

Energy Report

Dwelling Address	Bluestone Drive, 9, Stockport, Greater Manchester, SK4 3PX
Reference	Plot 02 Church Lane, Middleton-Church Lane, Middleton
Assessment Date	02/06/2025
Submission Date	
Property Type	House, Detached
Total Floor Area	164

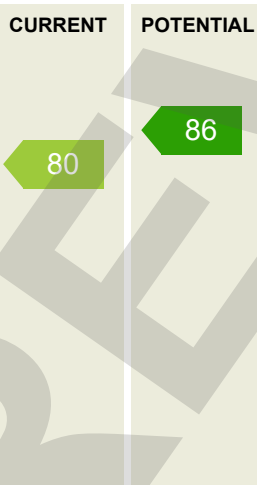
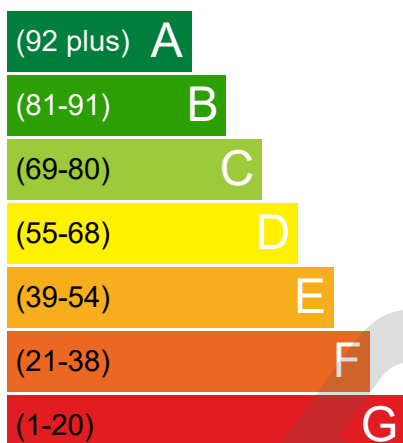
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

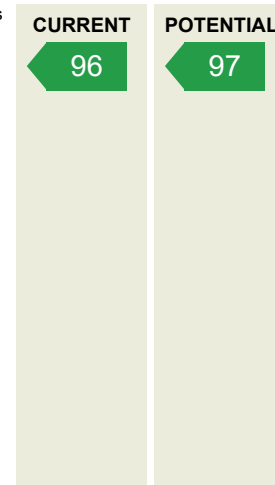
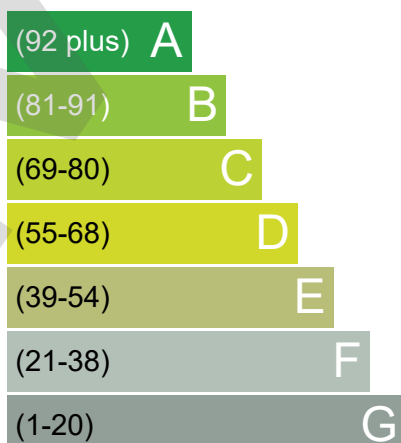
Energy Efficiency Rating

Carbon Dioxide (CO₂) Emissions Rating

Most energy efficient - lower running costs



Very environmentally friendly - lower CO₂ emissions



Additional ratings for your home

	Primary Energy	Energy	Carbon	Cost	HTC
CURRENT	39.27 kWh	4149 kWh	621 kg	1081.13 £	187 W/K
POTENTIAL	28.55 kWh	2964 kWh	465 kg	772.38 £	187 W/K

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good
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Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.18 W/m ² K	Very Good
Roof	Average thermal transmittance 0.16 W/m ² K	Very Good
Floor	Average thermal transmittance 0.12 W/m ² K	Very Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, radiators and underfloor, electric	Good
Main heating controls	Time and temperature zone control	Very Good
Secondary heating	None	
Hot water	From main system	Average
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 5.0 m ³ /h.m ² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£71	B 81	£4,000 - £6,000	£71	A 96
Photovoltaic	£309	B 86	£3,500 - £5,500	£238	A 97

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

The table below shows the estimated running costs of the space and water heating and lighting within the dwelling. It does not include the energy used from household appliances. The estimated annual costs after potential improvements indicates the total energy cost if all recommended measures named above were installed.

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting 	£77	£77	
Heating 	£581	£602	
Hot Water 	£423	£331	
New Technologies e.g. Impact of PV	£0	-(£238)	
TOTAL	£1081	£772	

Estimated energy use and potential savings



Space Heating
2229
kWh per year



Water Heating
1625
kWh per year

About this document

Created by:
Company/Trading name:
Phone number:
Email address:

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g. heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

Primary Energy	The measure of the energy required for lighting, heating and hot water in a property. This includes the efficiency of the property's heating system, power station efficiency for electricity and the energy used to produce the fuel and deliver it to the property.
Energy Used	The estimated amount of fuel energy for lighting, heating and hot water for the property. The estimate is based on typical usage which is likely to be different to actual consumption.
Carbon (CO ₂)	The current emissions based on the energy estimates.
Cost	The estimated cost of energy. The cost of each unit of fuel is based on an industry standard which is likely to be different to those the occupier actually pays.
Heat Transfer Coefficient	Heat flow through the property envelope where internal and external temperatures are different.

