

Summary for Input Data

Property Reference	Flat C - 3 New Close			Issued on Date	30/05/2024
Assessment Reference	New Build	Prop Type Ref	New Build		
Property	Flat C. 3. New Close				

SAP Rating	79 C	DER	6.93	TER	14.17
Environmental	96 A	% DER < TER			51.09
CO ₂ Emissions (t/year)	0.25	DFEE	26.93	TFEE	28.65
Compliance Check	See BREL	% DFEE < TFEE			6.02
% DPER < TPER	3.55	DPER	72.46	TPER	75.13

Assessor Details	Mr. Alexander Cotterill	Assessor ID	AV67-0001
Client			

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

Orientation	East
Property Tenture	ND
Transaction Type	6
Terrain Type	Urban
1.0 Property Type	Flat, Semi-Detached
Position of Flat	Mid-floor flat
Which Floor	2
2.0 Number of Storeys	1
3.0 Date Built	2024
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

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:	16.31 m	42.15 m ²	2.40 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	25.78	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
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	30.98	23.15	0.00	None	7.83	Enter Gross Area
Corridor Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	8.88	7.13	0.90	Stairwell Access Corridor 4	1.75	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 1	Filled Cavity with Edge Sealing	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	180.00	27.43	0.00	None		

9.2 Internal Walls				
Description	Construction	Kappa (kJ/m ² K)	Area (m ²)	
Internal Wall 1	Plasterboard on timber frame	9.00	80.40	

Summary for Input Data

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.14	9.00	6.00	6.00	None	0.00	Enter Gross Area	0.00
Semi Exposed Ceiling	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	12.76	12.76	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Timber I-joists, carpeted	20.00	23.39

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Timber I-joists, carpeted	20.00	42.15

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double glazed		Air Filled	0.76	Wood	0.70	1.40
Door	Manufacturer	Solid Door			Air Filled	0.00	Wood	0.70	1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Windows S	Windows	External Wall 1	South	3.67	0
Door E	Door	Corridor Wall	South	1.75	0
Windows N	Windows	External Wall 1	North	4.16	0

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)		6.93	0.00	0.00	No
E3 Sill		6.13	0.00	0.00	No
E4 Jamb		15.40	0.00	0.00	No
E7 Party floor between dwellings (in blocks of flats)		18.36	0.00	0.00	No
E14 Flat roof		5.07	0.00	0.00	No
E16 Corner (normal)		2.40	0.00	0.00	No
E18 Party wall between dwellings		12.00	0.00	0.00	No
E10 Eaves (insulation at ceiling level)		5.64	0.00	0.00	No
E17 Corner (inverted – internal area greater than external area)		2.40	0.00	0.00	No

Y-value W/m²K

Description

18.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Property Tested?

Test Method

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	95.00	12	1140	12

24.0 Main Heating 1

Percentage of Heat %

Database Ref. No.

Summary for Input Data

Fuel Type	Electricity
SAP Code	191
In Winter	100.00
In Summer	100.00
Controls SAP Code	2110
Delayed Start Stat	Yes
HETAS approved System	No
Oil Pump Inside	No
Fan Assisted Flue	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Boiler Interlock	Yes
Combi boiler type	No Combi

25.0 Main Heating 2	None
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26.0 Heat Networks	None
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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	Yes
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	Single
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
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
Shower	Vented hot water system	7.00		Yes	Instantaneous System 1

28.3 Waste Water Heat Recovery System Instantaneous System 1	
Database ID	80146
Brand Model	Recoup, Pipe HEX
Details	Year: 2019 + current Efficiency: 70.7 Utilisation factor: 0.972

29.0 Hot Water Cylinder	
Cylinder Stat	No
Cylinder In Heated Space	Yes
Independent Time Control	No
Insulation Type	Measured Loss
Cylinder Volume	120.00
Loss	1.00
In Airing Cupboard	No

Summary for Input Data

31.0 Thermal Store

None

32.0 Photovoltaic Unit

One Dwelling

Export Capable Meter? Yes

Connected To Dwelling Yes

Diverter Yes

Battery Capacity [kWh] 0.00

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.40	South	30°	None Or Little	No	No	1.00		

34.0 Small-scale Hydro

None

Electricity Generated 0.00

Apportioned 0.00 kWh/Year

Connected to dwelling's electricity meter Yes

Electricity Generation Annual

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

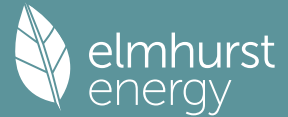
Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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Assessor Details	Mr. Alexander Cotterill					Assessor ID	AV67-0001
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	42.1500 (1b)	2.4000 (2b)	101.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	42.1500		101.1600 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 101.1600 (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	2 * 10 = 20.0000 (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) =	20.0000 / (5) = 0.1977 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4477 (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) = 0.3806 (21)

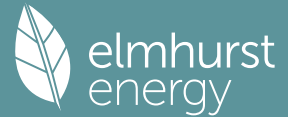
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4852	0.4757	0.4662	0.4186	0.4091	0.3615	0.3615	0.3520	0.3806	0.4091	0.4281	0.4471 (22b)
Effective ac	0.6177	0.6131	0.6087	0.5876	0.5837	0.5653	0.5653	0.5620	0.5724	0.5837	0.5916	0.6000 (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
Windows (Uw = 1.40)			7.8300	1.3258	10.3807		(27)
Door			1.7500	1.0000	1.7500		(26)
External Wall 1	30.9800	7.8300	23.1500	0.1800	4.1670	60.0000	1389.0000 (29a)
Corridor Wall	8.8800	1.7500	7.1300	0.1500	1.0695	9.0000	64.1700 (29a)
Flat Roof	6.0000		6.0000	0.1400	0.8400	9.0000	54.0000 (30)
Semi Exposed Ceiling	12.7600		12.7600	0.1100	1.4036	9.0000	114.8400 (30)
Total net area of external elements Aum(A, m ²)			58.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.6108		(33)
Party Wall 1			27.4300	0.0000	0.0000	180.0000	4937.4000 (32)
Party Floor 1			42.1500			30.0000	1264.5000 (32a)
Party Ceiling 1			23.3900			20.0000	467.8000 (32b)
Internal Wall 1			80.4000			9.0000	723.6000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		9015.3100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							213.8864 (35)
Thermal bridges (User defined value 0.040 * total exposed area)							2.3448 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	21.9556 (37)

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

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(38)m	Jan 20.6209	Feb 20.4683	Mar 20.3188	Apr 19.6162	May 19.4848	Jun 18.8729	Jul 18.8729	Aug 18.7596	Sep 19.1086	Oct 19.4848	Nov 19.7507	Dec 20.0287	(38)
Heat transfer coeff	42.5765	42.4239	42.2743	41.5718	41.4404	40.8285	40.8285	40.7152	41.0642	41.4404	41.7063	41.9843	(39)
Average = Sum(39)m / 12 =												41.5712	
HLP	Jan 1.0101	Feb 1.0065	Mar 1.0029	Apr 0.9863	May 0.9832	Jun 0.9686	Jul 0.9686	Aug 0.9660	Sep 0.9742	Oct 0.9832	Nov 0.9895	Dec 0.9961	(40)
HLP (average)												0.9863	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4646	(42)
Hot water usage for mixer showers	48.7756	48.0426	46.9745	44.9308	43.4226	41.7407	40.7847	41.8448	43.0068	44.8126	46.9002	48.5887	(42a)	
Hot water usage for baths	21.0983	20.7850	20.3438	19.5302	18.9210	18.2455	17.8806	18.3188	18.7958	19.5186	20.3490	21.0270	(42b)	
Hot water usage for other uses	29.6288	28.5514	27.4740	26.3965	25.3191	24.2417	24.2417	25.3191	26.3965	27.4740	28.5514	29.6288	(42c)	
Average daily hot water use (litres/day)												91.4662	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	99.5027	97.3790	94.7922	90.8575	87.6627	84.2279	82.9070	85.4827	88.1992	91.8052	95.8006	99.2445	(44)	
Energy content	157.5880	138.6664	145.6921	124.3794	118.0109	103.5681	100.2689	105.8454	108.7584	124.5788	136.4855	155.3930	(45)	
Energy content (annual)										Total = Sum(45)m =		1519.2348		
Distribution loss (46)m = 0.15 x (45)m														
	23.6382	20.8000	21.8538	18.6569	17.7016	15.5352	15.0403	15.8768	16.3138	18.6868	20.4728	23.3089	(46)	
Water storage loss:														
Store volume												120.0000	(47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.0000	(48)	
Temperature factor from Table 2b												0.6000	(49)	
Enter (49) or (54) in (55)												0.6000	(55)	
Total storage loss														
	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(56)	
If cylinder contains dedicated solar storage														
	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
	176.1880	155.4664	164.2921	142.3794	136.6109	121.5681	118.8689	124.4454	126.7584	143.1788	154.4855	173.9930	(62)	
WWHRS	-43.4337	-38.4131	-40.2240	-33.3070	-31.0410	-26.5620	-24.8976	-26.4761	-27.4820	-32.3983	-36.7033	-42.6293	(63a)	
PV diverter	-1.1834	-2.6298	-5.5133	-8.7746	-12.0253	-12.2536	-12.0823	-9.9208	-6.9828	-3.8618	-1.6102	-0.9214	(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	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1256.9079	(64)	
Electric shower(s)												1257	(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														
	67.2780	59.5466	63.3226	55.7562	54.1186	48.8364	48.2194	50.0736	50.5622	56.3025	59.7814	66.5482	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 73.2290	Feb 73.2290	Mar 73.2290	Apr 73.2290	May 73.2290	Jun 73.2290	Jul 73.2290	Aug 73.2290	Sep 73.2290	Oct 73.2290	Nov 73.2290	Dec 73.2290	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
65.0984	72.0732	65.0984	67.2684	65.0984	67.2684	65.0984	65.0984	67.2684	65.0984	67.2684	65.0984	65.0984	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
126.9762	128.2938	124.9735	117.9048	108.9820	100.5957	94.9932	93.6756	96.9959	104.0645	112.9874	121.3737	121.3737	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	(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)													
-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	(71)
Water heating gains (Table 5)													
90.4274	88.6110	85.1110	77.4391	72.7401	67.8283	64.8110	67.3032	70.2252	75.6754	83.0297	89.4464	89.4464	(72)
Total internal gains													
330.4708	336.9467	323.1516	310.5810	294.7892	280.6611	269.8713	271.0459	279.4582	292.8070	311.2542	323.8872	323.8872	(73)

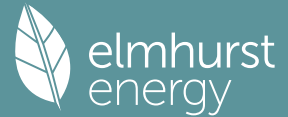
6. Solar gains

[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
North				4.1600	10.6334		0.7600		0.7000		0.7700		16.3083 (74)
South				3.6700	46.7521		0.7600		0.7000		0.7700		63.2575 (78)
Solar gains	79.5658	134.7655	184.9261	234.2171	270.0162	272.2486	260.6754	232.7922	201.5290	148.8409	95.1001	68.2557	(83)
Total gains	410.0366	471.7122	508.0777	544.7981	564.8053	552.9097	530.5468	503.8382	480.9873	441.6479	406.3543	392.1429	(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	58.8177	59.0293	59.2381	60.2392	60.4302	61.3359	61.3359	61.5065	60.9838	60.4302	60.0450	59.6474	
alpha	4.9212	4.9353	4.9492	5.0159	5.0287	5.0891	5.0891	5.1004	5.0656	5.0287	5.0030	4.9765	
util living area													
	0.9707	0.9440	0.8995	0.7988	0.6471	0.4670	0.3377	0.3702	0.5718	0.8238	0.9427	0.9753 (86)	

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MIT	20.0747	20.2967	20.5383	20.7985	20.9408	20.9908	20.9986	20.9977	20.9752	20.8003	20.4161	20.0427 (87)
Th 2	20.0749	20.0779	20.0809	20.0948	20.0974	20.1095	20.1095	20.1118	20.1049	20.0974	20.0921	20.0866 (88)
util rest of house												
	0.9637	0.9316	0.8784	0.7620	0.5942	0.4043	0.2698	0.2995	0.5040	0.7827	0.9279	0.9694 (89)
MIT 2	19.0261	19.3018	19.5952	19.9032	20.0502	20.1043	20.1090	20.1109	20.0890	19.9146	19.4643	18.9953 (90)
Living area fraction									fLA =	Living area /	(4) =	0.6116 (91)
MIT	19.6675	19.9103	20.1720	20.4508	20.5949	20.6465	20.6531	20.6533	20.6310	20.4563	20.0464	19.6359 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.5175	19.7603	20.0220	20.3008	20.4449	20.4965	20.5031	20.5033	20.4810	20.3063	19.8964	19.4859 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9586	0.9267	0.8769	0.7708	0.6151	0.4318	0.2999	0.3308	0.5331	0.7929	0.9242	0.9646	(94)
Useful gains	393.0620	437.1526	445.5331	419.9496	347.4178	238.7582	159.1125	166.6665	256.3907	350.1613	375.5706	378.2689	(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													
	647.9058	630.4327	571.6346	473.9513	362.3940	240.7461	159.3575	167.0677	262.0327	402.2333	533.6916	641.7691	(97)
Space heating kWh													
	189.6038	129.8842	93.8195	38.8812	11.1422	0.0000	0.0000	0.0000	0.0000	38.7416	113.8471	196.0441	(98a)
Space heating requirement - total per year (kWh/year)												811.9638	
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													
	189.6038	129.8842	93.8195	38.8812	11.1422	0.0000	0.0000	0.0000	0.0000	38.7416	113.8471	196.0441	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												811.9638	
Space heating per m2										(98c) / (4) =		19.2637	(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 %)													100.0000 (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													
	189.6038	129.8842	93.8195	38.8812	11.1422	0.0000	0.0000	0.0000	0.0000	38.7416	113.8471	196.0441	(98)
Space heating efficiency (main heating system 1)													
	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)													
	189.6038	129.8842	93.8195	38.8812	11.1422	0.0000	0.0000	0.0000	0.0000	38.7416	113.8471	196.0441	(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													
	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(64)
Efficiency of water heater (217)m													
	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month													
	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(219)
Space cooling fuel requirement													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa													
	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting													
	12.7841	10.2559	9.2343	6.7654	5.2258	4.2695	4.7671	6.1965	8.0487	10.5603	11.9278	13.1394	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
	-8.7070	-13.6484	-21.6548	-26.5160	-30.4107	-28.9377	-28.5695	-25.9214	-21.4672	-16.3010	-9.9794	-7.3752	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
	0.0046	-0.1456	-0.6885	-1.8888	-3.3644	-3.7900	-3.7360	-3.0104	-2.0667	-0.7773	-0.1135	0.0162	(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												811.9638	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												1256.9079	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												103.1747	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-259.0486	(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												1953.9979	(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	811.9638	0.1570	127.4870 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1256.9079	0.1417	178.0694 (264)
Space and water heating			305.5564 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	103.1747	0.1443	14.8913 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-239.4882	0.1328	-31.8141
PV Unit electricity exported	-19.5604	0.1148	-2.2463
Total			-34.0603 (269)
Total CO2, kg/year			292.0746 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.9300 (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	811.9638	1.5812	1283.9125 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1256.9079	1.5239	1915.3901 (278)
Space and water heating			3199.3027 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	103.1747	1.5338	158.2529 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-239.4882	1.4909	-357.0448
PV Unit electricity exported	-19.5604	0.4210	-8.2349
Total			-365.2798 (283)
Total Primary energy kWh/year			3054.3006 (286)
Dwelling Primary energy Rate (DPER)			72.4600 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.1500 (1b)	x 2.4000 (2b)	= 101.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	42.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 101.1600 (5)

