

Summary for Input Data



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

SAP Rating	70 C	DER	7.54	TER	9.02
Environmental	94 A	% DER < TER			16.41
CO ₂ Emissions (t/year)	0.5	DFEE	72.12	TFEE	37.62
Compliance Check	See BREL	% DFEE < TFEE			-91.72
% DPER < TPER	-63.01	DPER	78.75	TPER	48.31

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:	14.00 m	74.20 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	29.90	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
	New Ext Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	36.40	22.29	0.00	None	14.11	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	55.12	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	139.36

10.0 External Roofs

Summary for Input Data



Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.16	9.00	74.20	74.20	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	74.20

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance Door	Manufacturer	Solid Door			None	0.00	Wood	0.70	1.00
Windows	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.60
Patio Doors	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.60
Bifold Doors	Manufacturer	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	Metal 32 mm break	0.80	1.60

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front Elevation	Windows	New Ext Wall	North West	0.70	0
Entrance Door	Entrance Door	New Ext Wall	North West	1.89	0
Patio Doors	Patio Doors	New Ext Wall	North West	4.32	0
Rear Elevation	Windows	New Ext Wall	South East	1.80	0
Bifolds	Bifold Doors	New Ext Wall	South East	5.40	0

14.0 Conservatory

None

15.0 Draught Proofing

100

 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Default

Y-value

0.20

 W/m²K

18.0 Pressure Testing

No

Designed AP₅₀

15.00

 m³/(h.m²) @ 50 Pa

Property Tested?

Yes

Test Method

Blower Door

As Built AP₅₀

15.00

 m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

No

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

No

22.0 Lighting

No Fixed Lighting

No

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

24.0 Main Heating 1

SAP table

Percentage of Heat

100.00

 %

Database Ref. No.

0

Fuel Type

Electricity

SAP Code

224

In Winter

219.30

In Summer

190.40

Controls SAP Code

2207

PCDF Controls

0

Delayed Start Stat

Yes

HETAS approved System

No

Summary for Input Data

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

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

28.0 Water Heating

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

28.1 Showers

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

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

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

Summary for Input Data



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

31.0 Thermal Store

Thermal Store	None
Thermal Store Pipework	within a single casing

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

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

Full SAP Calculation Printout



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% DPER < TPER	-63.01		DPER	78.75	TPER	48.31
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	74.2000 (1b)	x 2.6000 (2b)	= 192.9200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.9200 (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) = 0.2073 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9573 (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) = 0.8137 (21)

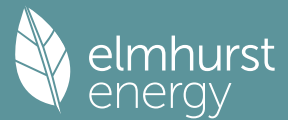
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.0375	1.0172	0.9968	0.8951	0.8748	0.7731	0.7731	0.7527	0.8137	0.8748	0.9155	0.9561 (22b)
Effective ac	1.0375	1.0172	0.9968	0.9006	0.8826	0.7988	0.7988	0.7833	0.8311	0.8826	0.9190	0.9571 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			2.5000	1.5038	3.7594		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			74.2000	0.2500	18.5500	20.0000	1484.0000 (28b)
New Ext Wall	36.4000	14.1100	22.2900	0.1800	4.0122	9.0000	200.6100 (29a)
Flat Roof	74.2000		74.2000	0.1600	11.8720	9.0000	667.8000 (30)
Total net area of external elements Aum(A, m ²)			184.8000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		54.7001		(33)
Party Wall			55.1200	0.0000	0.0000	20.0000	1102.4000 (32)
Internal Wall			139.3600			9.0000	1254.2400 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		4709.0500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							63.4643 (35)
Thermal bridges (Default value 0.200 * total exposed area)							36.9600 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		91.6601 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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Full SAP Calculation Printout



(38)m	66.0521	64.7569	63.4621	57.3363	56.1902	50.8548	50.8548	49.8667	52.9099	56.1902	58.5088	60.9327	(38)
Heat transfer coeff	157.7122	156.4171	155.1223	148.9964	147.8503	142.5149	142.5149	141.5269	144.5700	147.8503	150.1689	152.5929	(39)
Average = Sum(39)m / 12 =												148.9864	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.1255	2.1080	2.0906	2.0080	1.9926	1.9207	1.9207	1.9074	1.9484	1.9926	2.0238	2.0565	(40)
HLP (average)												2.0079	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3436	(42)
Hot water usage for mixer showers														
63.5146	62.5601	61.1692	58.5080	56.5441	54.3539	53.1091	54.4894	56.0026	58.3541	61.0725	63.2713	63.2713	(42a)	
Hot water usage for baths														
27.4366	27.0291	26.4553	25.3973	24.6051	23.7267	23.2522	23.8220	24.4424	25.3823	26.4621	27.3438	27.3438	(42b)	
Hot water usage for other uses														
38.6311	37.2263	35.8216	34.4168	33.0120	31.6073	31.6073	33.0120	34.4168	35.8216	37.2263	38.6311	38.6311	(42c)	
Average daily hot water use (litres/day)												119.1156	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
129.5823	126.8156	123.4461	118.3221	114.1612	109.6879	107.9685	111.3234	114.8618	119.5580	124.7610	129.2462	129.2462	(44)	
Energy content	205.2268	180.5837	189.7321	161.9771	153.6830	134.8741	130.5786	137.8417	141.6360	162.2391	177.7449	202.3684	(45)	
Energy content (annual)										Total = Sum(45)m =		1978.4854		
Distribution loss (46)m = 0.15 x (45)m														
30.7840	27.0876	28.4598	24.2966	23.0524	20.2311	19.5868	20.6763	21.2454	24.3359	26.6617	30.3553	30.3553	(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														
260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	258.1064	(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														
260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	258.1064	(64)	
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2634.7554	(64)	
Electric shower(s)												2635	(64)	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)	
Heat gains from water heating, kWh/month														
112.8283	100.3193	107.6763	97.0094	95.6900	87.9976	88.0078	90.4228	90.2460	98.5349	102.2522	111.8779	111.8779	(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	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	105.8735	117.2171	105.8735	109.4026	105.8735	109.4026	105.8735	105.8735	109.4026	105.8735	109.4026	105.8735	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.8948	209.0417	203.6315	192.1139	177.5750	163.9105	154.7817	152.6348	158.0450	169.5626	184.1015	197.7660	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	(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)	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	(71)
Water heating gains (Table 5)	151.6509	149.2847	144.7262	134.7353	128.6156	122.2189	118.2900	121.5360	125.3416	132.4394	142.0169	150.3735	(72)
Total internal gains	525.5736	536.6979	515.3857	497.4062	473.2185	453.6864	437.0997	438.1987	450.9437	469.0299	496.6755	515.1675	(73)

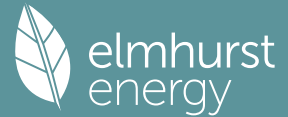
6. Solar gains

[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			1.8000	36.7938	0.6300	0.8000	0.7700	23.1319 (77)					
Northwest			0.7000	11.2829	0.6300	0.8000	0.7700	2.7586 (81)					
Northwest			4.3200	11.2829	0.6300	0.8000	0.7700	17.0243 (81)					
Southeast			5.4000	36.7938	0.6300	0.8000	0.7700	69.3957 (77)					
Solar gains	112.3105	197.8774	288.1984	386.3473	459.4443	467.8676	446.1863	389.8569	321.9051	223.4027	135.7187	95.3401	(83)
Total gains	637.8841	734.5753	803.5842	883.7536	932.6628	921.5541	883.2859	828.0556	772.8488	692.4326	632.3942	610.5075	(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	8.2940	8.3627	8.4325	8.7792	8.8473	9.1785	9.1785	9.2426	9.0480	8.8473	8.7107	8.5723
alpha	1.5529	1.5575	1.5622	1.5853	1.5898	1.6119	1.6119	1.6162	1.6032	1.5898	1.5807	1.5715
util living area												
	0.9139	0.8914	0.8613	0.8044	0.7263	0.6139	0.5094	0.5422	0.6918	0.8230	0.8894	0.9180 (86)

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MIT	16.1635	16.5774	17.2810	18.3112	19.2722	20.1186	20.5493	20.4832	19.8342	18.6031	17.2672	16.1556 (87)
Th 2	19.2510	19.2623	19.2736	19.3280	19.3383	19.3867	19.3867	19.3958	19.3680	19.3383	19.3175	19.2959 (88)
util rest of house	0.9007	0.8748	0.8389	0.7703	0.6712	0.5226	0.3717	0.4095	0.6113	0.7851	0.8700	0.9057 (89)
MIT 2	14.1028	14.6013	15.4488	16.6901	17.8081	18.7591	19.1714	19.1287	18.4732	17.0632	15.4603	14.1062 (90)
Living area fraction									fLA = Living area / (4) =			0.4030 (91)
MIT	14.9332	15.3976	16.1871	17.3434	18.3981	19.3069	19.7267	19.6745	19.0216	17.6837	16.1884	14.9320 (92)
Temperature adjustment												0.0000
adjusted MIT	14.9332	15.3976	16.1871	17.3434	18.3981	19.3069	19.7267	19.6745	19.0216	17.6837	16.1884	14.9320 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.8491	0.8190	0.7809	0.7161	0.6322	0.5173	0.4048	0.4362	0.5902	0.7331	0.8156	0.8555	(94)
Useful gains	541.6242	601.6017	627.5567	632.8304	589.5960	476.7507	357.5729	361.1619	456.1438	507.6046	515.7799	522.3106	(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	1676.9791	1642.0018	1502.6869	1258.0291	990.3125	670.8049	445.5961	463.4332	711.5225	1047.3277	1364.7982	1637.6313	(97)
Space heating kWh	844.7041	699.1489	651.0969	450.1431	298.1331	0.0000	0.0000	0.0000	0.0000	401.5540	611.2932	829.7987	(98a)
Space heating requirement - total per year (kWh/year)												4785.8719	
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	844.7041	699.1489	651.0969	450.1431	298.1331	0.0000	0.0000	0.0000	0.0000	401.5540	611.2932	829.7987	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4785.8719	
Space heating per m2											(98c) / (4) =	64.4996	(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	
	844.7041	699.1489	651.0969	450.1431	298.1331	0.0000	0.0000	0.0000	0.0000	401.5540	611.2932	829.7987	(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)	385.1820	318.8093	296.8978	205.2636	135.9476	0.0000	0.0000	0.0000	0.0000	183.1072	278.7475	378.3852	(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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	(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	137.0613	121.2856	128.9234	113.4018	109.9900	99.1670	97.8553	101.6700	102.7185	114.4838	121.6832	135.5601	(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	25.4826	20.4431	18.4067	13.4855	10.4166	8.5105	9.5024	12.3516	16.0435	21.0499	23.7758	26.1908	(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												2182.3401	(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												1383.8001	(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)												205.6590	(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												3771.7992	(238)

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

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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2182.3401	0.1536	335.1875 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1383.8001	0.1409	194.9280 (264)
Space and water heating			530.1156 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	205.6590	0.1443	29.6829 (268)
Total CO2, kg/year			559.7985 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.5400 (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	2182.3401	1.5686	3423.2795 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1383.8001	1.5209	2104.5710 (278)
Space and water heating			5527.8505 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	205.6590	1.5338	315.4466 (282)
Total Primary energy kWh/year			5843.2971 (286)
Dwelling Primary energy Rate (DPER)			78.7500 (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	74.2000 (1b)	x 2.6000 (2b)	= 192.9200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.9200 (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) = 0.1555 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4055 (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) = 0.3447 (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	0.4395	0.4308	0.4222	0.3791	0.3705	0.3274	0.3274	0.3188	0.3447	0.3705	0.3878	0.4050 (22b)
Effective ac	0.5966	0.5928	0.5891	0.5719	0.5686	0.5536	0.5536	0.5508	0.5594	0.5686	0.5752	0.5820 (25)

