (273)
EI value			93.1948
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)

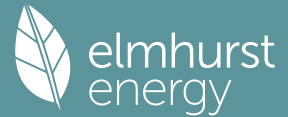
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1623 (8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.9123	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 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 = 1.20)			1.8900	1.1450	2.1641			(27)
Patio Doors (Uw = 1.20)			3.7800	1.1450	4.3282			(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832			(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000	(28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.1800	5.8122	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	0.1400	13.2720	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) =	63.5256				(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) =	117.3576				(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 =	184.9882	182.4816	182.4816	178.9509	178.9509	174.6713	175.6954	173.6779	174.6713	176.7500	176.7500	180.0973	(39)
												178.3472	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.9514	1.9249	1.9249	1.8877	1.8877	1.8425	1.8533	1.8320	1.8425	1.8645	1.8645	1.8998	(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)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	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)	
Distribution loss (46)m = 0.15 x (45)m	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)	
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	32.4756	(56)	
If cylinder contains dedicated solar storage														
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
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	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)		

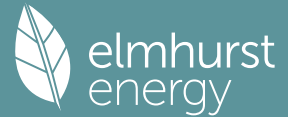
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	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)
Appliances gains (calculated in Appendix L, equation L13 or L13a), 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)
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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)
Pumps, fans	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)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Water heating gains (Table 5)	-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)
Total internal gains	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)
	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	19.4989	19.7667	19.7667	20.1567	20.1567	20.6506	20.5302	20.7687	20.6506	20.4077	20.4077	20.0284
alpha	2.2999	2.3178	2.3178	2.3438	2.3438	2.3767	2.3687	2.3846	2.3767	2.3605	2.3605	2.3352
util living area	0.9597	0.9486	0.9264	0.8832	0.8042	0.6445	0.4823	0.5008	0.7340	0.8838	0.9419	0.9632 (86)
MIT	17.9326	18.1992	18.7289	19.4372	20.1285	20.6903	20.8986	20.8886	20.5120	19.6912	18.7660	17.9562 (87)
Th 2	19.3660	19.3839	19.3839	19.4093	19.4093	19.4404	19.4329	19.4477	19.4404	19.4252	19.4252	19.4010 (88)
util rest of house	0.9503	0.9366	0.9077	0.8497	0.7358	0.5034	0.2639	0.2865	0.6211	0.8433	0.9258	0.9546 (89)
MIT 2	15.9720	16.3156	16.9817	17.8708	18.6904	19.2833	19.4156	19.4260	19.1307	18.2024	17.0567	16.0188 (90)
Living area fraction									fLA = Living area / (4) =			0.3755 (91)
MIT	16.7083	17.0229	17.6378	18.4590	19.2305	19.8117	19.9725	19.9753	19.6494	18.7615	17.6986	16.7463 (92)
Temperature adjustment												0.0000
adjusted MIT	16.7083	17.0229	17.6378	18.4590	19.2305	19.8117	19.9725	19.9753	19.6494	18.7615	17.6986	16.7463 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9270	0.9108	0.8793	0.8233	0.7264	0.5418	0.3465	0.3669	0.6392	0.8205	0.9004	0.9329 (94)
Useful gains	774.8758	834.3267	861.4277	850.6313	752.2163	557.2808	341.6508	351.8474	593.3493	712.1507	737.1831	742.0233 (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	2147.3954	2084.4761	1868.2154	1531.6447	1114.9519	665.7939	364.1323	377.7951	777.1812	1265.7940	1714.2273	2097.4706 (97)
Space heating kWh	1021.1546	840.1003	749.0501	490.3296	269.8753	0.0000	0.0000	0.0000	0.0000	411.9107	703.4718	1008.4528 (98a)
Space heating requirement - total per year (kWh/year)												5494.3452
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	1021.1546	840.1003	749.0501	490.3296	269.8753	0.0000	0.0000	0.0000	0.0000	411.9107	703.4718	1008.4528 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5494.3452
Space heating per m2										(98c) / (4) =		57.9572 (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	1021.1546	840.1003	749.0501	490.3296	269.8753	0.0000	0.0000	0.0000	0.0000	411.9107	703.4718	1008.4528 (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)	465.6428	383.0827	341.5641	223.5885	123.0621	0.0000	0.0000	0.0000	0.0000	187.8298	320.7806	459.8508 (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												2505.4014 (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	4260.9490 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2505.4014	25.1600	630.3590 (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			1072.0548 (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	2505.4014	0.1543	386.6081 (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			594.8323 (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			634.9323 (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	2505.4014	1.5713	3936.7396 (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			6184.3923 (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			6610.5425 (286)