2. Ventilation rate

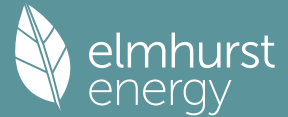
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (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 20.0000 / (5) = 0.1977 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4477 (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) = 0.3806 (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	0.4852	0.4757	0.4662	0.4186	0.4091	0.3615	0.3615	0.3520	0.3806	0.4091	0.4281	0.4471 (22b)
Effective ac	0.6177	0.6131	0.6087	0.5876	0.5837	0.5653	0.5653	0.5620	0.5724	0.5837	0.5916	0.6000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			1.7500	1.0000	1.7500		(26)
TER Opening Type (Uw = 1.20)			7.8300	1.1450	8.9656		(27)
External Wall 1	30.9800	7.8300	23.1500	0.1800	4.1670		(29a)
Corridor Wall	8.8800	1.7500	7.1300	0.1800	1.2834		(29a)
Flat Roof	6.0000		6.0000	0.1100	0.6600		(30)
Semi Exposed Ceiling	12.7600		12.7600	0.1100	1.4036		(30)

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Total net area of external elements Aum(A, m2)	58.6200			(31)
Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) =	18.2296		(33)
Party Wall 1	27.4300	0.0000	0.0000	(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 219.4356 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	6.9300	0.0500	0.3465
E2 Other lintels (including other steel lintels)	6.1300	0.0500	0.3065
E3 Sill	15.4000	0.0500	0.7700
E4 Jamb	18.3600	0.0700	1.2852
E7 Party floor between dwellings (in blocks of flats)	5.0700	0.0800	0.4056
E14 Flat roof	2.4000	0.0900	0.2160
E16 Corner (normal)	12.0000	0.0600	0.7200
E18 Party wall between dwellings	5.6400	0.0600	0.3384
E10 Eaves (insulation at ceiling level)	2.4000	-0.0900	-0.2160
E17 Corner (inverted - internal area greater than external area)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	4.1722	(36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	22.4018 (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	20.6209	20.4683	20.3188	19.6162	19.4848	18.8729	18.8729	18.7596	19.1086	19.4848	19.7507	20.0287
Average = Sum(39)m / 12 =	43.0228	42.8702	42.7206	42.0181	41.8867	41.2748	41.2748	41.1615	41.5105	41.8867	42.1526	42.4305
	42.0175											
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0207	1.0171	1.0135	0.9969	0.9938	0.9792	0.9792	0.9765	0.9848	0.9938	1.0001	1.0067
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4646 (42)
Hot water usage for mixer showers	48.7756	48.0426	46.9745	44.9308	43.4226	41.7407	40.7847	41.8448	43.0068	44.8126	46.9002	48.5887	(42a)
Hot water usage for baths	21.0983	20.7850	20.3438	19.5302	18.9210	18.2455	17.8806	18.3188	18.7958	19.5186	20.3490	21.0270	(42b)
Hot water usage for other uses	29.6288	28.5514	27.4740	26.3965	25.3191	24.2417	24.2417	25.3191	26.3965	27.4740	28.5514	29.6288	(42c)
Average daily hot water use (litres/day)													91.4662 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	99.5027	97.3790	94.7922	90.8575	87.6627	84.2279	82.9070	85.4827	88.1992	91.8052	95.8006	99.2445	(44)
Energy content (annual)	157.5880	138.6664	145.6921	124.3794	118.0109	103.5681	100.2689	105.8454	108.7584	124.5788	136.4855	155.3930	(45)
Distribution loss (46)m = 0.15 x (45)m	23.6382	20.8000	21.8538	18.6569	17.7016	15.5352	15.0403	15.8768	16.3138	18.6868	20.4728	23.3089	(46)
Water storage loss:													
Store volume													120.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.2247 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6613 (55)
Total storage loss	20.5007	18.5168	20.5007	19.8394	20.5007	19.8394	20.5007	20.5007	19.8394	20.5007	19.8394	20.5007	(56)
If cylinder contains dedicated solar storage	20.5007	18.5168	20.5007	19.8394	20.5007	19.8394	20.5007	20.5007	19.8394	20.5007	19.8394	20.5007	(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	201.3511	178.1943	189.4552	166.7308	161.7740	145.9194	144.0320	149.6085	151.1098	168.3420	178.8369	199.1561	(62)
WWHRS	-22.2982	-19.7207	-20.6504	-17.0993	-15.9360	-13.6365	-12.7821	-13.5924	-14.1089	-16.6328	-18.8429	-21.8852	(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	179.0529	158.4737	168.8048	149.6315	145.8381	132.2829	131.2499	136.0161	137.0009	151.7092	159.9939	177.2708	(64)
12Total per year (kWh/year)													1827.3247 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month	87.4085	77.7289	83.4531	75.2373	74.2491	68.3175	68.3499	70.2041	70.0433	76.4330	79.2625	86.6786	(65)

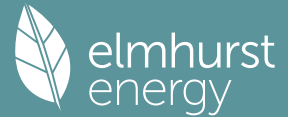
5. Internal gains (see Table 5 and 5a)

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	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	65.0984	72.0732	65.0984	67.2684	65.0984	67.2684	65.0984	65.0984	67.2684	65.0984	67.2684	65.0984	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	126.9762	128.2938	124.9735	117.9048	108.9820	100.5957	94.9932	93.6756	96.9959	104.0645	112.9874	121.3737	(68)
Pumps, fans	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	(69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Water heating gains (Table 5)	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	(71)
Total internal gains	117.4845	115.6681	112.1681	104.4962	99.7972	94.8854	91.8681	94.3603	97.2823	102.7325	110.0868	116.5035	(72)
	357.5279	364.0038	350.2087	337.6381	321.8463	307.7182	296.9284	298.1030	306.5153	319.8641	338.3113	350.9443	(73)

6. Solar gains

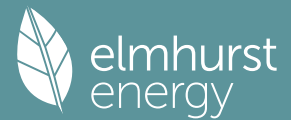
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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North	4.1600		10.6334		0.6300		0.7000		0.7700		13.5188 (74)	
South	3.6700		46.7521		0.6300		0.7000		0.7700		52.4371 (78)	
Solar gains	65.9559	111.7135	153.2940	194.1536	223.8292	225.6798	216.0862	192.9725	167.0570	123.3812	78.8330	56.5804 (83)
Total gains	423.4837	475.7173	503.5027	531.7918	545.6755	533.3980	513.0147	491.0755	473.5723	443.2454	417.1443	407.5247 (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	59.7178	59.9304	60.1402	61.1457	61.3376	62.2468	62.2468	62.4182	61.8934	61.3376	60.9506	60.5513
alpha	4.9812	4.9954	5.0093	5.0764	5.0892	5.1498	5.1498	5.1612	5.1262	5.0892	5.0634	5.0368
util living area	0.9692	0.9458	0.9069	0.8161	0.6717	0.4884	0.3529	0.3838	0.5858	0.8284	0.9409	0.9735 (86)
MIT	20.1095	20.3049	20.5287	20.7838	20.9331	20.9894	20.9984	20.9975	20.9738	20.8011	20.4385	20.0835 (87)
Th 2	20.0661	20.0691	20.0721	20.0859	20.0885	20.1007	20.1007	20.1029	20.0960	20.0885	20.0833	20.0778 (88)
util rest of house	0.9618	0.9335	0.8865	0.7799	0.6177	0.4226	0.2814	0.3099	0.5162	0.7871	0.9255	0.9670 (89)
MIT 2	19.0609	19.3036	19.5763	19.8799	20.0352	20.0946	20.1001	20.1020	20.0794	19.9073	19.4828	19.0375 (90)
Living area fraction	19.7023	19.9160	20.1588	20.4328	20.5844	20.6419	20.6495	20.6497	20.6264	20.4540	20.0673	19.6773 (92)
MIT	19.7023	19.9160	20.1588	20.4328	20.5844	20.6419	20.6495	20.6497	20.6264	20.4540	20.0673	19.6773 (93)
Temperature adjustment												0.0000
adjusted MIT	19.7023	19.9160	20.1588	20.4328	20.5844	20.6419	20.6495	20.6497	20.6264	20.4540	20.0673	19.6773 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9583	0.9312	0.8886	0.7943	0.6477	0.4625	0.3251	0.3551	0.5576	0.8046	0.9252	0.9636 (94)
Useful gains	405.8400	442.9728	447.3941	422.4044	353.4476	246.7072	166.7925	174.3767	264.0709	356.6399	385.9449	392.7109 (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	662.6478	643.7373	583.5115	484.5843	372.1376	249.3790	167.1425	174.9245	270.9138	412.7508	546.6043	656.7100 (97)
Space heating kWh	191.0650	134.9137	101.2713	44.7695	13.9053	0.0000	0.0000	0.0000	0.0000	41.7465	115.6747	196.4153 (98a)
Space heating requirement - total per year (kWh/year)												839.7615
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	191.0650	134.9137	101.2713	44.7695	13.9053	0.0000	0.0000	0.0000	0.0000	41.7465	115.6747	196.4153 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												839.7615
Space heating per m2										(98c) / (4) =		19.9232 (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	191.0650	134.9137	101.2713	44.7695	13.9053	0.0000	0.0000	0.0000	0.0000	41.7465	115.6747	196.4153 (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)	207.0043	146.1687	109.7197	48.5044	15.0654	0.0000	0.0000	0.0000	0.0000	45.2292	125.3247	212.8010 (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	179.0529	158.4737	168.8048	149.6315	145.8381	132.2829	131.2499	136.0161	137.0009	151.7092	159.9939	177.2708 (64)
Efficiency of water heater (217)m	84.2057	83.7010	82.9525	81.7071	80.5103	79.8000	79.8000	79.8000	79.8000	81.5843	83.3445	79.8000 (216)
Fuel for water heating, kWh/month	212.6376	189.3331	203.4957	183.1316	181.1421	165.7681	164.4736	170.4462	171.6803	185.9538	191.9669	84.2903 (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	13.5262	10.8512	9.7703	7.1581	5.5292	4.5174	5.0439	6.5562	8.5159	11.1733	12.6202	13.9021 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-14.6138	-21.4158	-31.9989	-37.4721	-41.7465	-39.4993	-39.0576	-36.2287	-31.4331	-25.1855	-16.3669	-12.5444 (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	-5.9581	-12.7404	-25.6959	-39.1289	-52.2388	-52.6312	-51.9708	-43.7408	-31.7439	-18.3509	-8.0008	-4.6933 (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												909.8174 (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												2230.3389 (219)

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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)	109.1639 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-694.4565 (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	2640.8638 (238)

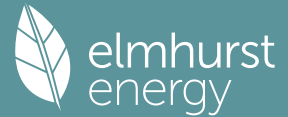
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	909.8174	0.2100	191.0617 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2230.3389	0.2100	468.3712 (264)
Space and water heating			659.4328 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	109.1639	0.1443	15.7557 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-347.5628	0.1337	-46.4826
PV Unit electricity exported	-346.8937	0.1255	-43.5398
Total			-90.0224 (269)
Total CO2, kg/year			597.0954 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.1700 (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	909.8174	1.1300	1028.0937 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2230.3389	1.1300	2520.2829 (278)
Space and water heating			3548.3766 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	109.1639	1.5338	167.4392 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-347.5628	1.4942	-519.3379
PV Unit electricity exported	-346.8937	0.4607	-159.8155
Total			-679.1534 (283)
Total Primary energy kWh/year			3166.7633 (286)
Target Primary Energy Rate (TPER)			75.1300 (287)

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Property Reference	Flat C - 3 New Close				Issued on Date	30/05/2024	
Assessment Reference	New Build			Prop Type Ref	New Build		
Property	Flat C, 3, New Close						
SAP Rating	79 C	DER	6.93	TER	14.17		
Environmental	96 A	% DER < TER				51.09	
CO ₂ Emissions (t/year)	0.25	DFEE	26.93	TFEE	28.65		
Compliance Check	See BREL	% DFEE < TFEE				6.02	
% DPER < TPER	3.55	DPER	72.46	TPER	75.13		
Assessor Details	Mr. Alexander Cotterill				Assessor ID	AV67-0001	
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	42.1500 (1b)	2.4000 (2b)	101.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	42.1500		101.1600 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	101.1600 (5)