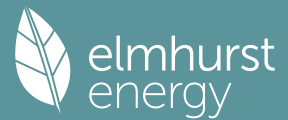
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.20)			12.2200	1.1450	13.9924		(27)
Floor Over Commercial			74.2000	0.1300	9.6460		(28b)
New Ext Wall	36.4000	14.1100	22.2900	0.1800	4.0122		(29a)
Flat Roof	74.2000		74.2000	0.1100	8.1620		(30)
Total net area of external elements Aum(A, m2)			184.8000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	37.7026	(33)
Party Wall			55.1200	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							63.4643 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							9.2400 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	46.9426 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(38)m	37.9795	37.7408	37.5068	36.4077	36.2021	35.2448	35.2448	35.0675	35.6135	36.2021	36.6181	37.0530 (38)
Heat transfer coeff	84.9221	84.6833	84.4493	83.3503	83.1446	82.1874	82.1874	82.0101	82.5561	83.1446	83.5606	83.9955 (39)
Average = Sum(39)m / 12 =												83.3493
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1445	1.1413	1.1381	1.1233	1.1205	1.1076	1.1076	1.1053	1.1126	1.1205	1.1262	1.1320 (40)
HLP (average)												1.1233
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3436 (42)
Hot water usage for mixer showers													
63.5146	62.5601	61.1692	58.5080	56.5441	54.3539	53.1091	54.4894	56.0026	58.3541	61.0725	63.2713	(42a)	
Hot water usage for baths													
27.4366	27.0291	26.4553	25.3973	24.6051	23.7267	23.2522	23.8220	24.4424	25.3823	26.4621	27.3438	(42b)	
Hot water usage for other uses													
38.6311	37.2263	35.8216	34.4168	33.0120	31.6073	31.6073	33.0120	34.4168	35.8216	37.2263	38.6311	(42c)	
Average daily hot water use (litres/day)												119.1156 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	129.5823	126.8156	123.4461	118.3221	114.1612	109.6879	107.9685	111.3234	114.8618	119.5580	124.7610	129.2462 (44)	
Energy conte	205.2268	180.5837	189.7321	161.9771	153.6830	134.8741	130.5786	137.8417	141.6360	162.2391	177.7449	202.3684 (45)	
Energy content (annual)										Total = Sum(45)m =		1978.4854	
Distribution loss (46)m = 0.15 x (45)m													
30.7840	27.0876	28.4598	24.2966	23.0524	20.2311	19.5868	20.6763	21.2454	24.3359	26.6617	30.3553	(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	(61)	
Total heat required for water heating calculated for each month													
256.9733	227.3226	241.4787	212.0544	205.4296	184.9514	182.3252	189.5883	191.7134	213.9857	227.8222	254.1150	(62)	
WWHRS	-29.0362	-25.6799	-26.8905	-22.2664	-20.7515	-17.7572	-16.6445	-17.6998	-18.3723	-21.6589	-24.5369	-28.4985 (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													
227.9371	201.6427	214.5882	189.7880	184.6781	167.1942	165.6806	171.8885	173.3411	192.3268	203.2853	225.6164	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2317.9672 (64)	
Electric shower(s)												2318 (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													
109.6352	97.4352	104.4832	93.9193	92.4969	84.9075	84.8146	87.2296	87.1559	95.3418	99.1621	108.6848	(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	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.2633	119.8629	108.2633	111.8721	108.2633	111.8721	108.2633	108.2633	111.8721	108.2633	111.8721	108.2633 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.8948	209.0417	203.6315	192.1139	177.5750	163.9105	154.7817	152.6348	158.0450	169.5626	184.1015	197.7660 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181 (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)	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452 (71)
Water heating gains (Table 5)	147.3591	144.9928	140.4344	130.4434	124.3237	117.9271	113.9982	117.2441	121.0498	128.1476	137.7251	146.0817 (72)
Total internal gains	523.6716	535.0519	513.4837	495.5839	471.3165	451.8641	435.1977	436.2967	449.1213	467.1279	494.8531	513.2654 (73)

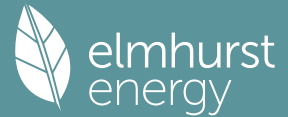
6. Solar gains

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	7.2000											80.9616 (77)
Northwest	5.0200											17.3100 (81)
Solar gains	98.2717	173.1427	252.1736	338.0539	402.0138	409.3842	390.4130	341.1248	281.6670	195.4774	118.7539	83.4225 (83)
Total gains	621.9433	708.1946	765.6573	833.6378	873.3302	861.2482	825.6106	777.4215	730.7883	662.6053	613.6070	596.6880 (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	15.4032	15.4466	15.4894	15.6936	15.7325	15.9157	15.9157	15.9501	15.8446	15.7325	15.6541	15.5731
alpha	2.0269	2.0298	2.0326	2.0462	2.0488	2.0610	2.0610	2.0633	2.0563	2.0488	2.0436	2.0382
util living area	0.8849	0.8526	0.8100	0.7332	0.6303	0.5003	0.3892	0.4222	0.5863	0.7563	0.8505	0.8923 (86)
MIT	17.9362	18.3144	18.8602	19.5838	20.2050	20.6585	20.8553	20.8238	20.4942	19.7024	18.7231	17.8802 (87)

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Th 2	19.9647	19.9673	19.9698	19.9818	19.9841	19.9946	19.9946	19.9965	19.9905	19.9841	19.9795	19.9748 (88)
util rest of house	0.8733	0.8381	0.7908	0.7055	0.5897	0.4416	0.3131	0.3458	0.5301	0.7251	0.8335	0.8814 (89)
MIT 2	16.4311	16.8989	17.5739	18.4593	19.1946	19.7065	19.9009	19.8769	19.5394	18.6220	17.4207	16.3648 (90)
Living area fraction									fLA = Living area / (4) =			0.4030 (91)
MIT	17.0376	17.4693	18.0922	18.9124	19.6018	20.0901	20.2855	20.2585	19.9242	19.0574	17.9455	16.9755 (92)
Temperature adjustment												0.0000
adjusted MIT	17.0376	17.4693	18.0922	18.9124	19.6018	20.0901	20.2855	20.2585	19.9242	19.0574	17.9455	16.9755 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8297	0.7936	0.7483	0.6721	0.5730	0.4475	0.3360	0.3667	0.5261	0.6918	0.7905	0.8387	(94)
Useful gains	516.0055	562.0053	572.9789	560.2797	500.4207	385.4409	277.4401	285.0708	384.4830	458.3623	485.0797	500.4141	(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	1081.7053	1064.4116	978.9564	834.5403	656.9916	451.2158	302.9037	316.4349	480.8209	703.1839	906.2589	1073.0808	(97)
Space heating kWh	420.8806	337.6170	302.0472	197.4676	116.4887	0.0000	0.0000	0.0000	0.0000	182.1473	303.2490	426.0640	(98a)
Space heating requirement - total per year (kWh/year)												2285.9614	
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	420.8806	337.6170	302.0472	197.4676	116.4887	0.0000	0.0000	0.0000	0.0000	182.1473	303.2490	426.0640	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2285.9614	
Space heating per m2											(98c) / (4) =	30.8081	(99)

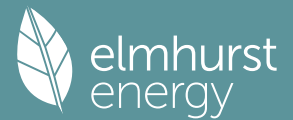
9a. Energy requirements - Individual heating systems, including micro-CHP

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	420.8806	337.6170	302.0472	197.4676	116.4887	0.0000	0.0000	0.0000	0.0000	182.1473	303.2490	426.0640	(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)	455.9920	365.7822	327.2451	213.9411	126.2067	0.0000	0.0000	0.0000	0.0000	197.3426	328.5471	461.6078	(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	227.9371	201.6427	214.5882	189.7880	184.6781	167.1942	165.6806	171.8885	173.3411	192.3268	203.2853	225.6164	(64)
Efficiency of water heater	85.4157	85.2067	84.8263	84.1489	83.0559	79.8000	79.8000	79.8000	79.8000	83.9380	84.9548	85.4630	(216)
Fuel for water heating, kWh/month	266.8562	236.6513	252.9736	225.5385	222.3538	209.5166	207.6198	215.3991	217.2194	229.1297	239.2866	263.9931	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	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	22.4950	18.0463	16.2487	11.9045	9.1954	7.5127	8.3883	10.9035	14.1625	18.5820	20.9883	23.1202	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-57.4650	-75.6081	-101.5295	-106.4422	-108.7230	-99.4309	-98.1968	-95.5508	-90.1731	-82.6052	-61.2232	-50.3441	(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)	-51.1784	-104.7754	-203.1647	-298.0984	-387.6264	-387.1232	-382.5367	-326.7793	-243.4735	-147.3166	-67.4660	-40.6904	(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												2476.6646	(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												2786.5377	(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)												181.5473	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3667.5209	(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												1863.2287	(238)

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

Energy	Emission factor	Emissions
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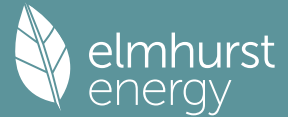


	kWh/year	kg CO2/kWh	kg CO2/year
Space heating - main system 1	2476.6646	0.2100	520.0996 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2786.5377	0.2100	585.1729 (264)
Space and water heating			1105.2725 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	181.5473	0.1443	26.2029 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1027.2919	0.1361	-139.7902
PV Unit electricity exported	-2640.2290	0.1266	-334.2534
Total			-474.0437 (269)
Total CO2, kg/year			669.3610 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.0200 (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	2476.6646	1.1300	2798.6310 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2786.5377	1.1300	3148.7876 (278)
Space and water heating			5947.4186 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	181.5473	1.5338	278.4634 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1027.2919	1.5030	-1544.0159
PV Unit electricity exported	-2640.2290	0.4647	-1227.0226
Total			-2771.0385 (283)
Total Primary energy kWh/year			3584.9443 (286)
Target Primary Energy Rate (TPER)			48.3100 (287)

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Property Reference	Flat 1D				Issued on Date	01/02/2024
Assessment Reference	Baseline		Prop Type Ref	Conversion		
Property						
SAP Rating	70 C	DER	7.54	TER	9.02	
Environmental	94 A	% DER < TER				16.41
CO ₂ Emissions (t/year)	0.5	DFEE	72.12	TFEE	37.62	
Compliance Check	See BREL	% DFEE < TFEE				-91.72
% DPER < TPER	-63.01	DPER	78.75	TPER	48.31	
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	74.2000 (1b)	x 2.6000 (2b)	= 192.9200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.9200 (5)

2. Ventilation rate

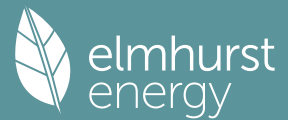
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1555 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9055 (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) = 0.7697 (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	0.9813	0.9621	0.9429	0.8466	0.8274	0.7312	0.7312	0.7120	0.7697	0.8274	0.8659	0.9044 (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	0.9815	0.9628	0.9445	0.8584	0.8423	0.7673	0.7673	0.7534	0.7962	0.8423	0.8749	0.9089 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			2.5000	1.5038	3.7594		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			74.2000	0.2500	18.5500	20.0000	1484.0000 (28b)
New Ext Wall	36.4000	14.1100	22.2900	0.1800	4.0122	9.0000	200.6100 (29a)
Flat Roof	74.2000		74.2000	0.1600	11.8720	9.0000	667.8000 (30)
Total net area of external elements Aum(A, m ²)			184.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	54.7001		(33)
Party Wall			55.1200	0.0000	0.0000	20.0000	1102.4000 (32)
Internal Wall			139.3600			9.0000	1254.2400 (32c)
Heat capacity Cm = Sum (A x k)				(28)...(30) + (32) + (32a)...(32e) =			4709.0500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							63.4643 (35)
Thermal bridges (Default value 0.200 * total exposed area)							36.9600 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss				(33) + (36) + (36a) =			91.6601 (37)