SAP 10 EPC IMPROVEMENTS

Be Lean

Current energy efficiency rating:	D 67
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 67
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 £1072	Potential £1072	Saving £0
Electricity			
Space heating	£630	£630	£0
Water heating	£372	£372	£0
Lighting	£70	£70	£0
Total cost of fuels	£1072	£1072	£0
Total cost of uses	£1072	£1072	£0
Delivered energy	45 kWh/m²	45 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.6 tonnes	0.6 tonnes	0.0 tonnes
CO2 emissions per m²	7 kg/m²	7 kg/m²	0 kg/m²
Primary energy	70 kWh/m²	70 kWh/m²	0 kWh/m²

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	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

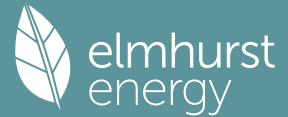
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			1.8900	1.1450	2.1641		(27)
Patio Doors (Uw = 1.20)			3.7800	1.1450	4.3282		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.1800	5.8122	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	0.1400	13.2720	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) =	63.5256			(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) =	117.3576			(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	197.7811	196.2374	194.7243	187.6171	186.2874	180.0973	180.0973	178.9509	182.4816	186.2874	188.9774	191.7897 (39)
Average = Sum(39)m / 12 =												187.6107
HLP	2.0863	2.0700	2.0541	1.9791	1.9651	1.8998	1.8998	1.8877	1.9249	1.9651	1.9934	2.0231 (40)
HLP (average)												1.9790
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												

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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 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)												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:												210.0000 (47)
Store volume												1.9400 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												1.0476 (55)
Enter (49) or (54) in (55)												
Total storage loss	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756 (56)
If cylinder contains dedicated solar storage	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	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)
												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	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)

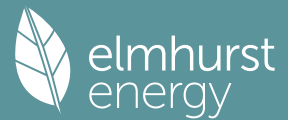
7. Mean internal temperature (heating season)

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	18.2377	18.3811	18.5240	19.2257	19.3629	20.0284	20.0284	20.1567	19.7667	19.3629	19.0873	18.8074
alpha	2.2158	2.2254	2.2349	2.2817	2.2909	2.3352	2.3352	2.3438	2.3178	2.2909	2.2725	2.2538
util living area	0.9652	0.9538	0.9358	0.9031	0.8476	0.7486	0.6296	0.6571	0.8033	0.9084	0.9527	0.9683 (86)
MIT	17.5097	17.8131	18.3383	19.0876	19.7822	20.4121	20.7296	20.6914	20.2330	19.3379	18.3481	17.5266 (87)
Th 2	19.2764	19.2871	19.2975	19.3473	19.3567	19.4010	19.4010	19.4093	19.3839	19.3567	19.3377	19.3180 (88)
util rest of house	0.9571	0.9430	0.9198	0.8761	0.7971	0.6484	0.4616	0.4983	0.7201	0.8775	0.9399	0.9611 (89)
MIT 2	15.3994	15.7861	16.4523	17.4101	18.2595	18.9965	19.2892	19.2691	18.8063	17.7374	16.4897	15.4370 (90)
Living area fraction	16.1919	16.5473	17.1606	18.0400	18.8313	19.5281	19.8301	19.8032	19.3421	18.3385	17.1876	16.2217 (92)
MIT	16.1919	16.5473	17.1606	18.0400	18.8313	19.5281	19.8301	19.8032	19.3421	18.3385	17.1876	16.2217 (93)
Temperature adjustment	16.1919	16.5473	17.1606	18.0400	18.8313	19.5281	19.8301	19.8032	19.3421	18.3385	17.1876	16.2217 (93)
adjusted MIT	16.1919	16.5473	17.1606	18.0400	18.8313	19.5281	19.8301	19.8032	19.3421	18.3385	17.1876	16.2217 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9345	0.9169	0.8906	0.8469	0.7763	0.6579	0.5136	0.5442	0.7174	0.8508	0.9149	0.9401 (94)
Ext temp.	767.8338	842.2892	878.7214	870.2435	806.4333	656.9992	494.4698	506.0866	649.7929	725.5145	729.2921	737.5460 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	2351.9896	2285.6339	2075.8737	1714.8264	1328.4699	887.5364	581.7327	609.0049	956.5820	1441.5770	1906.3257	2305.6419 (97)