2. Ventilation rate

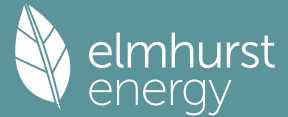
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (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)	20.0000 / (5) = 0.1977 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4477 (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) = 0.3806 (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	0.4852	0.4757	0.4662	0.4186	0.4091	0.3615	0.3615	0.3520	0.3806	0.4091	0.4281	0.4471 (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	0.6177	0.6131	0.6087	0.5876	0.5837	0.5653	0.5653	0.5620	0.5724	0.5837	0.5916	0.6000 (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
Windows (Uw = 1.40)			7.8300	1.3258	10.3807		(27)
Door			1.7500	1.0000	1.7500		(26)
External Wall 1	30.9800	7.8300	23.1500	0.1800	4.1670	60.0000	1389.0000 (29a)
Corridor Wall	8.8800	1.7500	7.1300	0.1500	1.0695	9.0000	64.1700 (29a)
Flat Roof	6.0000		6.0000	0.1400	0.8400	9.0000	54.0000 (30)
Semi Exposed Ceiling	12.7600		12.7600	0.1100	1.4036	9.0000	114.8400 (30)
Total net area of external elements Aum(A, m ²)			58.6200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.6108		(33)
Party Wall 1			27.4300	0.0000	0.0000	180.0000	4937.4000 (32)
Party Floor 1			42.1500			30.0000	1264.5000 (32a)
Party Ceiling 1			23.3900			30.0000	701.7000 (32b)
Internal Wall 1			80.4000			9.0000	723.6000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		9249.2100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							219.4356 (35)
Thermal bridges (User defined value 0.040 * total exposed area)							2.3448 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		21.9556 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	20.6209	20.4683	20.3188	19.6162	19.4848	18.8729	18.8729	18.7596	19.1086	19.4848	19.7507	20.0287	(38)
Heat transfer coeff	42.5765	42.4239	42.2743	41.5718	41.4404	40.8285	40.8285	40.7152	41.0642	41.4404	41.7063	41.9843	(39)
Average = Sum(39)m / 12 =												41.5712	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0101	1.0065	1.0029	0.9863	0.9832	0.9686	0.9686	0.9660	0.9742	0.9832	0.9895	0.9961	(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													1.4646 (42)
Hot water usage for mixer showers													(42a)
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	
Hot water usage for baths													(42b)
21.0983	20.7850	20.3438	19.5302	18.9210	18.2455	17.8806	18.3188	18.7958	19.5186	20.3490	21.0270	21.0270	
Hot water usage for other uses													(42c)
29.6288	28.5514	27.4740	26.3965	25.3191	24.2417	24.2417	25.3191	26.3965	27.4740	28.5514	29.6288	29.6288	
Average daily hot water use (litres/day)												46.4967	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
50.7271	49.3364	47.8177	45.9267	44.2401	42.4872	42.1223	43.6379	45.1924	46.9926	48.9003	50.6558	50.6558	(44)
Energy conte	80.3394	70.2543	73.4940	62.8714	59.5557	52.2430	50.9433	54.0328	55.7267	63.7685	69.6675	79.3147	(45)
Energy content (annual)												772.2113	
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
68.2884	59.7162	62.4699	53.4407	50.6223	44.4065	43.3018	45.9279	47.3677	54.2032	59.2174	67.4175	67.4175	(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	68.2884	59.7162	62.4699	53.4407	50.6223	44.4065	43.3018	45.9279	47.3677	54.2032	59.2174	67.4175	(64)
12Total per year (kWh/year)												656.3796	(64)
Electric shower(s)	39.0611	34.8038	38.0044	36.2671	36.9477	35.2445	36.4193	36.9477	36.2671	38.0044	37.2898	39.0611	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												444.3182	(64a)
Heat gains from water heating, kWh/month	26.8374	23.6300	25.1186	22.4270	21.8925	19.9128	19.9303	20.7189	20.9087	23.0519	24.1268	26.6197	(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	
73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
65.0984	72.0732	65.0984	67.2684	65.0984	67.2684	65.0984	65.0984	65.0984	67.2684	65.0984	67.2684	65.0984	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
126.9762	128.2938	124.9735	117.9048	108.9820	100.5957	94.9932	93.6756	96.9959	104.0645	112.9874	121.3737	121.3737	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	(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)													
-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	(71)
Water heating gains (Table 5)													
36.0718	35.1637	33.7615	31.1485	29.4254	27.6566	26.7880	27.8480	29.0399	30.9838	33.5094	35.7791	35.7791	(72)
Total internal gains	273.1151	280.4994	268.8021	261.2904	248.4745	240.4894	231.8483	231.5907	238.2729	245.1154	258.7339	267.2199	(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	
North					4.1600	10.6334		0.7600	0.7000	0.7700		16.3083 (74)	
South					3.6700	46.7521		0.7600	0.7000	0.7700		63.2575 (78)	
Solar gains	79.5658	134.7655	184.9261	234.2171	270.0162	272.2486	260.6754	232.7922	201.5290	148.8409	95.1001	68.2557	(83)
Total gains	352.6809	415.2649	453.7282	495.5075	518.4907	512.7380	492.5237	464.3829	439.8019	393.9563	353.8340	335.4756	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
60.3438	60.5608	60.7751	61.8021	61.9981	62.9272	62.9272	63.1023	62.5660	61.9981	61.6028	61.1949	61.1949	
alpha	5.0229	5.0374	5.0517	5.1201	5.1332	5.1951	5.1951	5.2068	5.1711	5.1332	5.1069	5.0797	
util living area	0.9849	0.9664	0.9322	0.8428	0.6936	0.5020	0.3635	0.4012	0.6190	0.8721	0.9671	0.9878	(86)
MIT	19.9464	20.1832	20.4487	20.7514	20.9250	20.9885	20.9982	20.9971	20.9676	20.7453	20.3089	19.9135	(87)
Th 2	20.0749	20.0779	20.0809	20.0948	20.0974	20.1095	20.1095	20.1118	20.1049	20.0974	20.0921	20.0866	(88)

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util rest of house	0.9809	0.9581	0.9159	0.8093	0.6400	0.4353	0.2906	0.3248	0.5480	0.8365	0.9575	0.9846 (89)	
MIT 2	19.1314	19.3646	19.6208	19.9073	20.0502	20.1044	20.1091	20.1109	20.0885	19.9109	19.5013	19.1084 (90)	
Living area fraction									FLA = Living area / (4) =				0.6116 (91)
MIT	19.6299	19.8653	20.1272	20.4236	20.5853	20.6452	20.6529	20.6529	20.6262	20.4213	19.9952	19.6008 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.6299	19.8653	20.1272	20.4236	20.5853	20.6452	20.6529	20.6529	20.6262	20.4213	19.9952	19.6008 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9786	0.9558	0.9168	0.8222	0.6697	0.4757	0.3352	0.3715	0.5901	0.8503	0.9563	0.9825	(94)
Useful gains	345.1327	396.9253	415.9781	407.3871	347.2189	243.9154	165.0932	172.5195	259.5127	334.9691	338.3670	329.6072	(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	652.6924	634.8850	576.0795	479.0566	368.2084	246.8151	165.4738	173.1592	267.9919	406.9972	537.8129	646.5926	(97)
Space heating kWh	228.8244	159.9089	119.1154	51.6021	15.6162	0.0000	0.0000	0.0000	0.0000	53.5889	143.6010	235.8371	(98a)
Space heating requirement - total per year (kWh/year)												1008.0940	
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	228.8244	159.9089	119.1154	51.6021	15.6162	0.0000	0.0000	0.0000	0.0000	53.5889	143.6010	235.8371	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1008.0940	
Space heating per m2												23.9168	(99)
											(98c) / (4) =		

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	383.7882	302.1311	309.4357	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9560	0.9800	0.9722	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	366.9117	296.1010	300.8422	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	576.2517	553.9527	522.3007	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	150.7248	191.8417	164.7651	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									FC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	37.6812	47.9604	41.1913	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												126.8329 (107)
Energy for space heating												23.9168 (99)
Energy for space cooling												3.0091 (108)
Total												26.9259 (109)
Fabric Energy Efficiency (DFEE)												26.9 (109)

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

1. Overall dwelling characteristics

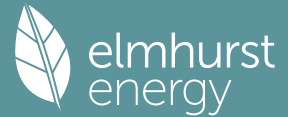
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	42.1500 (1b)	x 2.4000 (2b)	= 101.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	42.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 101.1600 (5)

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	2 * 10 = 20.0000 (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) = 20.0000 / (5) = 0.1977 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4477 (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) = 0.3806 (21)

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

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Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.4852	0.4757	0.4662	0.4186	0.4091	0.3615	0.3615	0.3520	0.3806	0.4091	0.4281	0.4471 (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	0.6177	0.6131	0.6087	0.5876	0.5837	0.5653	0.5653	0.5620	0.5724	0.5837	0.5916	0.6000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			1.7500	1.0000	1.7500		(26)
TER Opening Type (Uw = 1.20)			7.8300	1.1450	8.9656		(27)
External Wall 1	30.9800	7.8300	23.1500	0.1800	4.1670		(29a)
Corridor Wall	8.8800	1.7500	7.1300	0.1800	1.2834		(29a)
Flat Roof	6.0000		6.0000	0.1100	0.6600		(30)
Semi Exposed Ceiling	12.7600		12.7600	0.1100	1.4036		(30)
Total net area of external elements Aum(A, m ²)			58.6200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.2296		(31)
Party Wall 1			27.4300	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K

219.4356 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.9300	0.0500	0.3465
E3 Sill	6.1300	0.0500	0.3065
E4 Jamb	15.4000	0.0500	0.7700
E7 Party floor between dwellings (in blocks of flats)	18.3600	0.0700	1.2852
E14 Flat roof	5.0700	0.0800	0.4056
E16 Corner (normal)	2.4000	0.0900	0.2160
E18 Party wall between dwellings	12.0000	0.0600	0.7200
E10 Eaves (insulation at ceiling level)	5.6400	0.0600	0.3384
E17 Corner (inverted - internal area greater than external area)	2.4000	-0.0900	-0.2160

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	22.4018 (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	20.6209	20.4683	20.3188	19.6162	19.4848	18.8729	18.8729	18.7596	19.1086	19.4848	19.7507	20.0287 (38)
Heat transfer coeff	43.0228	42.8702	42.7206	42.0181	41.8867	41.2748	41.2748	41.1615	41.5105	41.8867	42.1526	42.4305 (39)
Average = Sum(39)m / 12 =												42.0175

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0207	1.0171	1.0135	0.9969	0.9938	0.9792	0.9792	0.9765	0.9848	0.9938	1.0001	1.0067 (40)
HLP (average)												0.9969
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4646 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	21.0983	20.7850	20.3438	19.5302	18.9210	18.2455	17.8806	18.3188	18.7958	19.5186	20.3490	21.0270 (42b)
Hot water usage for other uses	29.6288	28.5514	27.4740	26.3965	25.3191	24.2417	24.2417	25.3191	26.3965	27.4740	28.5514	29.6288 (42c)
Average daily hot water use (litres/day)												46.4967 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	50.7271	49.3364	47.8177	45.9267	44.2401	42.4872	42.1223	43.6379	45.1924	46.9926	48.9003	50.6558 (44)
Energy conte	80.3394	70.2543	73.4940	62.8714	59.5557	52.2430	50.9433	54.0328	55.7267	63.7685	69.6675	79.3147 (45)
Energy content (annual)												772.2113
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)

Water storage loss:

Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)

Total heat required for water heating calculated for each month

WWHRS	68.2884	59.7162	62.4699	53.4407	50.6223	44.4065	43.3018	45.9279	47.3677	54.2032	59.2174	67.4175 (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	68.2884	59.7162	62.4699	53.4407	50.6223	44.4065	43.3018	45.9279	47.3677	54.2032	59.2174	67.4175 (64)

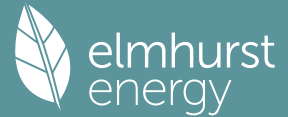
12Total per year (kWh/year)

Electric shower(s)	39.0611	34.8038	38.0044	36.2671	36.9477	35.2445	36.4193	36.9477	36.2671	38.0044	37.2898	39.0611 (64a)
Heat gains from water heating, kWh/month	26.8374	23.6300	25.1186	22.4270	21.8925	19.9128	19.9303	20.7189	20.9087	23.0519	24.1268	26.6197 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.0984	72.0732	65.0984	67.2684	65.0984	67.2684	65.0984	65.0984	67.2684	65.0984	67.2684	65.0984 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	126.9762	128.2938	124.9735	117.9048	108.9820	100.5957	94.9932	93.6756	96.9959	104.0645	112.9874	121.3737 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229 (69)

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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)	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832 (71)
Water heating gains (Table 5)	36.0718	35.1637	33.7615	31.1485	29.4254	27.6566	26.7880	27.8480	29.0399	30.9838	33.5094	35.7791 (72)
Total internal gains	273.1151	280.4994	268.8021	261.2904	248.4745	240.4894	231.8483	231.5907	238.2729	245.1154	258.7339	267.2199 (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
North				4.1600	10.6334	0.6300	0.7000			0.7700			13.5188 (74)
South				3.6700	46.7521	0.6300	0.7000			0.7700			52.4371 (78)
Solar gains	65.9559	111.7135	153.2940	194.1536	223.8292	225.6798	216.0862	192.9725	167.0570	123.3812	78.8330		56.5804 (83)
Total gains	339.0710	392.2130	422.0961	455.4441	472.3037	466.1692	447.9345	424.5632	405.3298	368.4967	337.5669		323.8003 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	59.7178	59.9304	60.1402	61.1457	61.3376	62.2468	62.2468	62.4182	61.8934	61.3376	60.9506	60.5513
alpha	4.9812	4.9954	5.0093	5.0764	5.0892	5.1498	5.1498	5.1612	5.1262	5.0892	5.0634	5.0368
util living area	0.9873	0.9735	0.9482	0.8778	0.7463	0.5531	0.4031	0.4421	0.6670	0.8971	0.9731	0.9897 (86)
MIT	19.8908	20.1078	20.3654	20.6844	20.8922	20.9815	20.9970	20.9952	20.9532	20.6947	20.2526	19.8624 (87)
Th 2	20.0661	20.0691	20.0721	20.0859	20.0885	20.1007	20.1007	20.1029	20.0960	20.0885	20.0833	20.0778 (88)
util rest of house	0.9839	0.9666	0.9349	0.8483	0.6933	0.4808	0.3219	0.3578	0.5936	0.8657	0.9649	0.9869 (89)
MIT 2	19.0698	19.2847	19.5359	19.8429	20.0190	20.0922	20.0998	20.1015	20.0718	19.8605	19.4401	19.0511 (90)
Living area fraction	19.5719	19.7881	20.0432	20.3576	20.5531	20.6361	20.6485	20.6481	20.6109	20.3707	19.9371	19.5473 (92)
MIT	19.5719	19.7881	20.0432	20.3576	20.5531	20.6361	20.6485	20.6481	20.6109	20.3707	19.9371	19.5473 (93)
Temperature adjustment												0.0000
adjusted MIT	19.5719	19.7881	20.0432	20.3576	20.5531	20.6361	20.6485	20.6481	20.6109	20.3707	19.9371	19.5473 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9817	0.9642	0.9344	0.8577	0.7212	0.5244	0.3716	0.4094	0.6364	0.8763	0.9634	0.9849 (94)
Ext temp.	332.8713	378.1768	394.4119	390.6348	340.6412	244.4364	166.4484	173.7981	257.9632	322.9179	325.2164	318.9052 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	657.0409	638.2564	578.5751	481.4251	370.8260	249.1405	167.1030	174.8589	270.2689	409.2618	541.1149	651.1950 (97)
Space heating requirement - total per year (kWh/year)	241.1822	174.7735	137.0174	65.3690	22.4574	0.0000	0.0000	0.0000	0.0000	64.2399	155.4469	247.2236 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	241.1822	174.7735	137.0174	65.3690	22.4574	0.0000	0.0000	0.0000	0.0000	64.2399	155.4469	247.2236 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1107.7099
Space heating per m2										(98c) / (4) =		26.2802 (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
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	387.9831	305.4335	312.8273	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9335	0.9682	0.9574	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	362.1841	295.7067	299.5145	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	521.8206	501.8354	475.7582	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction		0.0000	0.0000	0.0000	0.0000	114.9383	153.3598	131.1253	0.0000	0.0000	0.0000	0.0000 (104)
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	28.7346	38.3399	32.7813	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												99.8558 (107)
Energy for space heating												26.2802 (99)
Energy for space cooling												2.3691 (108)
Total												28.6492 (109)
Fabric Energy Efficiency (TFEE)												28.6 (109)