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Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	62.4868	61.2964	60.1296	54.6492	53.6238	48.8506	48.8506	47.9666	50.6891	53.6238	55.6981	57.8667 (38)
Average = Sum(39)m / 12 =	154.1469	152.9565	151.7897	146.3093	145.2840	140.5107	140.5107	139.6268	142.3493	145.2840	147.3583	149.5269 (39)
												146.3044

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.0775	2.0614	2.0457	1.9718	1.9580	1.8937	1.8937	1.8818	1.9185	1.9580	1.9860	2.0152 (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												2.3436 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												27.4366 (42b)
Hot water usage for other uses												38.6311 (42c)
Average daily hot water use (litres/day)												60.5572 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	66.0677	64.2555	62.2769	59.8141	57.6171	55.3339	54.8595	56.8340	58.8592	61.2039	63.6885	65.9750 (44)
Energy content (annual)	104.6351	91.4989	95.7173	81.8826	77.5638	68.0395	66.3478	70.3724	72.5793	83.0531	90.7359	103.3008 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1005.7264
Water storage loss:												0.0000 (46)
Total storage loss												0.0000 (56)
If cylinder contains dedicated solar storage												0.0000 (57)
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	88.9398	77.7741	81.3597	69.6002	65.9292	57.8336	56.3956	59.8165	61.6924	70.5952	77.1255	87.8057 (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	88.9398	77.7741	81.3597	69.6002	65.9292	57.8336	56.3956	59.8165	61.6924	70.5952	77.1255	87.8057 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 854.8674 (64)
Electric shower(s)												855 (64)
Heat gains from water heating, kWh/month	50.8646	45.3208	49.4886	47.2264	48.1125	45.8947	47.4245	48.1125	47.2264	49.4886	48.5580	50.8646 (64a)
	34.9511	30.7737	32.7121	29.2066	28.5104	25.9321	25.9550	26.9823	27.2297	30.0209	31.4209	34.6676 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 578.5823 (64a)												

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	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	105.8735	117.2171	105.8735	109.4026	105.8735	109.4026	105.8735	105.8735	109.4026	105.8735	109.4026	105.8735 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.8948	209.0417	203.6315	192.1139	177.5750	163.9105	154.7817	152.6348	158.0450	169.5626	184.1015	197.7660 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181 (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)	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452 (71)
Water heating gains (Table 5)	46.9773	45.7942	43.9678	40.5648	38.3205	36.0168	34.8858	36.2665	37.8190	40.3507	43.6401	46.5962 (72)
Total internal gains	417.9000	430.2075	411.6273	400.2357	379.9234	367.4843	353.6954	352.9292	363.4210	373.9412	395.2987	408.3902 (73)

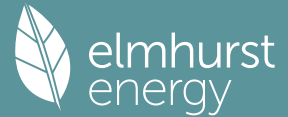
6. Solar gains

[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				1.8000	36.7938	0.6300	0.8000	0.7700	23.1319 (77)			
Northwest				0.7000	11.2829	0.6300	0.8000	0.7700	2.7586 (81)			
Northwest				4.3200	11.2829	0.6300	0.8000	0.7700	17.0243 (81)			
Southeast				5.4000	36.7938	0.6300	0.8000	0.7700	69.3957 (77)			
Solar gains	112.3105	197.8774	288.1984	386.3473	459.4443	467.8676	446.1863	389.8569	321.9051	223.4027	135.7187	95.3401 (83)
Total gains	530.2105	628.0848	699.8257	786.5831	839.3677	835.3519	799.8817	742.7862	685.3262	597.3440	531.0174	503.7302 (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	8.4859	8.5519	8.6176	8.9404	9.0035	9.3094	9.3094	9.3683	9.1892	9.0035	8.8768	8.7481
alpha	1.5657	1.5701	1.5745	1.5960	1.6002	1.6206	1.6206	1.6246	1.6126	1.6002	1.5918	1.5832
util living area	0.9319	0.9101	0.8815	0.8267	0.7510	0.6410	0.5374	0.5734	0.7224	0.8496	0.9109	0.9362 (86)
MIT	16.0078	16.4350	17.1537	18.2041	19.1913	20.0644	20.5155	20.4411	19.7592	18.4821	17.1154	15.9890 (87)

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Th 2	19.2822	19.2927	19.3031	19.3522	19.3615	19.4052	19.4052	19.4133	19.3883	19.3615	19.3427	19.3232 (88)
util rest of house	0.9213	0.8961	0.8619	0.7955	0.6989	0.5516	0.3987	0.4406	0.6459	0.8161	0.8949	0.9264 (89)
MIT 2	14.9120	15.3369	16.0489	17.0970	18.0406	18.8537	19.2116	19.1718	18.5983	17.3908	16.0433	14.9158 (90)
Living area fraction									fLA = Living area / (4) =			0.4030 (91)
MIT	15.3536	15.7794	16.4941	17.5431	18.5043	19.3416	19.7370	19.6833	19.0661	17.8305	16.4753	15.3483 (92)
Temperature adjustment												0.0000
adjusted MIT	15.3536	15.7794	16.4941	17.5431	18.5043	19.3416	19.7370	19.6833	19.0661	17.8305	16.4753	15.3483 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.8834	0.8532	0.8155	0.7499	0.6648	0.5473	0.4319	0.4670	0.6268	0.7729	0.8533	0.8901	(94)
Useful gains	468.4034	535.8643	570.7028	589.8816	557.9789	457.2110	345.4469	346.8663	429.5502	461.6719	453.1255	448.3572	(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	1703.8730	1664.0806	1517.0005	1264.5653	988.5555	666.2401	440.7798	458.4314	706.9163	1050.4826	1381.5349	1666.9687	(97)
Space heating kWh	919.1894	758.1614	704.0455	485.7723	320.3490	0.0000	0.0000	0.0000	0.0000	438.0752	668.4548	906.6470	(98a)
Space heating requirement - total per year (kWh/year)												5200.6944	
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	919.1894	758.1614	704.0455	485.7723	320.3490	0.0000	0.0000	0.0000	0.0000	438.0752	668.4548	906.6470	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5200.6944	
Space heating per m2										(98c) / (4) =		70.0902	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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	1320.8006	1039.7792	1061.1634	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5096	0.5717	0.5420	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	673.0477	594.4661	575.1879	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	935.0590	895.7072	831.0454	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	188.6482	224.1234	190.3579	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fC = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	47.1620	56.0309	47.5895	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												150.7824	(107)
Energy for space heating												70.0902	(99)
Energy for space cooling												2.0321	(108)
Total												72.1223	(109)
Fabric Energy Efficiency (DFEE)												72.1	(109)

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

1. Overall dwelling characteristics

Ground floor	Area (m2)	Storey height (m)	Volume (m3)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.2000	2.6000	192.9200	(1b) - (3b)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 192.9200 (5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1555	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4055	(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) =	0.3447	(21)

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

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	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.2633	119.8629	108.2633	111.8721	108.2633	111.8721	108.2633	108.2633	111.8721	108.2633	111.8721	108.2633	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.8948	209.0417	203.6315	192.1139	177.5750	163.9105	154.7817	152.6348	158.0450	169.5626	184.1015	197.7660	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	(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)	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	(71)
Water heating gains (Table 5)	46.9773	45.7942	43.9678	40.5648	38.3205	36.0168	34.8858	36.2665	37.8190	40.3507	43.6401	46.5962	(72)
Total internal gains	420.2898	432.8533	414.0171	402.7052	382.3132	369.9538	356.0853	355.3190	365.8905	376.3311	397.7681	410.7800	(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				7.2000	36.7938	0.6300	0.7000	0.7700	80.9616 (77)			
Northwest				5.0200	11.2829	0.6300	0.7000	0.7700	17.3100 (81)			
Solar gains	98.2717	173.1427	252.1736	338.0539	402.0138	409.3842	390.4130	341.1248	281.6670	195.4774	118.7539	83.4225 (83)
Total gains	518.5615	605.9960	666.1908	740.7591	784.3270	779.3379	746.4982	696.4439	647.5575	571.8084	516.5220	494.2025 (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	15.4032	15.4466	15.4894	15.6936	15.7325	15.9157	15.9157	15.9501	15.8446	15.7325	15.6541	15.5731
alpha	2.0269	2.0298	2.0326	2.0462	2.0488	2.0610	2.0610	2.0633	2.0563	2.0488	2.0436	2.0382
util living area	0.9133	0.8828	0.8429	0.7683	0.6672	0.5355	0.4215	0.4590	0.6288	0.7974	0.8842	0.9201 (86)
MIT	17.6653	18.0711	18.6527	19.4337	20.1080	20.6099	20.8314	20.7930	20.4182	19.5413	18.4910	17.6044 (87)
Th 2	19.9647	19.9673	19.9698	19.9818	19.9841	19.9946	19.9946	19.9965	19.9905	19.9841	19.9795	19.9748 (88)
util rest of house	0.9041	0.8706	0.8260	0.7424	0.6275	0.4756	0.3414	0.3788	0.5730	0.7692	0.8701	0.9116 (89)
MIT 2	16.9234	17.3214	17.8906	18.6497	19.2824	19.7336	19.9078	19.8847	19.5778	18.7692	17.7482	16.8699 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.2223	17.6235	18.1977	18.9656	19.6151	20.0867	20.2800	20.2507	19.9165	19.0803	18.0475	17.1659 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.2223	17.6235	18.1977	18.9656	19.6151	20.0867	20.2800	20.2507	19.9165	19.0803	18.0475	17.1659 (93)

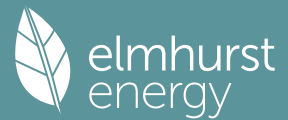
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8713	0.8351	0.7903	0.7125	0.6116	0.4815	0.3652	0.4003	0.5685	0.7393	0.8358	0.8800 (94)
Useful gains	451.8006	506.0662	526.5006	527.8117	479.6619	375.2263	272.6238	278.7575	368.1661	422.7581	431.6994	434.8923 (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	1097.3921	1077.4704	987.8624	838.9723	658.0956	450.9403	302.4487	315.7964	480.1848	705.0950	914.7789	1089.0764 (97)
Space heating kWh	480.3201	383.9837	343.2531	224.0356	132.7547	0.0000	0.0000	0.0000	0.0000	210.0586	347.8172	486.7130 (98a)
Space heating requirement - total per year (kWh/year)												2608.9361
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)												
Space heating kWh	480.3201	383.9837	343.2531	224.0356	132.7547	0.0000	0.0000	0.0000	0.0000	210.0586	347.8172	486.7130 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2608.9361
Space heating per m2												(98c) / (4) = 35.1609 (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	772.5614	608.1866	623.2769	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7112	0.7709	0.7433	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	549.4686	468.8721	463.2814	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	866.9109	830.7436	774.3794	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	228.5585	269.2324	231.4569	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
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 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	57.1396	67.3081	57.8642	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												182.3119 (107)
Energy for space heating												35.1609 (99)
Energy for space cooling												2.4570 (108)
Total												37.6179 (109)
Fabric Energy Efficiency (TFEE)												37.6 (109)