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Space heating requirement - total per year (kWh/year)	1178.6119	969.9276	890.6813	608.0997	388.3952	0.0000	0.0000	0.0000	0.0000	532.7505	847.4642	1166.6634	(98a)
Solar heating kWh												6582.5939	
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	1178.6119	969.9276	890.6813	608.0997	388.3952	0.0000	0.0000	0.0000	0.0000	532.7505	847.4642	1166.6634	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6582.5939	
Space heating per m2										(98c) / (4) =		69.4366	(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	1178.6119	969.9276	890.6813	608.0997	388.3952	0.0000	0.0000	0.0000	0.0000	532.7505	847.4642	1166.6634	(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)	537.4427	442.2835	406.1474	277.2912	177.1068	0.0000	0.0000	0.0000	0.0000	242.9323	386.4406	531.9942	(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	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												3001.6388	(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												4757.1864	(238)

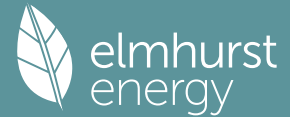
10a. Fuel costs - using Table 12 prices

	Fuel	Fuel price	Fuel cost	
	kWh/year	p/kWh	£/year	
Space heating - main system 1	3001.6388	16.4900	494.9702	(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			784.4600	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		2.0201 (257)
SAP value	[(255) x (256)] / [(4) + 45.0] =	67.2547
SAP rating (Section 12)		67 (258)
SAP band		D

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	3001.6388	0.1538	461.6462 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	1477.7142	0.1409	208.2242 (264)
Space and water heating			669.8704 (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 CO ₂ , kg/year			709.9704 (272)
CO ₂ emissions per m ²			7.4900 (273)
EI value			93.1948
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 (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	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)

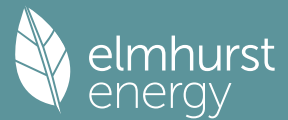
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.20)			1.8900	1.1450	2.1641		(27)
Patio Doors (Uw = 1.20)			3.7800	1.1450	4.3282		(27)
Bifold Doors (Uw = 1.20)			5.4000	1.1450	6.1832		(27)
Floor Over Commercial			94.8000	0.2500	23.7000	20.0000	1896.0000 (28b)
Existing Ext Wall	37.9600	5.6700	32.2900	0.1800	5.8122	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	0.1400	13.2720	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) =		63.5256		(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) =	117.3576 (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)
	184.9882	182.4816	182.4816	178.9509	178.9509	174.6713	175.6954	173.6779	174.6713	176.7500	176.7500	180.0973 (39)

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Average = Sum(39)m / 12 =

178.3472

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.9514	1.9249	1.9249	1.8877	1.8877	1.8425	1.8533	1.8320	1.8425	1.8645	1.8645	1.8998	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6859	(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	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	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)													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	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	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	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	32.4756	(56)	
If cylinder contains dedicated solar storage														
32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	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	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	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	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	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	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	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	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	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	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	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	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	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	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	-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	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	662.7892	(73)