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Property Reference	Flat C - 3 New Close				Issued on Date	30/05/2024
Assessment Reference	New Build		Prop Type Ref	New Build		
Property	Flat C, 3, New Close					
SAP Rating	79 C	DER	6.93	TER	14.17	
Environmental	96 A	% DER < TER				51.09
CO ₂ Emissions (t/year)	0.25	DFEE	26.93	TFEE	28.65	
Compliance Check	See BREL	% DFEE < TFEE				6.02
% DPER < TPER	3.55	DPER	72.46	TPER	75.13	
Assessor Details	Mr. Alexander Cotterill				Assessor ID	AV67-0001
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	42.1500	2.4000	101.1600
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	42.1500		
Dwelling volume			101.1600

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	2 * 10 = 20.0000 (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) =	20.0000 / (5) =	0.1977 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	5.0000		(17)
Infiltration rate	0.4477		(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) =	0.3806	(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	0.4852	0.4757	0.4662	0.4186	0.4091	0.3615	0.3615	0.3520	0.3806	0.4091	0.4281	0.4471 (22b)
Effective ac	0.6177	0.6131	0.6087	0.5876	0.5837	0.5653	0.5653	0.5620	0.5724	0.5837	0.5916	0.6000 (25)

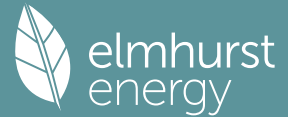
3. Heat losses and heat loss parameter

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
Windows (U _w = 1.40)			7.8300	1.3258	10.3807		(27)
Door			1.7500	1.0000	1.7500		(26)
External Wall 1	30.9800	7.8300	23.1500	0.1800	4.1670	60.0000	1389.0000 (29a)
Corridor Wall	8.8800	1.7500	7.1300	0.1500	1.0695	9.0000	64.1700 (29a)
Flat Roof	6.0000		6.0000	0.1400	0.8400	9.0000	54.0000 (30)
Semi Exposed Ceiling	12.7600		12.7600	0.1100	1.4036	9.0000	114.8400 (30)
Total net area of external elements A _{um} (A, m ²)			58.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.6108		(33)
Party Wall 1			27.4300	0.0000	0.0000	180.0000	4937.4000 (32)
Party Floor 1			42.1500			30.0000	1264.5000 (32a)
Party Ceiling 1			23.3900			20.0000	467.8000 (32b)
Internal Wall 1			80.4000			9.0000	723.6000 (32c)

Heat capacity C _m = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9015.3100	(34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K		213.8864	(35)
Thermal bridges (User defined value 0.040 * total exposed area)		2.3448	(36)
Point Thermal bridges	(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =	21.9556	(37)

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

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(38)m	Jan 20.6209	Feb 20.4683	Mar 20.3188	Apr 19.6162	May 19.4848	Jun 18.8729	Jul 18.8729	Aug 18.7596	Sep 19.1086	Oct 19.4848	Nov 19.7507	Dec 20.0287	(38)
Heat transfer coeff	42.5765	42.4239	42.2743	41.5718	41.4404	40.8285	40.8285	40.7152	41.0642	41.4404	41.7063	41.9843	(39)
Average = Sum(39)m / 12 =												41.5712	
HLP	Jan 1.0101	Feb 1.0065	Mar 1.0029	Apr 0.9863	May 0.9832	Jun 0.9686	Jul 0.9686	Aug 0.9660	Sep 0.9742	Oct 0.9832	Nov 0.9895	Dec 0.9961	(40)
HLP (average)												0.9863	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4646	(42)
Hot water usage for mixer showers	48.7756	48.0426	46.9745	44.9308	43.4226	41.7407	40.7847	41.8448	43.0068	44.8126	46.9002	48.5887	(42a)	
Hot water usage for baths	21.0983	20.7850	20.3438	19.5302	18.9210	18.2455	17.8806	18.3188	18.7958	19.5186	20.3490	21.0270	(42b)	
Hot water usage for other uses	29.6288	28.5514	27.4740	26.3965	25.3191	24.2417	24.2417	25.3191	26.3965	27.4740	28.5514	29.6288	(42c)	
Average daily hot water use (litres/day)												91.4662	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	99.5027	97.3790	94.7922	90.8575	87.6627	84.2279	82.9070	85.4827	88.1992	91.8052	95.8006	99.2445	(44)	
Energy content	157.5880	138.6664	145.6921	124.3794	118.0109	103.5681	100.2689	105.8454	108.7584	124.5788	136.4855	155.3930	(45)	
Energy content (annual)										Total = Sum(45)m =		1519.2348		
Distribution loss (46)m = 0.15 x (45)m														
	23.6382	20.8000	21.8538	18.6569	17.7016	15.5352	15.0403	15.8768	16.3138	18.6868	20.4728	23.3089	(46)	
Water storage loss:														
Store volume												120.0000	(47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.0000	(48)	
Temperature factor from Table 2b												0.6000	(49)	
Enter (49) or (54) in (55)												0.6000	(55)	
Total storage loss														
	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(56)	
If cylinder contains dedicated solar storage														
	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
	176.1880	155.4664	164.2921	142.3794	136.6109	121.5681	118.8689	124.4454	126.7584	143.1788	154.4855	173.9930	(62)	
WWHRS	-43.4337	-38.4131	-40.2240	-33.3070	-31.0410	-26.5620	-24.8976	-26.4761	-27.4820	-32.3983	-36.7033	-42.6293	(63a)	
PV diverter	-1.1834	-2.6298	-5.5133	-8.7746	-12.0253	-12.2536	-12.0823	-9.9208	-6.9828	-3.8618	-1.6102	-0.9214	(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	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1256.9079	(64)	
Electric shower(s)												1257	(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														
	67.2780	59.5466	63.3226	55.7562	54.1186	48.8364	48.2194	50.0736	50.5622	56.3025	59.7814	66.5482	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 73.2290	Feb 73.2290	Mar 73.2290	Apr 73.2290	May 73.2290	Jun 73.2290	Jul 73.2290	Aug 73.2290	Sep 73.2290	Oct 73.2290	Nov 73.2290	Dec 73.2290	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
65.0984	72.0732	65.0984	67.2684	65.0984	67.2684	65.0984	65.0984	67.2684	65.0984	67.2684	65.0984	65.0984	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
126.9762	128.2938	124.9735	117.9048	108.9820	100.5957	94.9932	93.6756	96.9959	104.0645	112.9874	121.3737	121.3737	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	(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)													
-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	(71)
Water heating gains (Table 5)													
90.4274	88.6110	85.1110	77.4391	72.7401	67.8283	64.8110	67.3032	70.2252	75.6754	83.0297	89.4464	89.4464	(72)
Total internal gains													
330.4708	336.9467	323.1516	310.5810	294.7892	280.6611	269.8713	271.0459	279.4582	292.8070	311.2542	323.8872	323.8872	(73)

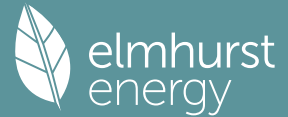
6. Solar gains

[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
North				4.1600	10.6334		0.7600		0.7000		0.7700		16.3083 (74)
South				3.6700	46.7521		0.7600		0.7000		0.7700		63.2575 (78)
Solar gains	79.5658	134.7655	184.9261	234.2171	270.0162	272.2486	260.6754	232.7922	201.5290	148.8409	95.1001	68.2557	(83)
Total gains	410.0366	471.7122	508.0777	544.7981	564.8053	552.9097	530.5468	503.8382	480.9873	441.6479	406.3543	392.1429	(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	58.8177	59.0293	59.2381	60.2392	60.4302	61.3359	61.3359	61.5065	60.9838	60.4302	60.0450	59.6474	
alpha	4.9212	4.9353	4.9492	5.0159	5.0287	5.0891	5.0891	5.1004	5.0656	5.0287	5.0030	4.9765	
util living area													
	0.9707	0.9440	0.8995	0.7988	0.6471	0.4670	0.3377	0.3702	0.5718	0.8238	0.9427	0.9753 (86)	

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MIT	20.0747	20.2967	20.5383	20.7985	20.9408	20.9908	20.9986	20.9977	20.9752	20.8003	20.4161	20.0427 (87)
Th 2	20.0749	20.0779	20.0809	20.0948	20.0974	20.1095	20.1095	20.1118	20.1049	20.0974	20.0921	20.0866 (88)
util rest of house												
	0.9637	0.9316	0.8784	0.7620	0.5942	0.4043	0.2698	0.2995	0.5040	0.7827	0.9279	0.9694 (89)
MIT 2	19.0261	19.3018	19.5952	19.9032	20.0502	20.1043	20.1090	20.1109	20.0890	19.9146	19.4643	18.9953 (90)
Living area fraction									fLA =	Living area /	(4) =	0.6116 (91)
MIT	19.6675	19.9103	20.1720	20.4508	20.5949	20.6465	20.6531	20.6533	20.6310	20.4563	20.0464	19.6359 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.5175	19.7603	20.0220	20.3008	20.4449	20.4965	20.5031	20.5033	20.4810	20.3063	19.8964	19.4859 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9586	0.9267	0.8769	0.7708	0.6151	0.4318	0.2999	0.3308	0.5331	0.7929	0.9242	0.9646	(94)
Useful gains	393.0620	437.1526	445.5331	419.9496	347.4178	238.7582	159.1125	166.6665	256.3907	350.1613	375.5706	378.2689	(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													
	647.9058	630.4327	571.6346	473.9513	362.3940	240.7461	159.3575	167.0677	262.0327	402.2333	533.6916	641.7691	(97)
Space heating kWh	189.6038	129.8842	93.8195	38.8812	11.1422	0.0000	0.0000	0.0000	0.0000	38.7416	113.8471	196.0441	(98a)
Space heating requirement - total per year (kWh/year)												811.9638	
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	189.6038	129.8842	93.8195	38.8812	11.1422	0.0000	0.0000	0.0000	0.0000	38.7416	113.8471	196.0441	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												811.9638	
Space heating per m2										(98c) / (4) =		19.2637	(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 %)													100.0000 (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	189.6038	129.8842	93.8195	38.8812	11.1422	0.0000	0.0000	0.0000	0.0000	38.7416	113.8471	196.0441	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	189.6038	129.8842	93.8195	38.8812	11.1422	0.0000	0.0000	0.0000	0.0000	38.7416	113.8471	196.0441	(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	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	12.7841	10.2559	9.2343	6.7654	5.2258	4.2695	4.7671	6.1965	8.0487	10.5603	11.9278	13.1394	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-8.7070	-13.6484	-21.6548	-26.5160	-30.4107	-28.9377	-28.5695	-25.9214	-21.4672	-16.3010	-9.9794	-7.3752	(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	0.0046	-0.1456	-0.6885	-1.8888	-3.3644	-3.7900	-3.7360	-3.0104	-2.0667	-0.7773	-0.1135	0.0162	(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												811.9638	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												1256.9079	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												103.1747	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-259.0486	(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												1953.9979	(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	811.9638	0.1570	127.4870 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1256.9079	0.1417	178.0694 (264)
Space and water heating			305.5564 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	103.1747	0.1443	14.8913 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-239.4882	0.1328	-31.8141
PV Unit electricity exported	-19.5604	0.1148	-2.2463
Total			-34.0603 (269)
Total CO2, kg/year			292.0746 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.9300 (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	811.9638	1.5812	1283.9125 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1256.9079	1.5239	1915.3901 (278)
Space and water heating			3199.3027 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	103.1747	1.5338	158.2529 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-239.4882	1.4909	-357.0448
PV Unit electricity exported	-19.5604	0.4210	-8.2349
Total			-365.2798 (283)
Total Primary energy kWh/year			3054.3006 (286)
Dwelling Primary energy Rate (DPER)			72.4600 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.1500 (1b)	x 2.4000 (2b)	= 101.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	42.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 101.1600 (5)

2. Ventilation rate

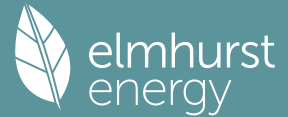
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (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 20.0000 / (5) = 0.1977 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4477 (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) = 0.3806 (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	0.4852	0.4757	0.4662	0.4186	0.4091	0.3615	0.3615	0.3520	0.3806	0.4091	0.4281	0.4471 (22b)
Effective ac	0.6177	0.6131	0.6087	0.5876	0.5837	0.5653	0.5653	0.5620	0.5724	0.5837	0.5916	0.6000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			1.7500	1.0000	1.7500		(26)
TER Opening Type (Uw = 1.20)			7.8300	1.1450	8.9656		(27)
External Wall 1	30.9800	7.8300	23.1500	0.1800	4.1670		(29a)
Corridor Wall	8.8800	1.7500	7.1300	0.1800	1.2834		(29a)
Flat Roof	6.0000		6.0000	0.1100	0.6600		(30)
Semi Exposed Ceiling	12.7600		12.7600	0.1100	1.4036		(30)