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Property Reference	Flat 1D				Issued on Date	01/02/2024	
Assessment Reference	Baseline			Prop Type Ref	Conversion		
Property							
SAP Rating	70 C		DER	7.54		TER	9.02
Environmental	94 A		% DER < TER				16.41
CO ₂ Emissions (t/year)	0.5		DFEE	72.12		TFEE	37.62
Compliance Check	See BREL		% DFEE < TFEE				-91.72
% DPER < TPER	-63.01		DPER	78.75		TPER	48.31
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	74.2000 (1b)	x 2.6000 (2b)	= 192.9200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.9200 (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) = 0.2073 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9573 (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) = 0.8137 (21)

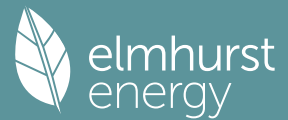
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.0375	1.0172	0.9968	0.8951	0.8748	0.7731	0.7731	0.7527	0.8137	0.8748	0.9155	0.9561 (22b)
Effective ac	1.0375	1.0172	0.9968	0.9006	0.8826	0.7988	0.7988	0.7833	0.8311	0.8826	0.9190	0.9571 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			2.5000	1.5038	3.7594		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			74.2000	0.2500	18.5500	20.0000	1484.0000 (28b)
New Ext Wall	36.4000	14.1100	22.2900	0.1800	4.0122	9.0000	200.6100 (29a)
Flat Roof	74.2000		74.2000	0.1600	11.8720	9.0000	667.8000 (30)
Total net area of external elements Aum(A, m ²)			184.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	54.7001		(33)
Party Wall			55.1200	0.0000	0.0000	20.0000	1102.4000 (32)
Internal Wall			139.3600			9.0000	1254.2400 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4709.0500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							63.4643 (35)
Thermal bridges (Default value 0.200 * total exposed area)							36.9600 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	91.6601 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(38)m	66.0521	64.7569	63.4621	57.3363	56.1902	50.8548	50.8548	49.8667	52.9099	56.1902	58.5088	60.9327	(38)
Heat transfer coeff	157.7122	156.4171	155.1223	148.9964	147.8503	142.5149	142.5149	141.5269	144.5700	147.8503	150.1689	152.5929	(39)
Average = Sum(39)m / 12 =												148.9864	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.1255	2.1080	2.0906	2.0080	1.9926	1.9207	1.9207	1.9074	1.9484	1.9926	2.0238	2.0565	(40)
HLP (average)												2.0079	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3436	(42)
Hot water usage for mixer showers														
63.5146	62.5601	61.1692	58.5080	56.5441	54.3539	53.1091	54.4894	56.0026	58.3541	61.0725	63.2713	63.2713	(42a)	
Hot water usage for baths														
27.4366	27.0291	26.4553	25.3973	24.6051	23.7267	23.2522	23.8220	24.4424	25.3823	26.4621	27.3438	27.3438	(42b)	
Hot water usage for other uses														
38.6311	37.2263	35.8216	34.4168	33.0120	31.6073	31.6073	33.0120	34.4168	35.8216	37.2263	38.6311	38.6311	(42c)	
Average daily hot water use (litres/day)												119.1156	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	129.5823	126.8156	123.4461	118.3221	114.1612	109.6879	107.9685	111.3234	114.8618	119.5580	124.7610	129.2462	(44)	
Energy content	205.2268	180.5837	189.7321	161.9771	153.6830	134.8741	130.5786	137.8417	141.6360	162.2391	177.7449	202.3684	(45)	
Energy content (annual)										Total = Sum(45)m =		1978.4854		
Distribution loss (46)m = 0.15 x (45)m														
30.7840	27.0876	28.4598	24.2966	23.0524	20.2311	19.5868	20.6763	21.2454	24.3359	26.6617	30.3553	(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														
260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	(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														
260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	(64)		
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2634.7554	(64)	
Electric shower(s)												2635	(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														
112.8283	100.3193	107.6763	97.0094	95.6900	87.9976	88.0078	90.4228	90.2460	98.5349	102.2522	111.8779	(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	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	105.8735	117.2171	105.8735	109.4026	105.8735	109.4026	105.8735	105.8735	109.4026	105.8735	109.4026	105.8735 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.8948	209.0417	203.6315	192.1139	177.5750	163.9105	154.7817	152.6348	158.0450	169.5626	184.1015	197.7660 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181 (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)	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452 (71)
Water heating gains (Table 5)	151.6509	149.2847	144.7262	134.7353	128.6156	122.2189	118.2900	121.5360	125.3416	132.4394	142.0169	150.3735 (72)
Total internal gains	525.5736	536.6979	515.3857	497.4062	473.2185	453.6864	437.0997	438.1987	450.9437	469.0299	496.6755	515.1675 (73)

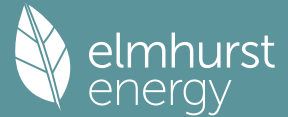
6. Solar gains

[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				1.8000	36.7938	0.6300	0.8000	0.7700	23.1319 (77)				
Northwest				0.7000	11.2829	0.6300	0.8000	0.7700	2.7586 (81)				
Northwest				4.3200	11.2829	0.6300	0.8000	0.7700	17.0243 (81)				
Southeast				5.4000	36.7938	0.6300	0.8000	0.7700	69.3957 (77)				
Solar gains	112.3105	197.8774	288.1984	386.3473	459.4443	467.8676	446.1863	389.8569	321.9051	223.4027	135.7187	95.3401	(83)
Total gains	637.8841	734.5753	803.5842	883.7536	932.6628	921.5541	883.2859	828.0556	772.8488	692.4326	632.3942	610.5075	(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	8.2940	8.3627	8.4325	8.7792	8.8473	9.1785	9.1785	9.2426	9.0480	8.8473	8.7107	8.5723
alpha	1.5529	1.5575	1.5622	1.5853	1.5898	1.6119	1.6119	1.6162	1.6032	1.5898	1.5807	1.5715
util living area												
	0.9139	0.8914	0.8613	0.8044	0.7263	0.6139	0.5094	0.5422	0.6918	0.8230	0.8894	0.9180 (86)

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MIT	16.1635	16.5774	17.2810	18.3112	19.2722	20.1186	20.5493	20.4832	19.8342	18.6031	17.2672	16.1556 (87)
Th 2	19.2510	19.2623	19.2736	19.3280	19.3383	19.3867	19.3867	19.3958	19.3680	19.3383	19.3175	19.2959 (88)
util rest of house	0.9007	0.8748	0.8389	0.7703	0.6712	0.5226	0.3717	0.4095	0.6113	0.7851	0.8700	0.9057 (89)
MIT 2	14.1028	14.6013	15.4488	16.6901	17.8081	18.7591	19.1714	19.1287	18.4732	17.0632	15.4603	14.1062 (90)
Living area fraction									fLA = Living area / (4) =			0.4030 (91)
MIT	14.9332	15.3976	16.1871	17.3434	18.3981	19.3069	19.7267	19.6745	19.0216	17.6837	16.1884	14.9320 (92)
Temperature adjustment												0.0000
adjusted MIT	14.9332	15.3976	16.1871	17.3434	18.3981	19.3069	19.7267	19.6745	19.0216	17.6837	16.1884	14.9320 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.8491	0.8190	0.7809	0.7161	0.6322	0.5173	0.4048	0.4362	0.5902	0.7331	0.8156	0.8555	(94)
Useful gains	541.6242	601.6017	627.5567	632.8304	589.5960	476.7507	357.5729	361.1619	456.1438	507.6046	515.7799	522.3106	(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	1676.9791	1642.0018	1502.6869	1258.0291	990.3125	670.8049	445.5961	463.4332	711.5225	1047.3277	1364.7982	1637.6313	(97)
Space heating kWh	844.7041	699.1489	651.0969	450.1431	298.1331	0.0000	0.0000	0.0000	0.0000	401.5540	611.2932	829.7987	(98a)
Space heating requirement - total per year (kWh/year)												4785.8719	
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	844.7041	699.1489	651.0969	450.1431	298.1331	0.0000	0.0000	0.0000	0.0000	401.5540	611.2932	829.7987	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4785.8719	
Space heating per m2											(98c) / (4) =	64.4996	(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	
	844.7041	699.1489	651.0969	450.1431	298.1331	0.0000	0.0000	0.0000	0.0000	401.5540	611.2932	829.7987	(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)	385.1820	318.8093	296.8978	205.2636	135.9476	0.0000	0.0000	0.0000	0.0000	183.1072	278.7475	378.3852	(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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	(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	137.0613	121.2856	128.9234	113.4018	109.9900	99.1670	97.8553	101.6700	102.7185	114.4838	121.6832	135.5601	(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	25.4826	20.4431	18.4067	13.4855	10.4166	8.5105	9.5024	12.3516	16.0435	21.0499	23.7758	26.1908	(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												2182.3401	(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												1383.8001	(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)												205.6590	(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												3771.7992	(238)

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

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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2182.3401	0.1536	335.1875 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1383.8001	0.1409	194.9280 (264)
Space and water heating			530.1156 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	205.6590	0.1443	29.6829 (268)
Total CO2, kg/year			559.7985 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.5400 (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	2182.3401	1.5686	3423.2795 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1383.8001	1.5209	2104.5710 (278)
Space and water heating			5527.8505 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	205.6590	1.5338	315.4466 (282)
Total Primary energy kWh/year			5843.2971 (286)
Dwelling Primary energy Rate (DPER)			78.7500 (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	74.2000 (1b)	x 2.6000 (2b)	= 192.9200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.9200 (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) = 0.1555 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4055 (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) = 0.3447 (21)