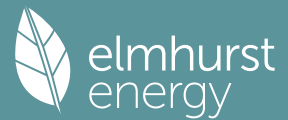
6. Solar gains

[Jan]				Area	Solar flux	g		FF	Access		Gains	
				m2	Table 6a	Specific data		Specific data	factor		W	
					W/m2	or Table 6b		or Table 6c	Table 6d			
Southeast				1.8900	40.4699	0.6300		0.8000	0.7700		26.7152 (77)	
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	19.4989	19.7667	19.7667	20.1567	20.1567	20.6506	20.5302	20.7687	20.6506	20.4077	20.4077	20.0284	
alpha	2.2999	2.3178	2.3178	2.3438	2.3438	2.3767	2.3687	2.3846	2.3767	2.3605	2.3605	2.3352	
util living area	0.9597	0.9486	0.9264	0.8832	0.8042	0.6445	0.4823	0.5008	0.7340	0.8838	0.9419	0.9632	(86)
MIT	17.9326	18.1992	18.7289	19.4372	20.1285	20.6903	20.8986	20.8886	20.5120	19.6912	18.7660	17.9562	(87)
Th 2	19.3660	19.3839	19.3839	19.4093	19.4093	19.4404	19.4329	19.4477	19.4404	19.4252	19.4252	19.4010	(88)
util rest of house	0.9503	0.9366	0.9077	0.8497	0.7358	0.5034	0.2639	0.2865	0.6211	0.8433	0.9258	0.9546	(89)

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MIT 2	15.9720	16.3156	16.9817	17.8708	18.6904	19.2833	19.4156	19.4260	19.1307	18.2024	17.0567	16.0188 (90)
Living area fraction									FLA = Living area / (4) =			0.3755 (91)
MIT	16.7083	17.0229	17.6378	18.4590	19.2305	19.8117	19.9725	19.9753	19.6494	18.7615	17.6986	16.7463 (92)
Temperature adjustment												0.0000
adjusted MIT	16.7083	17.0229	17.6378	18.4590	19.2305	19.8117	19.9725	19.9753	19.6494	18.7615	17.6986	16.7463 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9270	0.9108	0.8793	0.8233	0.7264	0.5418	0.3465	0.3669	0.6392	0.8205	0.9004	0.9329	(94)
Useful gains	774.8758	834.3267	861.4277	850.6313	752.2163	557.2808	341.6508	351.8474	593.3493	712.1507	737.1831	742.0233	(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	2147.3954	2084.4761	1868.2154	1531.6447	1114.9519	665.7939	364.1323	377.7951	777.1812	1265.7940	1714.2273	2097.4706	(97)
Space heating kWh	1021.1546	840.1003	749.0501	490.3296	269.8753	0.0000	0.0000	0.0000	0.0000	411.9107	703.4718	1008.4528	(98a)
Space heating requirement - total per year (kWh/year)												5494.3452	
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	1021.1546	840.1003	749.0501	490.3296	269.8753	0.0000	0.0000	0.0000	0.0000	411.9107	703.4718	1008.4528	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5494.3452	
Space heating per m2											(98c) / (4) =	57.9572	(99)

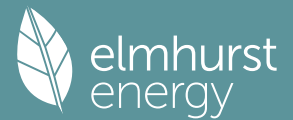
9a. Energy requirements - Individual heating systems, including micro-CHP

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	1021.1546	840.1003	749.0501	490.3296	269.8753	0.0000	0.0000	0.0000	0.0000	411.9107	703.4718	1008.4528	(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)	465.6428	383.0827	341.5641	223.5885	123.0621	0.0000	0.0000	0.0000	0.0000	187.8298	320.7806	459.8508	(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													2505.4014 (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													4260.9490 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2505.4014	25.1600	630.3590 (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			1072.0548 (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	2505.4014	0.1543	386.6081 (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			594.8323 (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			634.9323 (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	2505.4014	1.5713	3936.7396 (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			6184.3923 (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			6610.5425 (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

67

67

Least energy efficient - higher running costs

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good
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Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.18 W/m ² K	Very Good
Roof	Average thermal transmittance 0.14 W/m ² K	Very Good
Floor	Average thermal transmittance 0.25 W/m ² K	Good
Windows	High performance glazing	Very Good
Main heating	Air source heat pump, underfloor, electric	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 70 kilowatt hour (kWh) per square metre

Estimated CO₂ emissions of the dwelling

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

The estimated CO emissions for this dwellings is: **0.6** per year

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

Recommendations

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

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

Estimated energy cost for this property over a year

£1072

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