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Total net area of external elements Aum(A, m2)	58.6200			(31)
Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) =	18.2296		(33)
Party Wall 1	27.4300	0.0000	0.0000	(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 219.4356 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	6.9300	0.0500	0.3465
E2 Other lintels (including other steel lintels)	6.1300	0.0500	0.3065
E3 Sill	15.4000	0.0500	0.7700
E4 Jamb	18.3600	0.0700	1.2852
E7 Party floor between dwellings (in blocks of flats)	5.0700	0.0800	0.4056
E14 Flat roof	2.4000	0.0900	0.2160
E16 Corner (normal)	12.0000	0.0600	0.7200
E18 Party wall between dwellings	5.6400	0.0600	0.3384
E10 Eaves (insulation at ceiling level)	2.4000	-0.0900	-0.2160
E17 Corner (inverted - internal area greater than external area)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	4.1722	(36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	22.4018 (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	20.6209	20.4683	20.3188	19.6162	19.4848	18.8729	18.8729	18.7596	19.1086	19.4848	19.7507	20.0287
Average = Sum(39)m / 12 =	43.0228	42.8702	42.7206	42.0181	41.8867	41.2748	41.2748	41.1615	41.5105	41.8867	42.1526	42.4305
	42.0175											
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0207	1.0171	1.0135	0.9969	0.9938	0.9792	0.9792	0.9765	0.9848	0.9938	1.0001	1.0067
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4646 (42)
Hot water usage for mixer showers	48.7756	48.0426	46.9745	44.9308	43.4226	41.7407	40.7847	41.8448	43.0068	44.8126	46.9002	48.5887	(42a)
Hot water usage for baths	21.0983	20.7850	20.3438	19.5302	18.9210	18.2455	17.8806	18.3188	18.7958	19.5186	20.3490	21.0270	(42b)
Hot water usage for other uses	29.6288	28.5514	27.4740	26.3965	25.3191	24.2417	24.2417	25.3191	26.3965	27.4740	28.5514	29.6288	(42c)
Average daily hot water use (litres/day)													91.4662 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	99.5027	97.3790	94.7922	90.8575	87.6627	84.2279	82.9070	85.4827	88.1992	91.8052	95.8006	99.2445	(44)
Energy content (annual)	157.5880	138.6664	145.6921	124.3794	118.0109	103.5681	100.2689	105.8454	108.7584	124.5788	136.4855	155.3930	(45)
Distribution loss (46)m = 0.15 x (45)m	23.6382	20.8000	21.8538	18.6569	17.7016	15.5352	15.0403	15.8768	16.3138	18.6868	20.4728	23.3089	(46)
Water storage loss:													
Store volume													120.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.2247 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6613 (55)
Total storage loss	20.5007	18.5168	20.5007	19.8394	20.5007	19.8394	20.5007	20.5007	19.8394	20.5007	19.8394	20.5007	(56)
If cylinder contains dedicated solar storage	20.5007	18.5168	20.5007	19.8394	20.5007	19.8394	20.5007	20.5007	19.8394	20.5007	19.8394	20.5007	(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	201.3511	178.1943	189.4552	166.7308	161.7740	145.9194	144.0320	149.6085	151.1098	168.3420	178.8369	199.1561	(62)
WWHRS	-22.2982	-19.7207	-20.6504	-17.0993	-15.9360	-13.6365	-12.7821	-13.5924	-14.1089	-16.6328	-18.8429	-21.8852	(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	179.0529	158.4737	168.8048	149.6315	145.8381	132.2829	131.2499	136.0161	137.0009	151.7092	159.9939	177.2708	(64)
12Total per year (kWh/year)													1827.3247 (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	87.4085	77.7289	83.4531	75.2373	74.2491	68.3175	68.3499	70.2041	70.0433	76.4330	79.2625	86.6786	(65)

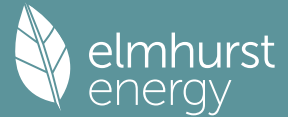
5. Internal gains (see Table 5 and 5a)

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	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	73.2290	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	65.0984	72.0732	65.0984	67.2684	65.0984	67.2684	65.0984	65.0984	67.2684	65.0984	67.2684	65.0984	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	126.9762	128.2938	124.9735	117.9048	108.9820	100.5957	94.9932	93.6756	96.9959	104.0645	112.9874	121.3737	(68)
Pumps, fans	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	30.3229	(69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Water heating gains (Table 5)	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	(71)
Total internal gains	117.4845	115.6681	112.1681	104.4962	99.7972	94.8854	91.8681	94.3603	97.2823	102.7325	110.0868	116.5035	(72)
	357.5279	364.0038	350.2087	337.6381	321.8463	307.7182	296.9284	298.1030	306.5153	319.8641	338.3113	350.9443	(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
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North	4.1600		10.6334		0.6300		0.7000		0.7700		13.5188 (74)	
South	3.6700		46.7521		0.6300		0.7000		0.7700		52.4371 (78)	
Solar gains	65.9559	111.7135	153.2940	194.1536	223.8292	225.6798	216.0862	192.9725	167.0570	123.3812	78.8330	56.5804 (83)
Total gains	423.4837	475.7173	503.5027	531.7918	545.6755	533.3980	513.0147	491.0755	473.5723	443.2454	417.1443	407.5247 (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	59.7178	59.9304	60.1402	61.1457	61.3376	62.2468	62.2468	62.4182	61.8934	61.3376	60.9506	60.5513
alpha	4.9812	4.9954	5.0093	5.0764	5.0892	5.1498	5.1498	5.1612	5.1262	5.0892	5.0634	5.0368
util living area	0.9692	0.9458	0.9069	0.8161	0.6717	0.4884	0.3529	0.3838	0.5858	0.8284	0.9409	0.9735 (86)
MIT	20.1095	20.3049	20.5287	20.7838	20.9331	20.9894	20.9984	20.9975	20.9738	20.8011	20.4385	20.0835 (87)
Th 2	20.0661	20.0691	20.0721	20.0859	20.0885	20.1007	20.1007	20.1029	20.0960	20.0885	20.0833	20.0778 (88)
util rest of house	0.9618	0.9335	0.8865	0.7799	0.6177	0.4226	0.2814	0.3099	0.5162	0.7871	0.9255	0.9670 (89)
MIT 2	19.0609	19.3036	19.5763	19.8799	20.0352	20.0946	20.1001	20.1020	20.0794	19.9073	19.4828	19.0375 (90)
Living area fraction	19.7023	19.9160	20.1588	20.4328	20.5844	20.6419	20.6495	20.6497	20.6264	20.4540	20.0673	19.6773 (92)
MIT	19.7023	19.9160	20.1588	20.4328	20.5844	20.6419	20.6495	20.6497	20.6264	20.4540	20.0673	19.6773 (93)
Temperature adjustment												0.0000
adjusted MIT	19.7023	19.9160	20.1588	20.4328	20.5844	20.6419	20.6495	20.6497	20.6264	20.4540	20.0673	19.6773 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9583	0.9312	0.8886	0.7943	0.6477	0.4625	0.3251	0.3551	0.5576	0.8046	0.9252	0.9636 (94)
Useful gains	405.8400	442.9728	447.3941	422.4044	353.4476	246.7072	166.7925	174.3767	264.0709	356.6399	385.9449	392.7109 (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	662.6478	643.7373	583.5115	484.5843	372.1376	249.3790	167.1425	174.9245	270.9138	412.7508	546.6043	656.7100 (97)
Space heating kWh	191.0650	134.9137	101.2713	44.7695	13.9053	0.0000	0.0000	0.0000	0.0000	41.7465	115.6747	196.4153 (98a)
Space heating requirement - total per year (kWh/year)												839.7615
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	191.0650	134.9137	101.2713	44.7695	13.9053	0.0000	0.0000	0.0000	0.0000	41.7465	115.6747	196.4153 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												839.7615
Space heating per m2										(98c) / (4) =		19.9232 (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	191.0650	134.9137	101.2713	44.7695	13.9053	0.0000	0.0000	0.0000	0.0000	41.7465	115.6747	196.4153 (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)	207.0043	146.1687	109.7197	48.5044	15.0654	0.0000	0.0000	0.0000	0.0000	45.2292	125.3247	212.8010 (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	179.0529	158.4737	168.8048	149.6315	145.8381	132.2829	131.2499	136.0161	137.0009	151.7092	159.9939	177.2708 (64)
Efficiency of water heater (217)m	84.2057	83.7010	82.9525	81.7071	80.5103	79.8000	79.8000	79.8000	79.8000	81.5843	83.3445	79.8000 (216)
Fuel for water heating, kWh/month	212.6376	189.3331	203.4957	183.1316	181.1421	165.7681	164.4736	170.4462	171.6803	185.9538	191.9669	84.2903 (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	13.5262	10.8512	9.7703	7.1581	5.5292	4.5174	5.0439	6.5562	8.5159	11.1733	12.6202	13.9021 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-14.6138	-21.4158	-31.9989	-37.4721	-41.7465	-39.4993	-39.0576	-36.2287	-31.4331	-25.1855	-16.3669	-12.5444 (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	-5.9581	-12.7404	-25.6959	-39.1289	-52.2388	-52.6312	-51.9708	-43.7408	-31.7439	-18.3509	-8.0008	-4.6933 (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												909.8174 (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												2230.3389 (219)

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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)	109.1639 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-694.4565 (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	2640.8638 (238)

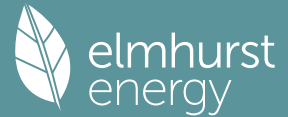
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	909.8174	0.2100	191.0617 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2230.3389	0.2100	468.3712 (264)
Space and water heating			659.4328 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	109.1639	0.1443	15.7557 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-347.5628	0.1337	-46.4826
PV Unit electricity exported	-346.8937	0.1255	-43.5398
Total			-90.0224 (269)
Total CO2, kg/year			597.0954 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.1700 (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	909.8174	1.1300	1028.0937 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2230.3389	1.1300	2520.2829 (278)
Space and water heating			3548.3766 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	109.1639	1.5338	167.4392 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-347.5628	1.4942	-519.3379
PV Unit electricity exported	-346.8937	0.4607	-159.8155
Total			-679.1534 (283)
Total Primary energy kWh/year			3166.7633 (286)
Target Primary Energy Rate (TPER)			75.1300 (287)

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Property Reference	Flat C - 3 New Close				Issued on Date	30/05/2024	
Assessment Reference	New Build			Prop Type Ref	New Build		
Property	Flat C, 3, New Close						
SAP Rating	79 C		DER	6.93		TER	14.17
Environmental	96 A		% DER < TER				51.09
CO ₂ Emissions (t/year)	0.25		DFEE	26.93		TFEE	28.65
Compliance Check	See BREL		% DFEE < TFEE				6.02
% DPER < TPER	3.55		DPER	72.46		TPER	75.13
Assessor Details	Mr. Alexander Cotterill					Assessor ID	AV67-0001
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	42.1500	2.4000	101.1600
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	42.1500		
Dwelling volume			101.1600

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	2 * 10 = 20.0000 (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) =	20.0000 / (5) =	0.1977 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4477	(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) =	0.3806 (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	0.4852	0.4757	0.4662	0.4186	0.4091	0.3615	0.3615	0.3520	0.3806	0.4091	0.4281	0.4471 (22b)
Effective ac	0.6177	0.6131	0.6087	0.5876	0.5837	0.5653	0.5653	0.5620	0.5724	0.5837	0.5916	0.6000 (25)

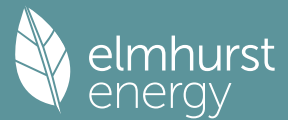
3. Heat losses and heat loss parameter

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
Windows (U _w = 1.40)			7.8300	1.3258	10.3807		(27)
Door			1.7500	1.0000	1.7500		(26)
External Wall 1	30.9800	7.8300	23.1500	0.1800	4.1670	60.0000	1389.0000 (29a)
Corridor Wall	8.8800	1.7500	7.1300	0.1500	1.0695	9.0000	64.1700 (29a)
Flat Roof	6.0000		6.0000	0.1400	0.8400	9.0000	54.0000 (30)
Semi Exposed Ceiling	12.7600		12.7600	0.1100	1.4036	9.0000	114.8400 (30)
Total net area of external elements A _{um} (A, m ²)			58.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.6108		(33)
Party Wall 1			27.4300	0.0000	0.0000	180.0000	4937.4000 (32)
Party Floor 1			42.1500			30.0000	1264.5000 (32a)
Party Ceiling 1			23.3900			30.0000	701.7000 (32b)
Internal Wall 1			80.4000			9.0000	723.6000 (32c)

Heat capacity C _m = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9249.2100 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K		219.4356 (35)
Thermal bridges (User defined value 0.040 * total exposed area)		2.3448 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	21.9556 (37)