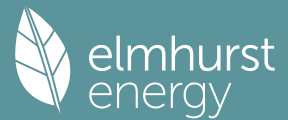
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4395	0.4308	0.4222	0.3791	0.3705	0.3274	0.3274	0.3188	0.3447	0.3705	0.3878	0.4050 (22b)
Effective ac	0.5966	0.5928	0.5891	0.5719	0.5686	0.5536	0.5536	0.5508	0.5594	0.5686	0.5752	0.5820 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.20)			12.2200	1.1450	13.9924		(27)
Floor Over Commercial			74.2000	0.1300	9.6460		(28b)
New Ext Wall	36.4000	14.1100	22.2900	0.1800	4.0122		(29a)
Flat Roof	74.2000		74.2000	0.1100	8.1620		(30)
Total net area of external elements Aum(A, m2)			184.8000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	37.7026	(33)
Party Wall			55.1200	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							63.4643 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							9.2400 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	46.9426 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(38)m	37.9795	37.7408	37.5068	36.4077	36.2021	35.2448	35.2448	35.0675	35.6135	36.2021	36.6181	37.0530 (38)
Heat transfer coeff	84.9221	84.6833	84.4493	83.3503	83.1446	82.1874	82.1874	82.0101	82.5561	83.1446	83.5606	83.9955 (39)
Average = Sum(39)m / 12 =												83.3493
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1445	1.1413	1.1381	1.1233	1.1205	1.1076	1.1076	1.1053	1.1126	1.1205	1.1262	1.1320 (40)
HLP (average)												1.1233
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3436 (42)
Hot water usage for mixer showers													
63.5146	62.5601	61.1692	58.5080	56.5441	54.3539	53.1091	54.4894	56.0026	58.3541	61.0725	63.2713	(42a)	
Hot water usage for baths													
27.4366	27.0291	26.4553	25.3973	24.6051	23.7267	23.2522	23.8220	24.4424	25.3823	26.4621	27.3438	(42b)	
Hot water usage for other uses													
38.6311	37.2263	35.8216	34.4168	33.0120	31.6073	31.6073	33.0120	34.4168	35.8216	37.2263	38.6311	(42c)	
Average daily hot water use (litres/day)												119.1156 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	129.5823	126.8156	123.4461	118.3221	114.1612	109.6879	107.9685	111.3234	114.8618	119.5580	124.7610	129.2462 (44)	
Energy conte	205.2268	180.5837	189.7321	161.9771	153.6830	134.8741	130.5786	137.8417	141.6360	162.2391	177.7449	202.3684 (45)	
Energy content (annual)										Total = Sum(45)m =		1978.4854	
Distribution loss (46)m = 0.15 x (45)m													
30.7840	27.0876	28.4598	24.2966	23.0524	20.2311	19.5868	20.6763	21.2454	24.3359	26.6617	30.3553	(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	(61)	
Total heat required for water heating calculated for each month													
256.9733	227.3226	241.4787	212.0544	205.4296	184.9514	182.3252	189.5883	191.7134	213.9857	227.8222	254.1150	(62)	
WWHRS	-29.0362	-25.6799	-26.8905	-22.2664	-20.7515	-17.7572	-16.6445	-17.6998	-18.3723	-21.6589	-24.5369	-28.4985 (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													
227.9371	201.6427	214.5882	189.7880	184.6781	167.1942	165.6806	171.8885	173.3411	192.3268	203.2853	225.6164	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2317.9672 (64)	
Electric shower(s)												2318 (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													
109.6352	97.4352	104.4832	93.9193	92.4969	84.9075	84.8146	87.2296	87.1559	95.3418	99.1621	108.6848	(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	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815	117.1815 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.2633	119.8629	108.2633	111.8721	108.2633	111.8721	108.2633	108.2633	111.8721	108.2633	111.8721	108.2633 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.8948	209.0417	203.6315	192.1139	177.5750	163.9105	154.7817	152.6348	158.0450	169.5626	184.1015	197.7660 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181	34.7181 (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)	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452 (71)
Water heating gains (Table 5)	147.3591	144.9928	140.4344	130.4434	124.3237	117.9271	113.9982	117.2441	121.0498	128.1476	137.7251	146.0817 (72)
Total internal gains	523.6716	535.0519	513.4837	495.5839	471.3165	451.8641	435.1977	436.2967	449.1213	467.1279	494.8531	513.2654 (73)

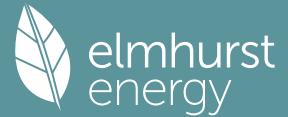
6. Solar gains

[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				7.2000	36.7938	0.6300	0.7000		0.7700	80.9616 (77)		
Northwest				5.0200	11.2829	0.6300	0.7000		0.7700	17.3100 (81)		
Solar gains	98.2717	173.1427	252.1736	338.0539	402.0138	409.3842	390.4130	341.1248	281.6670	195.4774	118.7539	83.4225 (83)
Total gains	621.9433	708.1946	765.6573	833.6378	873.3302	861.2482	825.6106	777.4215	730.7883	662.6053	613.6070	596.6880 (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	15.4032	15.4466	15.4894	15.6936	15.7325	15.9157	15.9157	15.9501	15.8446	15.7325	15.6541	15.5731
alpha	2.0269	2.0298	2.0326	2.0462	2.0488	2.0610	2.0610	2.0633	2.0563	2.0488	2.0436	2.0382
util living area												
	0.8849	0.8526	0.8100	0.7332	0.6303	0.5003	0.3892	0.4222	0.5863	0.7563	0.8505	0.8923 (86)
MIT	17.9362	18.3144	18.8602	19.5838	20.2050	20.6585	20.8553	20.8238	20.4942	19.7024	18.7231	17.8802 (87)

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Th 2	19.9647	19.9673	19.9698	19.9818	19.9841	19.9946	19.9946	19.9965	19.9905	19.9841	19.9795	19.9748 (88)
util rest of house	0.8733	0.8381	0.7908	0.7055	0.5897	0.4416	0.3131	0.3458	0.5301	0.7251	0.8335	0.8814 (89)
MIT 2	16.4311	16.8989	17.5739	18.4593	19.1946	19.7065	19.9009	19.8769	19.5394	18.6220	17.4207	16.3648 (90)
Living area fraction									fLA = Living area / (4) =			0.4030 (91)
MIT	17.0376	17.4693	18.0922	18.9124	19.6018	20.0901	20.2855	20.2585	19.9242	19.0574	17.9455	16.9755 (92)
Temperature adjustment												0.0000
adjusted MIT	17.0376	17.4693	18.0922	18.9124	19.6018	20.0901	20.2855	20.2585	19.9242	19.0574	17.9455	16.9755 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8297	0.7936	0.7483	0.6721	0.5730	0.4475	0.3360	0.3667	0.5261	0.6918	0.7905	0.8387	(94)
Useful gains	516.0055	562.0053	572.9789	560.2797	500.4207	385.4409	277.4401	285.0708	384.4830	458.3623	485.0797	500.4141	(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	1081.7053	1064.4116	978.9564	834.5403	656.9916	451.2158	302.9037	316.4349	480.8209	703.1839	906.2589	1073.0808	(97)
Space heating kWh	420.8806	337.6170	302.0472	197.4676	116.4887	0.0000	0.0000	0.0000	0.0000	182.1473	303.2490	426.0640	(98a)
Space heating requirement - total per year (kWh/year)												2285.9614	
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	420.8806	337.6170	302.0472	197.4676	116.4887	0.0000	0.0000	0.0000	0.0000	182.1473	303.2490	426.0640	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2285.9614	
Space heating per m2										(98c) / (4) =		30.8081	(99)

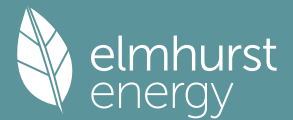
9a. Energy requirements - Individual heating systems, including micro-CHP

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	420.8806	337.6170	302.0472	197.4676	116.4887	0.0000	0.0000	0.0000	0.0000	182.1473	303.2490	426.0640	(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)	455.9920	365.7822	327.2451	213.9411	126.2067	0.0000	0.0000	0.0000	0.0000	197.3426	328.5471	461.6078	(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	227.9371	201.6427	214.5882	189.7880	184.6781	167.1942	165.6806	171.8885	173.3411	192.3268	203.2853	225.6164	(64)
Efficiency of water heater	85.4157	85.2067	84.8263	84.1489	83.0559	79.8000	79.8000	79.8000	79.8000	83.9380	84.9548	85.4630	(216)
Fuel for water heating, kWh/month	266.8562	236.6513	252.9736	225.5385	222.3538	209.5166	207.6198	215.3991	217.2194	229.1297	239.2866	263.9931	(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	22.4950	18.0463	16.2487	11.9045	9.1954	7.5127	8.3883	10.9035	14.1625	18.5820	20.9883	23.1202	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-57.4650	-75.6081	-101.5295	-106.4422	-108.7230	-99.4309	-98.1968	-95.5508	-90.1731	-82.6052	-61.2232	-50.3441	(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)	-51.1784	-104.7754	-203.1647	-298.0984	-387.6264	-387.1232	-382.5367	-326.7793	-243.4735	-147.3166	-67.4660	-40.6904	(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												2476.6646	(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												2786.5377	(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)												181.5473	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3667.5209	(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												1863.2287	(238)

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

Energy	Emission factor	Emissions
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	kWh/year	kg CO2/kWh	kg CO2/year
Space heating - main system 1	2476.6646	0.2100	520.0996 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2786.5377	0.2100	585.1729 (264)
Space and water heating			1105.2725 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	181.5473	0.1443	26.2029 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1027.2919	0.1361	-139.7902
PV Unit electricity exported	-2640.2290	0.1266	-334.2534
Total			-474.0437 (269)
Total CO2, kg/year			669.3610 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.0200 (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	2476.6646	1.1300	2798.6310 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2786.5377	1.1300	3148.7876 (278)
Space and water heating			5947.4186 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	181.5473	1.5338	278.4634 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1027.2919	1.5030	-1544.0159
PV Unit electricity exported	-2640.2290	0.4647	-1227.0226
Total			-2771.0385 (283)
Total Primary energy kWh/year			3584.9443 (286)
Target Primary Energy Rate (TPER)			48.3100 (287)

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Property Reference	Flat 1D			Issued on Date	01/02/2024		
Assessment Reference	Baseline		Prop Type Ref	Conversion			
Property							
SAP Rating	70 C		DER	7.54		TER	9.02
Environmental	94 A		% DER < TER				16.41
CO ₂ Emissions (t/year)	0.5		DFEE	72.12		TFEE	37.62
Compliance Check	See BREL		% DFEE < TFEE				-91.72
% DPER < TPER	-63.01		DPER	78.75		TPER	48.31
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	74.2000 (1b)	x 2.6000 (2b)	= 192.9200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.9200 (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) = 0.2073 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9573 (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) = 0.8137 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.0375	1.0172	0.9968	0.8951	0.8748	0.7731	0.7731	0.7527	0.8137	0.8748	0.9155	0.9561 (22b)
Effective ac	1.0375	1.0172	0.9968	0.9006	0.8826	0.7988	0.7988	0.7833	0.8311	0.8826	0.9190	0.9571 (25)

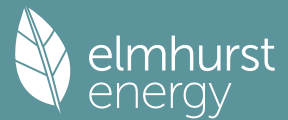
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			2.5000	1.5038	3.7594		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			74.2000	0.2500	18.5500	20.0000	1484.0000 (28b)
New Ext Wall	36.4000	14.1100	22.2900	0.1800	4.0122	9.0000	200.6100 (29a)
Flat Roof	74.2000		74.2000	0.1600	11.8720	9.0000	667.8000 (30)
Total net area of external elements Aum(A, m ²)			184.8000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		54.7001		(33)
Party Wall			55.1200	0.0000	0.0000	20.0000	1102.4000 (32)
Internal Wall			139.3600			9.0000	1254.2400 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		4709.0500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							63.4643 (35)
Thermal bridges (Default value 0.200 * total exposed area)							36.9600 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		91.6601 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(38)m	66.0521	64.7569	63.4621	57.3363	56.1902	50.8548	50.8548	49.8667	52.9099	56.1902	58.5088	60.9327	(38)
Heat transfer coeff	157.7122	156.4171	155.1223	148.9964	147.8503	142.5149	142.5149	141.5269	144.5700	147.8503	150.1689	152.5929	(39)
Average = Sum(39)m / 12 =												148.9864	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.1255	2.1080	2.0906	2.0080	1.9926	1.9207	1.9207	1.9074	1.9484	1.9926	2.0238	2.0565	(40)
HLP (average)												2.0079	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3436	(42)
Hot water usage for mixer showers	63.5146	62.5601	61.1692	58.5080	56.5441	54.3539	53.1091	54.4894	56.0026	58.3541	61.0725	63.2713	(42a)	
Hot water usage for baths	27.4366	27.0291	26.4553	25.3973	24.6051	23.7267	23.2522	23.8220	24.4424	25.3823	26.4621	27.3438	(42b)	
Hot water usage for other uses	38.6311	37.2263	35.8216	34.4168	33.0120	31.6073	31.6073	33.0120	34.4168	35.8216	37.2263	38.6311	(42c)	
Average daily hot water use (litres/day)												119.1156	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	129.5823	126.8156	123.4461	118.3221	114.1612	109.6879	107.9685	111.3234	114.8618	119.5580	124.7610	129.2462	(44)	
Energy content	205.2268	180.5837	189.7321	161.9771	153.6830	134.8741	130.5786	137.8417	141.6360	162.2391	177.7449	202.3684	(45)	
Energy content (annual)										Total = Sum(45)m =		1978.4854		
Distribution loss (46)m = 0.15 x (45)m	30.7840	27.0876	28.4598	24.2966	23.0524	20.2311	19.5868	20.6763	21.2454	24.3359	26.6617	30.3553	(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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	(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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	(64)	
								Total per year (kWh/year) = Sum(64)m =				2634.7554	(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	112.8283	100.3193	107.6763	97.0094	95.6900	87.9976	88.0078	90.4228	90.2460	98.5349	102.2522	111.8779	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	29.1132	25.8580	21.0292	15.9204	11.9007	10.0471	10.8562	14.1113	18.9402	24.0489	28.0687	29.9223	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	308.7982	312.0025	303.9277	286.7372	265.0373	244.6425	231.0175	227.8131	235.8880	253.0785	274.7784	295.1732	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	(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)	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	(71)
Water heating gains (Table 5)	151.6509	149.2847	144.7262	134.7353	128.6156	122.2189	118.2900	121.5360	125.3416	132.4394	142.0169	150.3735	(72)
Total internal gains	590.8403	588.4232	570.9611	538.6709	506.8316	475.1865	458.4417	461.7384	478.4479	510.8448	546.1419	576.7470	(73)