Predicted Energy Assessment



Bluestone Drive, 9, Stockport, Greater Manchester, SK4 3PX

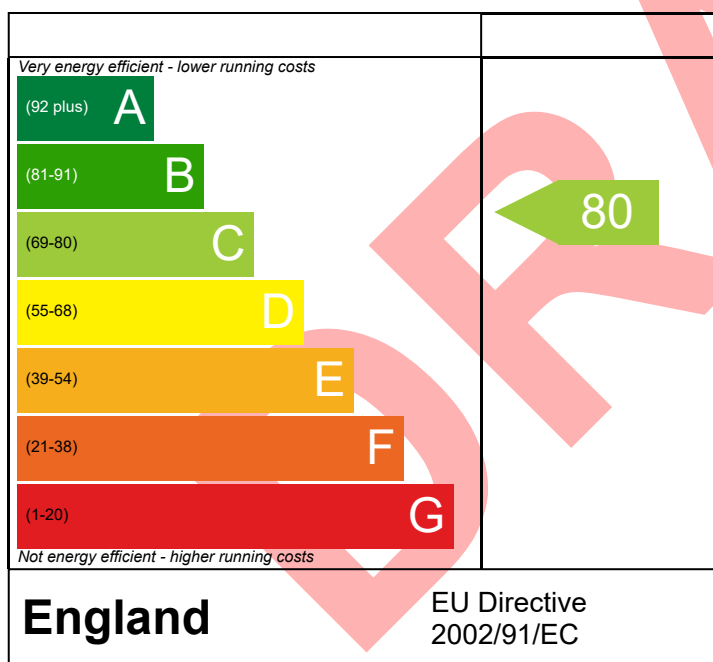
Dwelling type:
Date of assessment:
Produced by:
Total floor area:
DRRN:

House, Detached
10/06/2025
Daniel Watt
164.15 m²

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

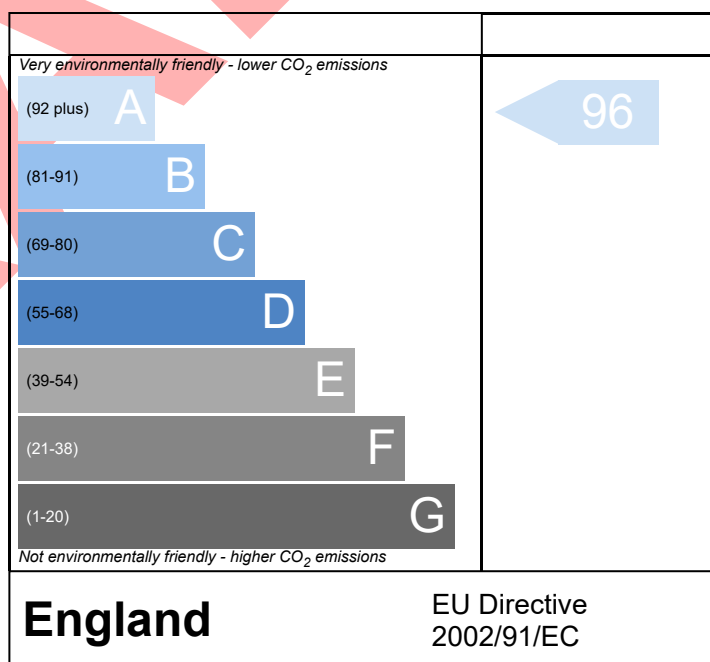
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO₂) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

Full SAP Calculation Printout



Property Reference	Plot 02 Church Lane, Middleton				Issued on Date	10/06/2025
Assessment Reference	Church Lane, Middleton	Prop Type Ref	Church Lane, Middleton			
Property	Bluestone Drive, 9, Stockport, Greater Manchester, SK4 3PX					
SAP Rating	80 C	DER	4.11	TER	10.99	
Environmental	96 A	% DER < TER				62.60
CO ₂ Emissions (t/year)	0.62	DFEE	43.69	TFEE	44.14	
Compliance Check	See BREL	% DFEE < TFEE				1.01
% DPER < TPER	26.12	DPER	42.58	TPER	57.64	
Assessor Details	Mr. Daniel Watt				Assessor ID	AV75-0001
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)
Main dwelling			
Ground floor	58.1600 (1b)	x 2.4000 (2b)	= 139.5840 (1b) - (3b)
First floor	56.8200 (1c)	x 2.6000 (2c)	= 147.7320 (1c) - (3c)
Second floor	49.1700 (1d)	x 2.9000 (2d)	= 142.5930 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	164.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	429.9090 (5)