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

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(38)m	Jan 20.6209	Feb 20.4683	Mar 20.3188	Apr 19.6162	May 19.4848	Jun 18.8729	Jul 18.8729	Aug 18.7596	Sep 19.1086	Oct 19.4848	Nov 19.7507	Dec 20.0287 (38)
Heat transfer coeff	42.5765	42.4239	42.2743	41.5718	41.4404	40.8285	40.8285	40.7152	41.0642	41.4404	41.7063	41.9843 (39)
Average = Sum(39)m / 12 =												41.5712
HLP	Jan 1.0101	Feb 1.0065	Mar 1.0029	Apr 0.9863	May 0.9832	Jun 0.9686	Jul 0.9686	Aug 0.9660	Sep 0.9742	Oct 0.9832	Nov 0.9895	Dec 0.9961 (40)
HLP (average)												0.9863
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4646 (42)
Hot water usage for mixer showers													
48.7756	48.0426	46.9745	44.9308	43.4226	41.7407	40.7847	41.8448	43.0068	44.8126	46.9002	48.5887	(42a)	
Hot water usage for baths													
21.0983	20.7850	20.3438	19.5302	18.9210	18.2455	17.8806	18.3188	18.7958	19.5186	20.3490	21.0270	(42b)	
Hot water usage for other uses													
29.6288	28.5514	27.4740	26.3965	25.3191	24.2417	24.2417	25.3191	26.3965	27.4740	28.5514	29.6288	(42c)	
Average daily hot water use (litres/day)												91.4662 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
99.5027	97.3790	94.7922	90.8575	87.6627	84.2279	82.9070	85.4827	88.1992	91.8052	95.8006	99.2445	(44)	
Energy content	157.5880	138.6664	145.6921	124.3794	118.0109	103.5681	100.2689	105.8454	108.7584	124.5788	136.4855	155.3930 (45)	
Energy content (annual)										Total = Sum(45)m =		1519.2348	
Distribution loss (46)m = 0.15 x (45)m													
23.6382	20.8000	21.8538	18.6569	17.7016	15.5352	15.0403	15.8768	16.3138	18.6868	20.4728	23.3089	(46)	
Water storage loss:													
Store volume												120.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)	
Temperature factor from Table 2b												0.6000 (49)	
Enter (49) or (54) in (55)												0.6000 (55)	
Total storage loss													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.6000	18.6000	18.0000	18.6000	(56)	
If cylinder contains dedicated solar storage													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.6000	18.6000	18.0000	18.6000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month													
176.1880	155.4664	164.2921	142.3794	136.6109	121.5681	118.8689	124.4454	126.7584	143.1788	154.4855	173.9930	(62)	
WWHRS	-43.4337	-38.4131	-40.2240	-33.3070	-31.0410	-26.5620	-24.8976	-26.4761	-27.4820	-32.3983	-36.7033	-42.6293 (63a)	
PV diverter	-1.1834	-2.6298	-5.5133	-8.7746	-12.0253	-12.2536	-12.0823	-9.9208	-6.9828	-3.8618	-1.6102	-0.9214 (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													
131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(64)	
												1256.9079 (64)	
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
												0.0000 (64a)	
Heat gains from water heating, kWh/month													
67.2780	59.5466	63.3226	55.7562	54.1186	48.8364	48.2194	50.0736	50.5622	56.3025	59.7814	66.5482	(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	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	14.6055	12.9724	10.5499	7.9869	5.9703	5.0404	5.4463	7.0794	9.5019	12.0648	14.0815	15.0114 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	189.5167	191.4833	186.5275	175.9774	162.6596	150.1428	141.7809	139.8143	144.7700	155.3202	168.6379	181.1547 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521 (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)												
	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832 (71)
Water heating gains (Table 5)												
	90.4274	88.6110	85.1110	77.4391	72.7401	67.8283	64.8110	67.3032	70.2252	75.6754	83.0297	89.4464 (72)
Total internal gains												
	372.0933	370.6104	359.7322	338.9471	318.9137	297.5552	286.5819	288.7405	299.0408	320.6041	343.2928	363.1562 (73)

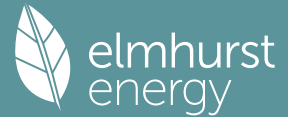
6. Solar gains

[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
North				4.1600	10.6334		0.7600		0.7000		0.7700	16.3083 (74)
South				3.6700	46.7521		0.7600		0.7000		0.7700	63.2575 (78)
Solar gains	79.5658	134.7655	184.9261	234.2171	270.0162	272.2486	260.6754	232.7922	201.5290	148.8409	95.1001	68.2557 (83)
Total gains	451.6591	505.3759	544.6582	573.1642	588.9299	569.8039	547.2573	521.5328	500.5699	469.4449	438.3929	431.4119 (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	60.3438	60.5608	60.7751	61.8021	61.9981	62.9272	62.9272	63.1023	62.5660	61.9981	61.6028	61.1949
alpha	5.0229	5.0374	5.0517	5.1201	5.1332	5.1951	5.1951	5.2068	5.1711	5.1332	5.1069	5.0797
util living area	0.9601	0.9319	0.8799	0.7776	0.6267	0.4542	0.3276	0.3580	0.5527	0.7992	0.9285	0.9663 (86)
MIT	20.1963	20.3852	20.6120	20.8330	20.9525	20.9927	20.9989	20.9983	20.9805	20.8374	20.4976	20.1619 (87)

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Th 2	20.0749	20.0779	20.0809	20.0948	20.0974	20.1095	20.1095	20.1118	20.1049	20.0974	20.0921	20.0866 (88)
util rest of house	0.9509	0.9174	0.8559	0.7390	0.5740	0.3929	0.2616	0.2894	0.4861	0.7554	0.9108	0.9584 (89)
MIT 2	19.1746	19.4072	19.6791	19.9386	20.0602	20.1054	20.1092	20.1112	20.0927	19.9518	19.5599	19.1415 (90)
Living area fraction									fLA = Living area / (4) =			0.6116 (91)
MIT	19.7995	20.0054	20.2497	20.4857	20.6059	20.6481	20.6534	20.6538	20.6357	20.4935	20.1335	19.7656 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.6495	19.8554	20.0997	20.3357	20.4559	20.4981	20.5034	20.5038	20.4857	20.3435	19.9835	19.6156 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9459	0.9134	0.8565	0.7498	0.5954	0.4198	0.2909	0.3198	0.5149	0.7681	0.9084	0.9536	(94)
Useful gains	427.2065	461.5974	466.4852	429.7394	350.6284	239.2201	159.1824	166.7823	257.7302	360.5682	398.2548	411.3841	(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	653.5297	634.4651	574.9170	475.4015	362.8486	240.8123	159.3685	167.0854	262.2231	403.7733	537.3209	647.2127	(97)
Space heating kWh	168.3844	116.1671	80.6732	32.8767	9.0919	0.0000	0.0000	0.0000	0.0000	32.1446	100.1276	175.4565	(98a)
Space heating requirement - total per year (kWh/year)												714.9220	
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	168.3844	116.1671	80.6732	32.8767	9.0919	0.0000	0.0000	0.0000	0.0000	32.1446	100.1276	175.4565	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												714.9220	
Space heating per m2										(98c) / (4) =		16.9614	(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 %)													100.0000 (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	168.3844	116.1671	80.6732	32.8767	9.0919	0.0000	0.0000	0.0000	0.0000	32.1446	100.1276	175.4565	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	168.3844	116.1671	80.6732	32.8767	9.0919	0.0000	0.0000	0.0000	0.0000	32.1446	100.1276	175.4565	(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	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	12.7841	10.2559	9.2343	6.7654	5.2258	4.2695	4.7671	6.1965	8.0487	10.5603	11.9278	13.1394	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-8.6794	-13.5987	-21.5473	-26.4127	-30.3544	-28.9377	-28.5695	-25.9214	-21.4672	-16.2489	-9.9465	-7.3544	(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	-0.0230	-0.1953	-0.7960	-1.9921	-3.4206	-3.7900	-3.7360	-3.0104	-2.0667	-0.8293	-0.1464	-0.0046	(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												714.9220	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												1256.9079	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												103.1747	(232)

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	714.9220	16.4900	117.8906 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1256.9079	16.4900	207.2641 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	103.1747	16.4900	17.0135 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-239.0381	16.4900	-39.4174
PV Unit electricity exported	-20.0104	5.5900	-1.1186
Total			-40.5360 (252)
Total energy cost			308.3932 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2739 (257)
SAP value		79.3499
SAP rating (Section 12)		79 (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	714.9220	0.1572	112.3682 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1256.9079	0.1417	178.0694 (264)
Space and water heating			290.4376 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	103.1747	0.1443	14.8913 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-239.0381	0.1328	-31.7475
PV Unit electricity exported	-20.0104	0.1159	-2.3198
Total			-34.0674 (269)
Total CO2, kg/year			276.9488 (272)
CO2 emissions per m2			6.5700 (273)
EI value			95.7417
EI rating			96 (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

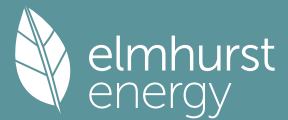
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	42.1500 (1b)	x 2.4000 (2b)	= 101.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	42.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	101.1600 (5)

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	2 * 10 = 20.0000 (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) =	20.0000 / (5) = 0.1977 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4477 (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) = 0.3806 (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	0.3996	0.3806	0.3806	0.3520	0.3520	0.3140	0.3235	0.3044	0.3140	0.3330	0.3330	0.3615 (22b)
Effective ac	0.5798	0.5724	0.5724	0.5620	0.5620	0.5493	0.5523	0.5463	0.5493	0.5554	0.5554	0.5653 (25)

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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						
Windows (Uw = 1.40)			7.8300	1.3258	10.3807			(27)					
Door			1.7500	1.0000	1.7500			(26)					
External Wall 1	30.9800	7.8300	23.1500	0.1800	4.1670	60.0000	1389.0000	(29a)					
Corridor Wall	8.8800	1.7500	7.1300	0.1500	1.0695	9.0000	64.1700	(29a)					
Flat Roof	6.0000		6.0000	0.1400	0.8400	9.0000	54.0000	(30)					
Semi Exposed Ceiling	12.7600		12.7600	0.1100	1.4036	9.0000	114.8400	(30)					
Total net area of external elements Aum(A, m2)			58.6200					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.6108			(33)					
Party Wall 1			27.4300	0.0000	0.0000	180.0000	4937.4000	(32)					
Party Floor 1			42.1500			30.0000	1264.5000	(32d)					
Party Ceiling 1			23.3900			30.0000	701.7000	(32b)					
Internal Wall 1			80.4000			9.0000	723.6000	(32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	9249.2100	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							219.4356	(35)					
Thermal bridges (User defined value 0.040 * total exposed area)							2.3448	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	21.9556	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 19.3564	Feb 19.1086	Mar 19.1086	Apr 18.7596	May 18.7596	Jun 18.3366	Jul 18.4378	Aug 18.2384	Sep 18.3366	Oct 18.5421	Nov 18.5421	Dec 18.8729	(38)
Heat transfer coeff	41.3120	41.0642	41.0642	40.7152	40.7152	40.2922	40.3934	40.1940	40.2922	40.4977	40.4977	40.8285	(39)
Average = Sum(39)m / 12 =												40.6555	
HLP	Jan 0.9801	Feb 0.9742	Mar 0.9742	Apr 0.9660	May 0.9660	Jun 0.9559	Jul 0.9583	Aug 0.9536	Sep 0.9559	Oct 0.9608	Nov 0.9608	Dec 0.9686	(40)
HLP (average)												0.9645	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

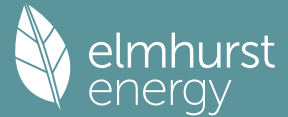
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4646 (42)
Hot water usage for mixer showers													
48.7756	48.0426	46.9745	44.9308	43.4226	41.7407	40.7847	41.8448	43.0068	44.8126	46.9002	48.5887	48.5887	(42a)
Hot water usage for baths													
21.0983	20.7850	20.3438	19.5302	18.9210	18.2455	17.8806	18.3188	18.7958	19.5186	20.3490	21.0270	21.0270	(42b)
Hot water usage for other uses													
29.6288	28.5514	27.4740	26.3965	25.3191	24.2417	24.2417	25.3191	26.3965	27.4740	28.5514	29.6288	29.6288	(42c)
Average daily hot water use (litres/day)												91.4662	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	99.5027	97.3790	94.7922	90.8575	87.6627	84.2279	82.9070	85.4827	88.1992	91.8052	95.8006	99.2445	(44)
Energy conte	157.5880	138.6664	145.6921	124.3794	118.0109	103.5681	100.2689	105.8454	108.7584	124.5788	136.4855	155.3930	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	23.6382	20.8000	21.8538	18.6569	17.7016	15.5352	15.0403	15.8768	16.3138	18.6868	20.4728	23.3089	(46)
Water storage loss:													
Store volume													120.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.6000 (49)
Enter (49) or (54) in (55)													0.6000 (55)
Total storage loss	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(56)
If cylinder contains dedicated solar storage	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
WWHRS	176.1880	155.4664	164.2921	142.3794	136.6109	121.5681	118.8689	124.4454	126.7584	143.1788	154.4855	173.9930	(62)
PV diverter	-43.4337	-38.4131	-40.2240	-33.3070	-31.0410	-26.5620	-24.8976	-26.4761	-27.4820	-32.3983	-36.7033	-42.6293	(63a)
Solar input	-1.3990	-2.6668	-5.5008	-9.1476	-12.0910	-13.5539	-13.1603	-11.1485	-7.8163	-4.3056	-1.9709	-1.0738	(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	131.3553	114.3865	118.5673	99.9247	93.4789	81.4522	80.8109	86.8208	91.4601	106.4750	115.8112	130.2898	(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	67.2780	59.5466	63.3226	55.7562	54.1186	48.8364	48.2194	50.0736	50.5622	56.3025	59.7814	66.5482	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.6055	12.9724	10.5499	7.9869	5.9703	5.0404	5.4463	7.0794	9.5019	12.0648	14.0815	15.0114	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.5167	191.4833	186.5275	175.9774	162.6596	150.1428	141.7809	139.8143	144.7700	155.3202	168.6379	181.1547	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	(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)	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	(71)
Water heating gains (Table 5)	90.4274	88.6110	85.1110	77.4391	72.7401	67.8283	64.8110	67.3032	70.2252	75.6754	83.0297	89.4464	(72)
Total internal gains	372.0933	370.6104	359.7322	338.9471	318.9137	297.5552	286.5819	288.7405	299.0408	320.6041	343.2928	363.1562	(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
North			4.1600	11.9814	0.7600	0.7000	0.7700	18.3758 (74)
South			3.6700	50.9848	0.7600	0.7000	0.7700	68.9846 (78)