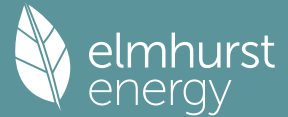
6. Solar gains

[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
						</					

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	8.2940	8.3627	8.4325	8.7792	8.8473	9.1785	9.1785	9.2426	9.0480	8.8473	8.7107	8.5723		
alpha	1.5529	1.5575	1.5622	1.5853	1.5898	1.6119	1.6119	1.6162	1.6032	1.5898	1.5807	1.5715		
util living area	0.9024	0.8818	0.8498	0.7943	0.7167	0.6068	0.5019	0.5333	0.6817	0.8108	0.8784	0.9070	(86)	

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MIT	16.2850	16.6688	17.3717	18.3699	19.3098	20.1350	20.5597	20.4965	19.8620	18.6661	17.3565	16.2744 (87)
Th 2	19.2510	19.2623	19.2736	19.3280	19.3383	19.3867	19.3867	19.3958	19.3680	19.3383	19.3175	19.2959 (88)
util rest of house												
	0.8877	0.8640	0.8260	0.7591	0.6608	0.5154	0.3651	0.4013	0.6005	0.7713	0.8575	0.8933 (89)
MIT 2	14.2461	14.7081	15.5529	16.7550	17.8462	18.7728	19.1774	19.1370	18.4984	17.1321	15.5640	14.2468 (90)
Living area fraction									fLA = Living area /	(4) =		0.4030 (91)
MIT	15.0677	15.4982	16.2858	17.4057	18.4360	19.3217	19.7344	19.6848	19.0479	17.7502	16.2863	15.0639 (92)
Temperature adjustment												0.0000
adjusted MIT	15.0677	15.4982	16.2858	17.4057	18.4360	19.3217	19.7344	19.6848	19.0479	17.7502	16.2863	15.0639 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8335	0.8068	0.7675	0.7056	0.6231	0.5110	0.3986	0.4286	0.5809	0.7199	0.8018	0.8405	(94)
Useful gains	586.0552	634.3955	659.4462	652.6685	602.1042	481.9473	360.5526	365.0299	464.9532	528.5955	546.7270	564.8574	(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													
	1698.1957	1657.7388	1517.9914	1267.3263	995.9193	672.9133	446.6960	464.8912	715.3124	1057.1662	1379.4945	1657.7489	(97)
Space heating kWh	827.4325	687.6867	638.7576	442.5536	292.9985	0.0000	0.0000	0.0000	0.0000	393.2566	599.5926	813.1113	(98a)
Space heating requirement - total per year (kWh/year)												4695.3894	
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													
	827.4325	687.6867	638.7576	442.5536	292.9985	0.0000	0.0000	0.0000	0.0000	393.2566	599.5926	813.1113	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4695.3894	
Space heating per m2										(98c) / (4) =		63.2802	(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	827.4325	687.6867	638.7576	442.5536	292.9985	0.0000	0.0000	0.0000	0.0000	393.2566	599.5926	813.1113	(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)	377.3062	313.5826	291.2711	201.8028	133.6062	0.0000	0.0000	0.0000	0.0000	179.3236	273.4121	370.7758	(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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	(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	137.0613	121.2856	128.9234	113.4018	109.9900	99.1670	97.8553	101.6700	102.7185	114.4838	121.6832	135.5601	(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	25.4826	20.4431	18.4067	13.4855	10.4166	8.5105	9.5024	12.3516	16.0435	21.0499	23.7758	26.1908	(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												2141.0805	(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												1383.8001	(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)												205.6590	(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												3730.5395	(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	2141.0805	16.4900	353.0642 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1383.8001	16.4900	228.1886 (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	205.6590	16.4900	33.9132 (250)
Additional standing charges			0.0000 (251)
Total energy cost			615.1660 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.8579 (257)
SAP value		69.8837
SAP rating (Section 12)		70 (258)
SAP band		C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2141.0805	0.1536	328.8421 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1383.8001	0.1409	194.9280 (264)
Space and water heating			523.7702 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	205.6590	0.1443	29.6829 (268)
Total CO2, kg/year			553.4531 (272)
CO2 emissions per m2			7.4600 (273)
EI value			93.7783
EI rating			94 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	74.2000 (1b)	x 2.6000 (2b)	= 192.9200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	192.9200 (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) =	0.2073 (8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.9573	(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) =		0.8137 (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	3.0000	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	0.8544	0.8137	0.8137	0.7527	0.7527	0.6713	0.6917	0.6510	0.6713	0.7120	0.7120	0.7731 (22b)
Effective ac	0.8650	0.8311	0.8311	0.7833	0.7833	0.7253	0.7392	0.7119	0.7253	0.7535	0.7535	0.7988 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			2.5000	1.5038	3.7594		(27)

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Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962			(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203			(27)
Floor Over Commercial			74.2000	0.2500	18.5500	20.0000	1484.0000	(28b)
New Ext Wall	36.4000	14.1100	22.2900	0.1800	4.0122	9.0000	200.6100	(29a)
Flat Roof	74.2000		74.2000	0.1600	11.8720	9.0000	667.8000	(30)
Total net area of external elements Aum(A, m2)			184.8000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	54.7001				(33)
Party Wall			55.1200	0.0000	0.0000	20.0000	1102.4000	(32)
Internal Wall			139.3600			9.0000	1254.2400	(32c)

Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =	4709.0500				(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				63.4643				(35)
Thermal bridges (Default value 0.200 * total exposed area)				36.9600				(36)
Point Thermal bridges				(36a) =	0.0000			
Total fabric heat loss			(33) + (36) + (36a) =	91.6601				(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	55.0704	52.9099	52.9099	49.8667	49.8667	46.1781	47.0607	45.3218	46.1781	47.9697	47.9697	50.8548	(38)	
Average = Sum(39)m / 12 =	146.7305	144.5700	144.5700	141.5269	141.5269	137.8382	138.7209	136.9819	137.8382	139.6299	139.6299	142.5149	(39)	
												141.0065		

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	1.9775	1.9484	1.9484	1.9074	1.9074	1.8577	1.8696	1.8461	1.8577	1.8818	1.8818	1.9207	(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													2.3436	(42)
Hot water usage for mixer showers														
Hot water usage for baths	63.5146	62.5601	61.1692	58.5080	56.5441	54.3539	53.1091	54.4894	56.0026	58.3541	61.0725	63.2713	(42a)	
Hot water usage for other uses	27.4366	27.0291	26.4553	25.3973	24.6051	23.7267	23.2522	23.8220	24.4424	25.3823	26.4621	27.3438	(42b)	
Average daily hot water use (litres/day)	38.6311	37.2263	35.8216	34.4168	33.0120	31.6073	31.6073	33.0120	34.4168	35.8216	37.2263	38.6311	(42c)	
												119.1156	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	129.5823	126.8156	123.4461	118.3221	114.1612	109.6879	107.9685	111.3234	114.8618	119.5580	124.7610	129.2462	(44)	
Energy content (annual)	205.2268	180.5837	189.7321	161.9771	153.6830	134.8741	130.5786	137.8417	141.6360	162.2391	177.7449	202.3684	(45)	
Distribution loss (46)m = 0.15 x (45)m														
Water storage loss:	30.7840	27.0876	28.4598	24.2966	23.0524	20.2311	19.5868	20.6763	21.2454	24.3359	26.6617	30.3553	(46)	
Store volume													210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.9400	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													1.0476	(55)
Total storage loss														
If cylinder contains dedicated solar storage	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756	(56)	
Primary loss	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)	
Combi 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)	
Total heat required for water heating calculated for each month	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)	
WWHRS	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	(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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	(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	112.8283	100.3193	107.6763	97.0094	95.6900	87.9976	88.0078	90.4228	90.2460	98.5349	102.2522	111.8779	(65)	

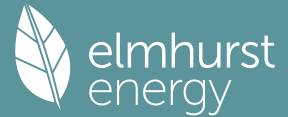
5. Internal gains (see Table 5 and 5a)

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	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	29.1132	25.8580	21.0292	15.9204	11.9007	10.0471	10.8562	14.1113	18.9402	24.0489	28.0687	29.9223	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	308.7982	312.0025	303.9277	286.7372	265.0373	244.6425	231.0175	227.8131	235.8880	253.0785	274.7784	295.1732	(68)	
Pumps, fans	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	(69)	
Losses e.g. evaporation (negative values) (Table 5)	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)	
Water heating gains (Table 5)	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	(71)	
Total internal gains	151.6509	149.2847	144.7262	134.7353	128.6156	122.2189	118.2900	121.5360	125.3416	132.4394	142.0169	150.3735	(72)	
	590.8403	588.4232	570.9611	538.6709	506.8316	475.1865	458.4417	461.7384	478.4479	510.8448	546.1419	576.7470	(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	1.8000	40.4699	0.6300	0.8000	0.7700	25.4430	(77)
Northwest	0.7000	12.9236	0.6300	0.8000	0.7700	3.1597	(81)
Northwest	4.3200	12.9236	0.6300	0.8000	0.7700	19.4998	(81)
Southeast	5.4000	40.4699	0.6300	0.8000	0.7700	76.3290	(77)