Solar gains	87.3604	133.2726	181.4374	238.7522	269.9701	292.0805	276.3324	251.0295	214.9643	157.3423	106.9844	74.2185 (83)
Total gains	459.4537	503.8829	541.1696	577.6993	588.8838	589.6357	562.9143	539.7701	514.0051	477.9464	450.2772	437.3747 (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	62.1908	62.5660	62.5660	63.1023	63.1023	63.7648	63.6050	63.9206	63.7648	63.4413	63.4413	62.9272	
alpha	5.1461	5.1711	5.1711	5.2068	5.2068	5.2510	5.2403	5.2614	5.2510	5.2294	5.2294	5.1951	
util living area	0.9463	0.9167	0.8508	0.7217	0.5415	0.3409	0.2224	0.2382	0.4507	0.7314	0.8973	0.9541 (86)	
MIT	20.3526	20.5025	20.7139	20.8976	20.9800	20.9986	20.9999	20.9998	20.9940	20.9089	20.6417	20.3224 (87)	
Th 2	20.0999	20.1049	20.1049	20.1118	20.1118	20.1202	20.1182	20.1222	20.1202	20.1161	20.1161	20.1095 (88)	
util rest of house	0.9341	0.8993	0.8222	0.6779	0.4854	0.2813	0.1592	0.1729	0.3841	0.6796	0.8732	0.9433 (89)	
MIT 2	19.3872	19.5711	19.8174	20.0212	20.0979	20.1196	20.1182	20.1222	20.1171	20.0408	19.7500	19.3588 (90)	
Living area fraction									fLA = Living area / (4) =				0.6116 (91)
MIT	19.9777	20.1407	20.3657	20.5572	20.6374	20.6572	20.6575	20.6590	20.6535	20.5718	20.2954	19.9482 (92)	
Temperature adjustment												-0.1500	
adjusted MIT	19.8277	19.9907	20.2157	20.4072	20.4874	20.5072	20.5075	20.5090	20.5035	20.4218	20.1454	19.7982 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9298	0.8968	0.8260	0.6929	0.5094	0.3076	0.1871	0.2017	0.4133	0.6983	0.8741	0.9390 (94)
Useful gains	427.1976	451.8714	447.0232	400.3115	299.9999	181.3476	105.3111	108.8654	212.4387	333.7293	393.6005	410.6826 (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	608.4284	590.9445	526.2677	427.8025	304.8521	181.6069	105.3243	108.8845	213.6878	357.2614	491.8598	600.1042 (97)
Space heating kWh	134.8358	93.4572	58.9579	19.7936	3.6101	0.0000	0.0000	0.0000	0.0000	17.5079	70.7467	140.9297 (98a)
Space heating requirement - total per year (kWh/year)												539.8388
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	134.8358	93.4572	58.9579	19.7936	3.6101	0.0000	0.0000	0.0000	0.0000	17.5079	70.7467	140.9297 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												539.8388
Space heating per m2										(98c) / (4) =		12.8076 (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 %)												100.0000 (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	134.8358	93.4572	58.9579	19.7936	3.6101	0.0000	0.0000	0.0000	0.0000	17.5079	70.7467	140.9297 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	134.8358	93.4572	58.9579	19.7936	3.6101	0.0000	0.0000	0.0000	0.0000	17.5079	70.7467	140.9297 (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	131.3553	114.3865	118.5673	99.9247	93.4789	81.4522	80.8109	86.8208	91.4601	106.4750	115.8112	130.2898 (64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	131.3553	114.3865	118.5673	99.9247	93.4789	81.4522	80.8109	86.8208	91.4601	106.4750	115.8112	130.2898 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	12.7841	10.2559	9.2343	6.7654	5.2258	4.2695	4.7671	6.1965	8.0487	10.5603	11.9278	13.1394 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.5896	-13.6270	-21.3288	-26.7970	-30.2897	-30.5069	-29.8791	-27.6018	-22.8638	-17.1974	-11.1836	-8.0597 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-0.0853	-0.2876	-0.9834	-2.3299	-3.5953	-4.2348	-4.1041	-3.4163	-2.3294	-1.0652	-0.2761	-0.0508 (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)

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Annual totals kWh/year		
Space heating fuel - main system 1	539.8388	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	100.0000	
Water heating fuel used	1250.8327	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
central heating pump	41.0000	(230c)
Total electricity for the above, kWh/year	41.0000	(231)
Electricity for lighting (calculated in Appendix L)	103.1747	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-271.6824	(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	1663.1639	(238)

10a. Fuel costs - using BEDF prices (542)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	539.8388	25.1600	135.8234	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1250.8327	25.1600	314.7095	(247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000	(247a)
Pumps, fans and electric keep-hot	41.0000	25.1600	10.3156	(249)
Energy for lighting	103.1747	25.1600	25.9588	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-248.9242	25.1600	-62.6293	
PV Unit electricity exported	-22.7581	5.8100	-1.3222	
Total			-63.9516	(252)
Total energy cost			422.8557	(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	539.8388	0.1580	85.2943	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1250.8327	0.1418	177.3137	(264)
Space and water heating			262.6080	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)
Energy for lighting	103.1747	0.1443	14.8913	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-248.9242	0.1327	-33.0364	
PV Unit electricity exported	-22.7581	0.1172	-2.6678	
Total			-35.7042	(269)
Total CO2, kg/year			247.4823	(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	539.8388	1.5849	855.5890	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1250.8327	1.5242	1906.5269	(278)
Space and water heating			2762.1159	(279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248	(281)
Energy for lighting	103.1747	1.5338	158.2529	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-248.9242	1.4904	-370.9915	
PV Unit electricity exported	-22.7581	0.4299	-9.7832	
Total			-380.7747	(283)
Total Primary energy kWh/year			2601.6188	(286)

SAP 10 EPC IMPROVEMENTS

New Build

Current energy efficiency rating:	C 79
Current environmental impact rating:	A 96

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

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

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

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Potential energy efficiency rating:
Potential environmental impact rating:

C 79
A 96

Fuel prices for cost data on this page from database revision number 542 TEST (30 Apr 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current £487	Potential £487	£0 Saving
Electricity			
Space heating	£146	£146	£0
Water heating	£315	£315	£0
Lighting	£26	£26	£0
Generated (PV)	-£64	-£64	£0
Total cost of fuels	£423	£423	£0
Total cost of uses	£423	£423	£0
Delivered energy	39 kWh/m ²	39 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m ²	6 kg/m ²	6 kg/m ²	0 kg/m ²
Primary energy	62 kWh/m ²	62 kWh/m ²	0 kWh/m ²

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	42.1500 (1b)	x 2.4000 (2b)	= 101.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	42.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 101.1600 (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	2 * 10 = 20.0000 (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) =	20.0000 / (5) =	0.1977 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4477 (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) =	0.3806 (21)

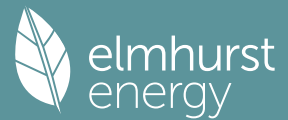
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4852	0.4757	0.4662	0.4186	0.4091	0.3615	0.3615	0.3520	0.3806	0.4091	0.4281	0.4471 (22b)
Effective ac	0.6177	0.6131	0.6087	0.5876	0.5837	0.5653	0.5653	0.5620	0.5724	0.5837	0.5916	0.6000 (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
Windows (Uw = 1.40)			7.8300	1.3258	10.3807		(27)
Door			1.7500	1.0000	1.7500		(26)
External Wall 1	30.9800	7.8300	23.1500	0.1800	4.1670	60.0000	1389.0000 (29a)
Corridor Wall	8.8800	1.7500	7.1300	0.1500	1.0695	9.0000	64.1700 (29a)
Flat Roof	6.0000		6.0000	0.1400	0.8400	9.0000	54.0000 (30)
Semi Exposed Ceiling	12.7600		12.7600	0.1100	1.4036	9.0000	114.8400 (30)
Total net area of external elements Aum(A, m ²)			58.6200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.6108		(33)
Party Wall 1			27.4300	0.0000	0.0000	180.0000	4937.4000 (32)
Party Floor 1			42.1500			30.0000	1264.5000 (32d)
Party Ceiling 1			23.3900			30.0000	701.7000 (32b)
Internal Wall 1			80.4000			9.0000	723.6000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		9249.2100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							219.4356 (35)
Thermal bridges (User defined value 0.040 * total exposed area)							2.3448 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	21.9556 (37)

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

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(38)m	Jan 20.6209	Feb 20.4683	Mar 20.3188	Apr 19.6162	May 19.4848	Jun 18.8729	Jul 18.8729	Aug 18.7596	Sep 19.1086	Oct 19.4848	Nov 19.7507	Dec 20.0287 (38)
Heat transfer coeff	42.5765	42.4239	42.2743	41.5718	41.4404	40.8285	40.8285	40.7152	41.0642	41.4404	41.7063	41.9843 (39)
Average = Sum(39)m / 12 =												41.5712
HLP	Jan 1.0101	Feb 1.0065	Mar 1.0029	Apr 0.9863	May 0.9832	Jun 0.9686	Jul 0.9686	Aug 0.9660	Sep 0.9742	Oct 0.9832	Nov 0.9895	Dec 0.9961 (40)
HLP (average)												0.9863
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4646 (42)
Hot water usage for mixer showers													
48.7756	48.0426	46.9745	44.9308	43.4226	41.7407	40.7847	41.8448	43.0068	44.8126	46.9002	48.5887	(42a)	
Hot water usage for baths													
21.0983	20.7850	20.3438	19.5302	18.9210	18.2455	17.8806	18.3188	18.7958	19.5186	20.3490	21.0270	(42b)	
Hot water usage for other uses													
29.6288	28.5514	27.4740	26.3965	25.3191	24.2417	24.2417	25.3191	26.3965	27.4740	28.5514	29.6288	(42c)	
Average daily hot water use (litres/day)												91.4662 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
99.5027	97.3790	94.7922	90.8575	87.6627	84.2279	82.9070	85.4827	88.1992	91.8052	95.8006	99.2445	(44)	
Energy content (annual)	157.5880	138.6664	145.6921	124.3794	118.0109	103.5681	100.2689	105.8454	108.7584	124.5788	136.4855	155.3930 (45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1519.2348	
23.6382	20.8000	21.8538	18.6569	17.7016	15.5352	15.0403	15.8768	16.3138	18.6868	20.4728	23.3089	(46)	
Water storage loss:													
Store volume												120.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)	
Temperature factor from Table 2b												0.6000 (49)	
Enter (49) or (54) in (55)												0.6000 (55)	
Total storage loss													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(56)	
If cylinder contains dedicated solar storage													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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													
176.1880	155.4664	164.2921	142.3794	136.6109	121.5681	118.8689	124.4454	126.7584	143.1788	154.4855	173.9930	(62)	
WWHRS	-43.4337	-38.4131	-40.2240	-33.3070	-31.0410	-26.5620	-24.8976	-26.4761	-27.4820	-32.3983	-36.7033	-42.6293 (63a)	
PV diverter	-1.1834	-2.6298	-5.5133	-8.7746	-12.0253	-12.2536	-12.0823	-9.9208	-6.9828	-3.8618	-1.6102	-0.9214 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422 (64)	
										Total per year (kWh/year) = Sum(64)m =		1256.9079 (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													
67.2780	59.5466	63.3226	55.7562	54.1186	48.8364	48.2194	50.0736	50.5622	56.3025	59.7814	66.5482	(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	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748	87.8748 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	14.6055	12.9724	10.5499	7.9869	5.9703	5.0404	5.4463	7.0794	9.5019	12.0648	14.0815	15.0114 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	189.5167	191.4833	186.5275	175.9774	162.6596	150.1428	141.7809	139.8143	144.7700	155.3202	168.6379	181.1547 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521 (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)												
	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832 (71)
Water heating gains (Table 5)												
	90.4274	88.6110	85.1110	77.4391	72.7401	67.8283	64.8110	67.3032	70.2252	75.6754	83.0297	89.4464 (72)
Total internal gains												
	372.0933	370.6104	359.7322	338.9471	318.9137	297.5552	286.5819	288.7405	299.0408	320.6041	343.2928	363.1562 (73)

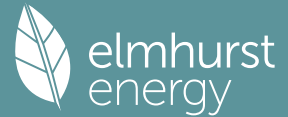
6. Solar gains

[Jan]																				
	Area				Solar flux		g		FF		Access		Gains							
	m2				Table 6a		Specific data		Specific data		factor		W							
					W/m2		or Table 6b		or Table 6c		Table 6d									
North	4.1600				10.6334		0.7600		0.7000		0.7700		16.3083 (74)							
South	3.6700				46.7521		0.7600		0.7000		0.7700		63.2575 (78)							
Solar gains	79.5658	134.7655	184.9261	234.2171	270.0162	272.2486	260.6754	232.7922	201.5290	148.8409	95.1001	68.2557 (83)								
Total gains	451.6591	505.3759	544.6582	573.1642	588.9299	569.8039	547.2573	521.5328	500.5699	469.4449	438.3929	431.4119 (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	60.3438	60.5608	60.7751	61.8021	61.9981	62.9272	62.9272	63.1023	62.5660	61.9981	61.6028	61.1949
alpha	5.0229	5.0374	5.0517	5.1201	5.1332	5.1951	5.1951	5.2068	5.1711	5.1332	5.1069	5.0797
util living area	0.9601	0.9319	0.8799	0.7776	0.6267	0.4542	0.3276	0.3580	0.5527	0.7992	0.9285	0.9663 (86)
MIT	20.1963	20.3852	20.6120	20.8330	20.9525	20.9927	20.9989	20.9983	20.9805	20.8374	20.4976	20.1619 (87)

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Th 2	20.0749	20.0779	20.0809	20.0948	20.0974	20.1095	20.1095	20.1118	20.1049	20.0974	20.0921	20.0866 (88)
util rest of house	0.9509	0.9174	0.8559	0.7390	0.5740	0.3929	0.2616	0.2894	0.4861	0.7554	0.9108	0.9584 (89)
MIT 2	19.1746	19.4072	19.6791	19.9386	20.0602	20.1054	20.1092	20.1112	20.0927	19.9518	19.5599	19.1415 (90)
Living area fraction									fLA = Living area / (4) =			0.6116 (91)
MIT	19.7995	20.0054	20.2497	20.4857	20.6059	20.6481	20.6534	20.6538	20.6357	20.4935	20.1335	19.7656 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.6495	19.8554	20.0997	20.3357	20.4559	20.4981	20.5034	20.5038	20.4857	20.3435	19.9835	19.6156 (93)