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Solar gains	124.4315	197.6721	285.6419	396.8676	461.5626	503.6782	474.8856	423.1208	346.6198	238.6233	154.1208	104.5679 (83)
Total gains	715.2718	786.0954	856.6030	935.5385	968.3942	978.8647	933.3274	884.8593	825.0677	749.4681	700.2627	681.3148 (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	8.9148	9.0480	9.0480	9.2426	9.2426	9.4899	9.4295	9.5492	9.4899	9.3681	9.3681	9.1785
alpha	1.5943	1.6032	1.6032	1.6162	1.6162	1.6327	1.6286	1.6366	1.6327	1.6245	1.6245	1.6119
util living area	0.8896	0.8694	0.8317	0.7642	0.6651	0.5092	0.3799	0.4015	0.6103	0.7759	0.8576	0.8946 (86)
MIT	16.7738	17.1143	17.8427	18.8102	19.7513	20.5026	20.8040	20.7823	20.2283	19.1113	17.8618	16.7841 (87)
Th 2	19.3484	19.3680	19.3680	19.3958	19.3958	19.4299	19.4217	19.4379	19.4299	19.4133	19.4133	19.3867 (88)
util rest of house	0.8732	0.8502	0.8052	0.7237	0.5968	0.3937	0.2103	0.2330	0.5104	0.7286	0.8334	0.8791 (89)
MIT 2	14.8640	15.2764	16.1478	17.2970	18.3659	19.1493	19.3744	19.3791	18.9096	17.6803	16.2008	14.8887 (90)
Living area fraction	15.6336	16.0170	16.8308	17.9068	18.9242	19.6946	19.9505	19.9445	19.4410	18.2569	16.8702	15.6525 (91)
MIT	15.6336	16.0170	16.8308	17.9068	18.9242	19.6946	19.9505	19.9445	19.4410	18.2569	16.8702	15.6525 (92)
Temperature adjustment												0.0000
adjusted MIT	15.6336	16.0170	16.8308	17.9068	18.9242	19.6946	19.9505	19.9445	19.4410	18.2569	16.8702	15.6525 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8181	0.7934	0.7486	0.6755	0.5727	0.4156	0.2728	0.2934	0.5112	0.6837	0.7783	0.8253 (94)
Useful gains	585.1503	623.6844	641.2252	631.9680	554.6152	406.8602	254.5734	259.6078	421.7819	512.4235	544.9819	562.2644 (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	1545.5970	1505.9838	1363.4084	1133.1737	838.4267	509.2580	284.4435	293.7612	584.5766	929.5048	1238.5401	1503.8849 (97)
Space heating kWh	714.5723	592.9052	537.3043	360.8681	211.1558	0.0000	0.0000	0.0000	0.0000	310.3085	499.3619	700.5656 (98a)
Space heating requirement - total per year (kWh/year)												3927.0416
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	714.5723	592.9052	537.3043	360.8681	211.1558	0.0000	0.0000	0.0000	0.0000	310.3085	499.3619	700.5656 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3927.0416
Space heating per m2										(98c) / (4) =		52.9251 (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	714.5723	592.9052	537.3043	360.8681	211.1558	0.0000	0.0000	0.0000	0.0000	310.3085	499.3619	700.5656 (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)	325.8424	270.3626	245.0088	164.5545	96.2863	0.0000	0.0000	0.0000	0.0000	141.4995	227.7072	319.4554 (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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064 (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	137.0613	121.2856	128.9234	113.4018	109.9900	99.1670	97.8553	101.6700	102.7185	114.4838	121.6832	135.5601 (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	25.4826	20.4431	18.4067	13.4855	10.4166	8.5105	9.5024	12.3516	16.0435	21.0499	23.7758	26.1908 (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												1790.7167 (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												1383.8001 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

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Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	205.6590 (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	3380.1757 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1790.7167	25.1600	450.5443 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1383.8001	25.1600	348.1641 (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	205.6590	25.1600	51.7438 (250)
Additional standing charges			0.0000 (251)
Total energy cost			850.4522 (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	1790.7167	0.1540	275.7967 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1383.8001	0.1409	194.9280 (264)
Space and water heating			470.7248 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	205.6590	0.1443	29.6829 (268)
Total CO2, kg/year			500.4077 (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	1790.7167	1.5702	2811.7965 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1383.8001	1.5209	2104.5710 (278)
Space and water heating			4916.3675 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	205.6590	1.5338	315.4466 (282)
Total Primary energy kWh/year			5231.8141 (286)

SAP 10 EPC IMPROVEMENTS

Baseline

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

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

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

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

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

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

	Current £850	Potential £850	Saving £0
Electricity			
Space heating	£451	£451	£0
Water heating	£348	£348	£0
Lighting	£52	£52	£0
Total cost of fuels	£850	£850	£0
Total cost of uses	£851	£851	£0
Delivered energy	46 kWh/m²	46 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.5 tonnes	0.5 tonnes	0.0 tonnes
CO2 emissions per m²	7 kg/m²	7 kg/m²	0 kg/m²
Primary energy	71 kWh/m²	71 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	74.2000 (1b)	x 2.6000 (2b)	= 192.9200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.9200 (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) = 0.2073 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9573 (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) = 0.8137 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.0375	1.0172	0.9968	0.8951	0.8748	0.7731	0.7731	0.7527	0.8137	0.8748	0.9155	0.9561 (22b)
Effective ac	1.0375	1.0172	0.9968	0.9006	0.8826	0.7988	0.7988	0.7833	0.8311	0.8826	0.9190	0.9571 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			2.5000	1.5038	3.7594		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			74.2000	0.2500	18.5500	20.0000	1484.0000 (28b)
New Ext Wall	36.4000	14.1100	22.2900	0.1800	4.0122	9.0000	200.6100 (29a)
Flat Roof	74.2000		74.2000	0.1600	11.8720	9.0000	667.8000 (30)
Total net area of external elements Aum(A, m ²)			184.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	54.7001		(33)
Party Wall			55.1200	0.0000	0.0000	20.0000	1102.4000 (32)
Internal Wall			139.3600			9.0000	1254.2400 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			4709.0500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							63.4643 (35)
Thermal bridges (Default value 0.200 * total exposed area)							36.9600 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 91.6601 (37)

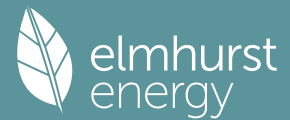
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	66.0521	64.7569	63.4621	57.3363	56.1902	50.8548	50.8548	49.8667	52.9099	56.1902	58.5088	60.9327 (38)
Heat transfer coeff	157.7122	156.4171	155.1223	148.9964	147.8503	142.5149	142.5149	141.5269	144.5700	147.8503	150.1689	152.5929 (39)
Average = Sum(39)m / 12 =												148.9864
HLP	2.1255	2.1080	2.0906	2.0080	1.9926	1.9207	1.9207	1.9074	1.9484	1.9926	2.0238	2.0565 (40)
HLP (average)												2.0079
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3436 (42)
Hot water usage for mixer showers												63.2713 (42a)
Hot water usage for baths												27.3438 (42b)
Hot water usage for other uses												38.6311 (42c)
Average daily hot water use (litres/day)												119.1156 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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Daily hot water use	129.5823	126.8156	123.4461	118.3221	114.1612	109.6879	107.9685	111.3234	114.8618	119.5580	124.7610	129.2462 (44)
Energy conte	205.2268	180.5837	189.7321	161.9771	153.6830	134.8741	130.5786	137.8417	141.6360	162.2391	177.7449	202.3684 (45)
Energy content (annual)										Total = Sum(45)m =		1978.4854
Distribution loss (46)m = 0.15 x (45)m	30.7840	27.0876	28.4598	24.2966	23.0524	20.2311	19.5868	20.6763	21.2454	24.3359	26.6617	30.3553 (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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064 (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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064 (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	112.8283	100.3193	107.6763	97.0094	95.6900	87.9976	88.0078	90.4228	90.2460	98.5349	102.2522	111.8779 (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	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	29.1132	25.8580	21.0292	15.9204	11.9007	10.0471	10.8562	14.1113	18.9402	24.0489	28.0687	29.9223	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	308.7982	312.0025	303.9277	286.7372	265.0373	244.6425	231.0175	227.8131	235.8880	253.0785	274.7784	295.1732	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	(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)	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	(71)
Water heating gains (Table 5)	151.6509	149.2847	144.7262	134.7353	128.6156	122.2189	118.2900	121.5360	125.3416	132.4394	142.0169	150.3735	(72)
Total internal gains	590.8403	588.4232	570.9611	538.6709	506.8316	475.1865	458.4417	461.7384	478.4479	510.8448	546.1419	576.7470	(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				1.8000	36.7938	0.6300	0.8000	0.7700	23.1319 (77)			
Northwest				0.7000	11.2829	0.6300	0.8000	0.7700	2.7586 (81)			
Northwest				4.3200	11.2829	0.6300	0.8000	0.7700	17.0243 (81)			
Southeast				5.4000	36.7938	0.6300	0.8000	0.7700	69.3957 (77)			
Solar gains	112.3105	197.8774	288.1984	386.3473	459.4443	467.8676	446.1863	389.8569	321.9051	223.4027	135.7187	95.3401 (83)
Total gains	703.1508	786.3006	859.1595	925.0182	966.2759	943.0541	904.6280	851.5954	800.3530	734.2475	681.8607	672.0870 (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	8.2940	8.3627	8.4325	8.7792	8.8473	9.1785	9.1785	9.2426	9.0480	8.8473	8.7107	8.5723
alpha	1.5529	1.5575	1.5622	1.5853	1.5898	1.6119	1.6119	1.6162	1.6032	1.5898	1.5807	1.5715
util living area	0.9024	0.8818	0.8498	0.7943	0.7167	0.6068	0.5019	0.5333	0.6817	0.8108	0.8784	0.9070 (86)
MIT	16.2850	16.6688	17.3717	18.3699	19.3098	20.1350	20.5597	20.4965	19.8620	18.6661	17.3565	16.2744 (87)
Th 2	19.2510	19.2623	19.2736	19.3280	19.3383	19.3867	19.3867	19.3958	19.3680	19.3383	19.3175	19.2959 (88)
util rest of house	0.8877	0.8640	0.8260	0.7591	0.6608	0.5154	0.3651	0.4013	0.6005	0.7713	0.8575	0.8933 (89)
MIT 2	14.2461	14.7081	15.5529	16.7550	17.8462	18.7728	19.1774	19.1370	18.4984	17.1321	15.5640	14.2468 (90)
Living area fraction												0.4030 (91)
MIT	15.0677	15.4982	16.2858	17.4057	18.4360	19.3217	19.7344	19.6848	19.0479	17.7502	16.2863	15.0639 (92)
Temperature adjustment												0.0000
adjusted MIT	15.0677	15.4982	16.2858	17.4057	18.4360	19.3217	19.7344	19.6848	19.0479	17.7502	16.2863	15.0639 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8335	0.8068	0.7675	0.7056	0.6231	0.5110	0.3986	0.4286	0.5809	0.7199	0.8018	0.8405	(94)
Useful gains	586.0552	634.3955	659.4462	652.6685	602.1042	481.9473	360.5526	365.0299	464.9532	528.5955	546.7270	564.8574	(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	1698.1957	1657.7388	1517.9914	1267.3263	995.9193	672.9133	446.6960	464.8912	715.3124	1057.1662	1379.4945	1657.7489	(97)
Space heating kWh	827.4325	687.6867	638.7576	442.5536	292.9985	0.0000	0.0000	0.0000	0.0000	393.2566	599.5926	813.1113	(98a)
Space heating requirement - total per year (kWh/year)												4695.3894	
Solar heating kWh													

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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	827.4325	687.6867	638.7576	442.5536	292.9985	0.0000	0.0000	0.0000	0.0000	393.2566	599.5926	813.1113 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4695.3894
Space heating per m2										(98c) / (4) =		63.2802 (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	827.4325	687.6867	638.7576	442.5536	292.9985	0.0000	0.0000	0.0000	0.0000	393.2566	599.5926	813.1113 (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)	377.3062	313.5826	291.2711	201.8028	133.6062	0.0000	0.0000	0.0000	0.0000	179.3236	273.4121	370.7758 (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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064 (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	137.0613	121.2856	128.9234	113.4018	109.9900	99.1670	97.8553	101.6700	102.7185	114.4838	121.6832	135.5601 (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	25.4826	20.4431	18.4067	13.4855	10.4166	8.5105	9.5024	12.3516	16.0435	21.0499	23.7758	26.1908 (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												2141.0805 (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												1383.8001 (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)												205.6590 (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												3730.5395 (238)