8. Space heating requirement

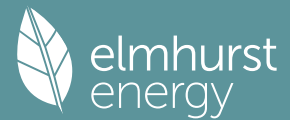
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9459	0.9134	0.8565	0.7498	0.5954	0.4198	0.2909	0.3198	0.5149	0.7681	0.9084	0.9536	(94)
Useful gains	427.2065	461.5974	466.4852	429.7394	350.6284	239.2201	159.1824	166.7823	257.7302	360.5682	398.2548	411.3841	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	653.5297	634.4651	574.9170	475.4015	362.8486	240.8123	159.3685	167.0854	262.2231	403.7733	537.3209	647.2127	(97)
Space heating kWh	168.3844	116.1671	80.6732	32.8767	9.0919	0.0000	0.0000	0.0000	0.0000	32.1446	100.1276	175.4565	(98a)
Space heating requirement - total per year (kWh/year)												714.9220	
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	168.3844	116.1671	80.6732	32.8767	9.0919	0.0000	0.0000	0.0000	0.0000	32.1446	100.1276	175.4565	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												714.9220	
Space heating per m2										(98c) / (4) =		16.9614	(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 %)													100.0000 (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	168.3844	116.1671	80.6732	32.8767	9.0919	0.0000	0.0000	0.0000	0.0000	32.1446	100.1276	175.4565	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	168.3844	116.1671	80.6732	32.8767	9.0919	0.0000	0.0000	0.0000	0.0000	32.1446	100.1276	175.4565	(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	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	131.5709	114.4235	118.5548	100.2977	93.5446	82.7525	81.8890	88.0485	92.2935	106.9187	116.1720	130.4422	(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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	12.7841	10.2559	9.2343	6.7654	5.2258	4.2695	4.7671	6.1965	8.0487	10.5603	11.9278	13.1394	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-8.6794	-13.5987	-21.5473	-26.4127	-30.3544	-28.9377	-28.5695	-25.9214	-21.4672	-16.2489	-9.9465	-7.3544	(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	-0.0230	-0.1953	-0.7960	-1.9921	-3.4206	-3.7900	-3.7360	-3.0104	-2.0667	-0.8293	-0.1464	-0.0046	(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												714.9220	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												1256.9079	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												103.1747	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-259.0486	(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												1856.9561	(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	714.9220	16.4900	117.8906 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1256.9079	16.4900	207.2641 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	103.1747	16.4900	17.0135 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-239.0381	16.4900	-39.4174
PV Unit electricity exported	-20.0104	5.5900	-1.1186
Total			-40.5360 (252)
Total energy cost			308.3932 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2739 (257)
SAP value		79.3499
SAP rating (Section 12)		79 (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	714.9220	0.1572	112.3682 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1256.9079	0.1417	178.0694 (264)
Space and water heating			290.4376 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	103.1747	0.1443	14.8913 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-239.0381	0.1328	-31.7475
PV Unit electricity exported	-20.0104	0.1159	-2.3198
Total			-34.0674 (269)
Total CO2, kg/year			276.9488 (272)
CO2 emissions per m2			6.5700 (273)
EI value			95.7417
EI rating			96 (274)
EI band			A

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

1. Overall dwelling characteristics

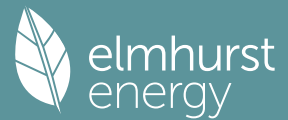
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	42.1500 (1b)	x 2.4000 (2b)	= 101.1600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	42.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	101.1600 (5)

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	2 * 10 = 20.0000 (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) =	20.0000 / (5) = 0.1977 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4477 (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) = 0.3806 (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	0.3996	0.3806	0.3806	0.3520	0.3520	0.3140	0.3235	0.3044	0.3140	0.3330	0.3330	0.3615 (22b)
Effective ac	0.5798	0.5724	0.5724	0.5620	0.5620	0.5493	0.5523	0.5463	0.5493	0.5554	0.5554	0.5653 (25)

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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						
Windows (Uw = 1.40)			7.8300	1.3258	10.3807			(27)					
Door			1.7500	1.0000	1.7500			(26)					
External Wall 1	30.9800	7.8300	23.1500	0.1800	4.1670	60.0000	1389.0000	(29a)					
Corridor Wall	8.8800	1.7500	7.1300	0.1500	1.0695	9.0000	64.1700	(29a)					
Flat Roof	6.0000		6.0000	0.1400	0.8400	9.0000	54.0000	(30)					
Semi Exposed Ceiling	12.7600		12.7600	0.1100	1.4036	9.0000	114.8400	(30)					
Total net area of external elements Aum(A, m2)			58.6200					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.6108			(33)					
Party Wall 1			27.4300	0.0000	0.0000	180.0000	4937.4000	(32)					
Party Floor 1			42.1500			30.0000	1264.5000	(32d)					
Party Ceiling 1			23.3900			30.0000	701.7000	(32b)					
Internal Wall 1			80.4000			9.0000	723.6000	(32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	9249.2100	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							219.4356	(35)					
Thermal bridges (User defined value 0.040 * total exposed area)							2.3448	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	21.9556	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 19.3564	Feb 19.1086	Mar 19.1086	Apr 18.7596	May 18.7596	Jun 18.3366	Jul 18.4378	Aug 18.2384	Sep 18.3366	Oct 18.5421	Nov 18.5421	Dec 18.8729	(38)
Heat transfer coeff	41.3120	41.0642	41.0642	40.7152	40.7152	40.2922	40.3934	40.1940	40.2922	40.4977	40.4977	40.8285	(39)
Average = Sum(39)m / 12 =												40.6555	
HLP	Jan 0.9801	Feb 0.9742	Mar 0.9742	Apr 0.9660	May 0.9660	Jun 0.9559	Jul 0.9583	Aug 0.9536	Sep 0.9559	Oct 0.9608	Nov 0.9608	Dec 0.9686	(40)
HLP (average)												0.9645	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

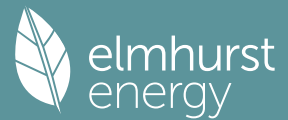
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4646 (42)
Hot water usage for mixer showers													
48.7756	48.0426	46.9745	44.9308	43.4226	41.7407	40.7847	41.8448	43.0068	44.8126	46.9002	48.5887	48.5887	(42a)
Hot water usage for baths													
21.0983	20.7850	20.3438	19.5302	18.9210	18.2455	17.8806	18.3188	18.7958	19.5186	20.3490	21.0270	21.0270	(42b)
Hot water usage for other uses													
29.6288	28.5514	27.4740	26.3965	25.3191	24.2417	24.2417	25.3191	26.3965	27.4740	28.5514	29.6288	29.6288	(42c)
Average daily hot water use (litres/day)												91.4662	(43)
Daily hot water use	Jan 99.5027	Feb 97.3790	Mar 94.7922	Apr 90.8575	May 87.6627	Jun 84.2279	Jul 82.9070	Aug 85.4827	Sep 88.1992	Oct 91.8052	Nov 95.8006	Dec 99.2445	(44)
Energy conte	157.5880	138.6664	145.6921	124.3794	118.0109	103.5681	100.2689	105.8454	108.7584	124.5788	136.4855	155.3930	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
23.6382	20.8000	21.8538	18.6569	17.7016	15.5352	15.0403	15.8768	16.3138	18.6868	20.4728	23.3089	23.3089	(46)
Water storage loss:													
Store volume												120.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												0.6000	(55)
Total storage loss													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(56)
If cylinder contains dedicated solar storage													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
WWHRS	176.1880	155.4664	164.2921	142.3794	136.6109	121.5681	118.8689	124.4454	126.7584	143.1788	154.4855	173.9930	(62)
PV diverter	-43.4337	-38.4131	-40.2240	-33.3070	-31.0410	-26.5620	-24.8976	-26.4761	-27.4820	-32.3983	-36.7033	-42.6293	(63a)
Solar input	-1.3990	-2.6668	-5.5008	-9.1476	-12.0910	-13.5539	-13.1603	-11.1485	-7.8163	-4.3056	-1.9709	-1.0738	(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	131.3553	114.3865	118.5673	99.9247	93.4789	81.4522	80.8109	86.8208	91.4601	106.4750	115.8112	130.2898	(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	67.2780	59.5466	63.3226	55.7562	54.1186	48.8364	48.2194	50.0736	50.5622	56.3025	59.7814	66.5482	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 87.8748	Feb 87.8748	Mar 87.8748	Apr 87.8748	May 87.8748	Jun 87.8748	Jul 87.8748	Aug 87.8748	Sep 87.8748	Oct 87.8748	Nov 87.8748	Dec 87.8748	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
14.6055	12.9724	10.5499	7.9869	5.9703	5.0404	5.4463	7.0794	9.5019	12.0648	14.0815	15.0114	15.0114	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
189.5167	191.4833	186.5275	175.9774	162.6596	150.1428	141.7809	139.8143	144.7700	155.3202	168.6379	181.1547	181.1547	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	45.2521	(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)													
-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	-58.5832	(71)
Water heating gains (Table 5)													
90.4274	88.6110	85.1110	77.4391	72.7401	67.8283	64.8110	67.3032	70.2252	75.6754	83.0297	89.4464	89.4464	(72)
Total internal gains	372.0933	370.6104	359.7322	338.9471	318.9137	297.5552	286.5819	288.7405	299.0408	320.6041	343.2928	363.1562	(73)

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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
North			4.1600	11.9814	0.7600	0.7000	0.7700	18.3758 (74)
South			3.6700	50.9848	0.7600	0.7000	0.7700	68.9846 (78)

Solar gains	87.3604	133.2726	181.4374	238.7522	269.9701	292.0805	276.3324	251.0295	214.9643	157.3423	106.9844	74.2185 (83)
Total gains	459.4537	503.8829	541.1696	577.6993	588.8838	589.6357	562.9143	539.7701	514.0051	477.9464	450.2772	437.3747 (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	62.1908	62.5660	62.5660	63.1023	63.1023	63.7648	63.6050	63.9206	63.7648	63.4413	63.4413	62.9272
alpha	5.1461	5.1711	5.1711	5.2068	5.2068	5.2510	5.2403	5.2614	5.2510	5.2294	5.2294	5.1951
util living area	0.9463	0.9167	0.8508	0.7217	0.5415	0.3409	0.2224	0.2382	0.4507	0.7314	0.8973	0.9541 (86)
MIT	20.3526	20.5025	20.7139	20.8976	20.9800	20.9986	20.9999	20.9998	20.9940	20.9089	20.6417	20.3224 (87)
Th 2	20.0999	20.1049	20.1049	20.1118	20.1118	20.1202	20.1182	20.1222	20.1202	20.1161	20.1161	20.1095 (88)
util rest of house	0.9341	0.8993	0.8222	0.6779	0.4854	0.2813	0.1592	0.1729	0.3841	0.6796	0.8732	0.9433 (89)
MIT 2	19.3872	19.5711	19.8174	20.0212	20.0979	20.1196	20.1182	20.1222	20.1171	20.0408	19.7500	19.3588 (90)
Living area fraction	19.9777	20.1407	20.3657	20.5572	20.6374	20.6572	20.6575	20.6590	fLA = Living area / (4) =	20.5718	20.2954	0.6116 (91)
Temperature adjustment	19.8277	19.9907	20.2157	20.4072	20.4874	20.5072	20.5075	20.5090	20.6535	20.4218	20.1454	19.9482 (92)
adjusted MIT												-0.1500
												19.7982 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9298	0.8968	0.8260	0.6929	0.5094	0.3076	0.1871	0.2017	0.4133	0.6983	0.8741	0.9390 (94)
Useful gains	427.1976	451.8714	447.0232	400.3115	299.9999	181.3476	105.3111	108.8654	212.4387	333.7293	393.6005	410.6826 (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	608.4284	590.9445	526.2677	427.8025	304.8521	181.6069	105.3243	108.8845	213.6878	357.2614	491.8598	600.1042 (97)
Space heating kWh	134.8358	93.4572	58.9579	19.7936	3.6101	0.0000	0.0000	0.0000	0.0000	17.5079	70.7467	140.9297 (98a)
Space heating requirement - total per year (kWh/year)												539.8388
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	134.8358	93.4572	58.9579	19.7936	3.6101	0.0000	0.0000	0.0000	0.0000	17.5079	70.7467	140.9297 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												539.8388
Space heating per m2										(98c) / (4) =		12.8076 (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 %)												100.0000 (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	134.8358	93.4572	58.9579	19.7936	3.6101	0.0000	0.0000	0.0000	0.0000	17.5079	70.7467	140.9297 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	134.8358	93.4572	58.9579	19.7936	3.6101	0.0000	0.0000	0.0000	0.0000	17.5079	70.7467	140.9297 (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	131.3553	114.3865	118.5673	99.9247	93.4789	81.4522	80.8109	86.8208	91.4601	106.4750	115.8112	130.2898 (64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	131.3553	114.3865	118.5673	99.9247	93.4789	81.4522	80.8109	86.8208	91.4601	106.4750	115.8112	130.2898 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	12.7841	10.2559	9.2343	6.7654	5.2258	4.2695	4.7671	6.1965	8.0487	10.5603	11.9278	13.1394 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.5896	-13.6270	-21.3288	-26.7970	-30.2897	-30.5069	-29.8791	-27.6018	-22.8638	-17.1974	-11.1836	-8.0597 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-0.0853	-0.2876	-0.9834	-2.3299	-3.5953	-4.2348	-4.1041	-3.4163	-2.3294	-1.0652	-0.2761	-0.0508 (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)

Full SAP Calculation Printout



Annual totals kWh/year		
Space heating fuel - main system 1	539.8388	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	100.0000	
Water heating fuel used	1250.8327	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
central heating pump	41.0000	(230c)
Total electricity for the above, kWh/year	41.0000	(231)
Electricity for lighting (calculated in Appendix L)	103.1747	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-271.6824	(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	1663.1639	(238)

10a. Fuel costs - using BEDF prices (542)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	539.8388	25.1600	135.8234 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1250.8327	25.1600	314.7095 (247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	25.1600	10.3156 (249)
Energy for lighting	103.1747	25.1600	25.9588 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-248.9242	25.1600	-62.6293
PV Unit electricity exported	-22.7581	5.8100	-1.3222
Total			-63.9516 (252)
Total energy cost			422.8557 (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	539.8388	0.1580	85.2943 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1250.8327	0.1418	177.3137 (264)
Space and water heating			262.6080 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	103.1747	0.1443	14.8913 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-248.9242	0.1327	-33.0364
PV Unit electricity exported	-22.7581	0.1172	-2.6678
Total			-35.7042 (269)
Total CO2, kg/year			247.4823 (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	539.8388	1.5849	855.5890 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1250.8327	1.5242	1906.5269 (278)
Space and water heating			2762.1159 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	103.1747	1.5338	158.2529 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-248.9242	1.4904	-370.9915
PV Unit electricity exported	-22.7581	0.4299	-9.7832
Total			-380.7747 (283)
Total Primary energy kWh/year			2601.6188 (286)