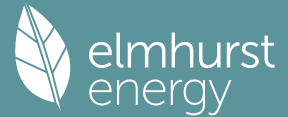
10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2141.0805	16.4900	353.0642 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1383.8001	16.4900	228.1886 (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	205.6590	16.4900	33.9132 (250)
Additional standing charges			0.0000 (251)
Total energy cost			615.1660 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.8579 (257)
SAP value		69.8837
SAP rating (Section 12)		70 (258)
SAP band		C

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	2141.0805	0.1536	328.8421 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	1383.8001	0.1409	194.9280 (264)
Space and water heating			523.7702 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	205.6590	0.1443	29.6829 (268)
Total CO ₂ , kg/year			553.4531 (272)
CO ₂ emissions per m ²			7.4600 (273)
EI value			93.7783
EI rating			94 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	74.2000 (1b)	x 2.6000 (2b)	= 192.9200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.9200 (5)

2. Ventilation rate

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) =	0.2073 (8)
Pressure Test	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.9573	(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) =	0.8137 (21)

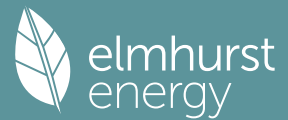
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate	0.8544	0.8137	0.8137	0.7527	0.7527	0.6713	0.6917	0.6510	0.6713	0.7120	0.7120	0.7731 (22b)
Effective ac	0.8650	0.8311	0.8311	0.7833	0.7833	0.7253	0.7392	0.7119	0.7253	0.7535	0.7535	0.7988 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Entrance Door			1.8900	1.0000	1.8900		(26)
Windows (Uw = 1.60)			2.5000	1.5038	3.7594		(27)
Patio Doors (Uw = 1.60)			4.3200	1.5038	6.4962		(27)
Bifold Doors (Uw = 1.60)			5.4000	1.5038	8.1203		(27)
Floor Over Commercial			74.2000	0.2500	18.5500	20.0000	1484.0000 (28b)
New Ext Wall	36.4000	14.1100	22.2900	0.1800	4.0122	9.0000	200.6100 (29a)
Flat Roof	74.2000		74.2000	0.1600	11.8720	9.0000	667.8000 (30)
Total net area of external elements Aum(A, m ²)			184.8000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	54.7001			(33)
Party Wall			55.1200	0.0000	0.0000	20.0000	1102.4000 (32)
Internal Wall			139.3600			9.0000	1254.2400 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		4709.0500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							63.4643 (35)
Thermal bridges (Default value 0.200 * total exposed area)							36.9600 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		91.6601 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	55.0704	52.9099	52.9099	49.8667	49.8667	46.1781	47.0607	45.3218	46.1781	47.9697	47.9697	50.8548 (38)
Heat transfer coeff	146.7305	144.5700	144.5700	141.5269	141.5269	137.8382	138.7209	136.9819	137.8382	139.6299	139.6299	142.5149 (39)
Average = Sum(39)m / 12 =												141.0065
HLP	1.9775	1.9484	1.9484	1.9074	1.9074	1.8577	1.8696	1.8461	1.8577	1.8818	1.8818	1.9207 (40)
HLP (average)												1.9004

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Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.3436 (42)
Hot water usage for mixer showers	63.5146	62.5601	61.1692	58.5080	56.5441	54.3539	53.1091	54.4894	56.0026	58.3541	61.0725	63.2713 (42a)
Hot water usage for baths	27.4366	27.0291	26.4553	25.3973	24.6051	23.7267	23.2522	23.8220	24.4424	25.3823	26.4621	27.3438 (42b)
Hot water usage for other uses	38.6311	37.2263	35.8216	34.4168	33.0120	31.6073	31.6073	33.0120	34.4168	35.8216	37.2263	38.6311 (42c)
Average daily hot water use (litres/day)												119.1156 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	129.5823	126.8156	123.4461	118.3221	114.1612	109.6879	107.9685	111.3234	114.8618	119.5580	124.7610	129.2462 (44)
Energy content (annual)	205.2268	180.5837	189.7321	161.9771	153.6830	134.8741	130.5786	137.8417	141.6360	162.2391	177.7449	202.3684 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1978.4854
Water storage loss:	30.7840	27.0876	28.4598	24.2966	23.0524	20.2311	19.5868	20.6763	21.2454	24.3359	26.6617	30.3553 (46)
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.9400 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.0476 (55)
Total storage loss	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756 (56)
If cylinder contains dedicated solar storage	32.4756	29.3328	32.4756	31.4280	32.4756	31.4280	32.4756	32.4756	31.4280	32.4756	31.4280	32.4756 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064 (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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064 (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	112.8283	100.3193	107.6763	97.0094	95.6900	87.9976	88.0078	90.4228	90.2460	98.5349	102.2522	111.8779 (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	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178	140.6178 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	29.1132	25.8580	21.0292	15.9204	11.9007	10.0471	10.8562	14.1113	18.9402	24.0489	28.0687	29.9223 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	308.7982	312.0025	303.9277	286.7372	265.0373	244.6425	231.0175	227.8131	235.8880	253.0785	274.7784	295.1732 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054	51.4054 (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)	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452	-93.7452 (71)
Water heating gains (Table 5)	151.6509	149.2847	144.7262	134.7353	128.6156	122.2189	118.2900	121.5360	125.3416	132.4394	142.0169	150.3735 (72)
Total internal gains	590.8403	588.4232	570.9611	538.6709	506.8316	475.1865	458.4417	461.7384	478.4479	510.8448	546.1419	576.7470 (73)

6. Solar gains												

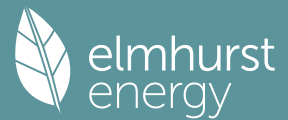
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	1.8000				40.4699		0.6300		0.8000		0.7700	25.4430 (77)
Northwest	0.7000				12.9236		0.6300		0.8000		0.7700	3.1597 (81)
Northwest	4.3200				12.9236		0.6300		0.8000		0.7700	19.4998 (81)
Southeast	5.4000				40.4699		0.6300		0.8000		0.7700	76.3290 (77)

Solar gains	124.4315	197.6721	285.6419	396.8676	461.5626	503.6782	474.8856	423.1208	346.6198	238.6233	154.1208	104.5679 (83)
Total gains	715.2718	786.0954	856.6030	935.5385	968.3942	978.8647	933.3274	884.8593	825.0677	749.4681	700.2627	681.3148 (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	8.9148	9.0480	9.0480	9.2426	9.2426	9.4899	9.4295	9.5492	9.4899	9.3681	9.3681	9.1785
alpha	1.5943	1.6032	1.6032	1.6162	1.6162	1.6327	1.6286	1.6366	1.6327	1.6245	1.6245	1.6119
util living area	0.8896	0.8694	0.8317	0.7642	0.6651	0.5092	0.3799	0.4015	0.6103	0.7759	0.8576	0.8946 (86)
MIT	16.7738	17.1143	17.8427	18.8102	19.7513	20.5026	20.8040	20.7823	20.2283	19.1113	17.8618	16.7841 (87)
Th 2	19.3484	19.3680	19.3680	19.3958	19.3958	19.4299	19.4217	19.4379	19.4299	19.4133	19.4133	19.3867 (88)
util rest of house	0.8732	0.8502	0.8052	0.7237	0.5968	0.3937	0.2103	0.2330	0.5104	0.7286	0.8334	0.8791 (89)
MIT 2	14.8640	15.2764	16.1478	17.2970	18.3659	19.1493	19.3744	19.3791	18.9096	17.6803	16.2008	14.8887 (90)
Living area fraction									fLA = Living area / (4) =			0.4030 (91)
MIT	15.6336	16.0170	16.8308	17.9068	18.9242	19.6946	19.9505	19.9445	19.4410	18.2569	16.8702	15.6525 (92)
Temperature adjustment												0.0000

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adjusted MIT 15.6336 16.0170 16.8308 17.9068 18.9242 19.6946 19.9505 19.9445 19.4410 18.2569 16.8702 15.6525 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8181	0.7934	0.7486	0.6755	0.5727	0.4156	0.2728	0.2934	0.5112	0.6837	0.7783	0.8253	(94)
Useful gains	585.1503	623.6844	641.2252	631.9680	554.6152	406.8602	254.5734	259.6078	421.7819	512.4235	544.9819	562.2644	(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	1545.5970	1505.9838	1363.4084	1133.1737	838.4267	509.2580	284.4435	293.7612	584.5766	929.5048	1238.5401	1503.8849	(97)
Space heating kWh	714.5723	592.9052	537.3043	360.8681	211.1558	0.0000	0.0000	0.0000	0.0000	310.3085	499.3619	700.5656	(98a)
Space heating requirement - total per year (kWh/year)												3927.0416	
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	714.5723	592.9052	537.3043	360.8681	211.1558	0.0000	0.0000	0.0000	0.0000	310.3085	499.3619	700.5656	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3927.0416	
Space heating per m2										(98c) / (4) =		52.9251	(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	714.5723	592.9052	537.3043	360.8681	211.1558	0.0000	0.0000	0.0000	0.0000	310.3085	499.3619	700.5656	(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)	325.8424	270.3626	245.0088	164.5545	96.2863	0.0000	0.0000	0.0000	0.0000	141.4995	227.7072	319.4554	(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	260.9648	230.9277	245.4701	215.9171	209.4210	188.8141	186.3166	193.5797	195.5760	217.9771	231.6849	258.1064	(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	137.0613	121.2856	128.9234	113.4018	109.9900	99.1670	97.8553	101.6700	102.7185	114.4838	121.6832	135.5601	(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	25.4826	20.4431	18.4067	13.4855	10.4166	8.5105	9.5024	12.3516	16.0435	21.0499	23.7758	26.1908	(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												1790.7167	(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												1383.8001	(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)												205.6590	(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												3380.1757	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1790.7167	25.1600	450.5443	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1383.8001	25.1600	348.1641	(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	205.6590	25.1600	51.7438	(250)

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Additional standing charges
Total energy cost

0.0000 (251)
850.4522 (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	1790.7167	0.1540	275.7967 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1383.8001	0.1409	194.9280 (264)
Space and water heating			470.7248 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	205.6590	0.1443	29.6829 (268)
Total CO2, kg/year			500.4077 (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	1790.7167	1.5702	2811.7965 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1383.8001	1.5209	2104.5710 (278)
Space and water heating			4916.3675 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	205.6590	1.5338	315.4466 (282)
Total Primary energy kWh/year			5231.8141 (286)

Overview Report

Dwelling Address	
Report Date	01/02/2024
Property Type	Flat, Semi-Detached
Floor Area [m ²]	74

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

Energy Rating

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

Most energy efficient - lower running costs

CURRENT

POTENTIAL

(92 plus)

A

(81-91)

B

(69-80)

C

(55-68)

D

(39-54)

E

(21-38)

F

(1-20)

G

70

70

Least energy efficient - higher running costs

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good
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Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.18 W/m ² K	Very Good
Roof	Average thermal transmittance 0.16 W/m ² K	Very Good
Floor	Average thermal transmittance 0.25 W/m ² K	Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, underfloor, electric	Average
Main heating controls	Time and temperature zone control	Very Good
Secondary heating	None	
Hot water	From main system	Average
Lighting	Good lighting efficiency	Good
Air tightness	(not tested)	

Primary Energy use

The primary energy use for this property per year is 71 kilowatt hour (kWh) per square metre

Estimated CO₂ emissions of the dwelling

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

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

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

Recommendations

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

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating
---------------------	-----------------------	--	-------------------------------	-----------------------------

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£850

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