2. Ventilation rate

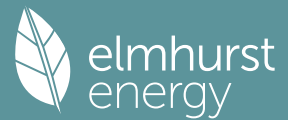
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0930 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3430	(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) =	0.2916 (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	0.3718	0.3645	0.3572	0.3207	0.3135	0.2770	0.2770	0.2697	0.2916	0.3135	0.3280	0.3426 (22b)
Effective ac	0.5691	0.5664	0.5638	0.5514	0.5491	0.5384	0.5384	0.5364	0.5425	0.5491	0.5538	0.5587 (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
Main dwelling							
Door			2.0000	1.3000	2.6000		(26)
Window			28.0400	1.2357	34.6502		(27)
Roof Light			2.4000	1.2357	2.9658		(27a)
Heatloss Floor 1			58.1600	0.1200	6.9792	110.0000	6397.6000 (28a)
External Wall	233.4600	30.0400	203.4200	0.1800	36.6156	140.0000	28478.8009 (29a)
External Roof	61.4600	2.4000	59.0600	0.1600	9.4496	9.0000	531.5400 (30)
Total net area of external elements Aum(A, m ²)			353.0800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	93.2604		(33)
Main dwelling							
Internal Wall			234.2200			100.0000	23422.0001 (32c)
Internal Floor			56.8200			18.0000	1022.7600 (32d)
Internal Floor			49.1700			18.0000	885.0600 (32d)
Internal Ceiling			56.8200			9.0000	511.3800 (32e)
Internal Ceiling			49.1700			9.0000	442.5300 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	61691.6711 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							375.8250 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	20.6000	0.0300	0.6180
E3 Sill	19.6500	0.0400	0.7860
E4 Jamb	56.2000	0.0500	2.8100
E5 Ground floor (normal)	32.0100	0.1600	5.1216
E6 Intermediate floor within a dwelling	40.7000	0.0010	0.0407
E16 Corner (normal)	44.6000	0.0900	4.0140
E17 Corner (inverted - internal area greater than external area)	13.0000	-0.0900	-1.1700
E11 Eaves (insulation at rafter level)	13.4000	0.0400	0.5360
E13 Gable (insulation at rafter level)	26.4800	0.0400	1.0592
R1 Head of roof window	3.2000	0.0800	0.2560
R2 Sill of roof window	3.2000	0.0600	0.1920
R3 Jamb of roof window	6.0000	0.0800	0.4800
R4 Ridge (vaulted ceiling)	14.7000	0.0500	0.7350
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			15.4785 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	108.7389 (37)

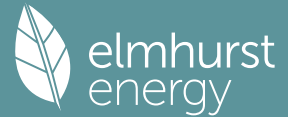
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	80.7393	80.3586	79.9854	78.2326	77.9047	76.3780	76.3780	76.0953	76.9661	77.9047	78.5681	79.2616 (38)
Heat transfer coeff	189.4781	189.0974	188.7242	186.9715	186.6435	185.1169	185.1169	184.8342	185.7049	186.6435	187.3069	188.0005 (39)
Average = Sum(39)m / 12 =												186.9699
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1543	1.1520	1.1497	1.1390	1.1370	1.1277	1.1277	1.1260	1.1313	1.1370	1.1411	1.1453 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.9547 (42)
Hot water usage for mixer showers												
	71.8962	70.7955	69.1733	66.6779	64.4420	61.3141	58.8401	61.7323	63.1870	66.2851	69.5115	71.8314 (42a)
Hot water usage for baths												
	31.1325	30.6625	29.9939	28.9927	28.0904	26.8482	25.9058	27.0582	27.6630	28.8938	30.1734	31.1078 (42b)
Hot water usage for other uses												
	44.8887	43.2563	41.6240	39.9917	38.3594	36.7271	36.7271	38.3594	39.9917	41.6240	43.2563	44.8887 (42c)
Average daily hot water use (litres/day)												135.9578 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	147.9174	144.7144	140.7913	135.6623	130.8918	124.8894	121.4730	127.1499	130.8417	136.8029	142.9413	147.8278 (44)
Energy conte	217.7599	191.4864	201.1879	177.2089	168.6673	144.4304	134.2312	149.6578	151.7698	176.2844	193.1899	217.0960 (45)
Energy content (annual)										Total = Sum(45)m =		2122.9699
Distribution loss (46)m = 0.15 x (45)m												
	32.6640	28.7230	30.1782	26.5813	25.3001	21.6646	20.1347	22.4487	22.7655	26.4427	28.9785	32.5644 (46)
Water storage loss:												
Store volume												300.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0103 (51)
Volume factor from Table 2a												0.7368 (52)
Temperature factor from Table 2b												0.5400 (53)
Enter (49) or (54) in (55)												1.2281 (55)
Total storage loss												
	38.0698	34.3856	38.0698	36.8417	38.0698	36.8417	38.0698	38.0698	36.8417	38.0698	36.8417	38.0698 (56)
If cylinder contains dedicated solar storage												
	38.0698	34.3856	38.0698	36.8417	38.0698	36.8417	38.0698	38.0698	36.8417	38.0698	36.8417	38.0698 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	279.0921	246.8832	262.5201	236.5626	229.9995	203.7841	195.5634	210.9900	211.1236	237.6166	252.5436	278.4282 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	279.0921	246.8832	262.5201	236.5626	229.9995	203.7841	195.5634	210.9900	211.1236	237.6166	252.5436	278.4282 (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)
Heat gains from water heating, kWh/month												
	121.4709	107.9867	115.9607	106.4049	105.1476	95.5061	93.6976	98.8270	97.9465	107.6803	111.7186	121.2502 (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	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	41.6966	37.0346	30.1185	22.8017	17.0445	14.3897	15.5486	20.2106	27.1267	34.4435	40.2007	42.8555 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	500.7977	505.9944	492.8989	465.0200	429.8279	396.7524	374.6558	369.4591	382.5547	410.4335	445.6256	478.7012 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826 (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)												
	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863 (71)
Water heating gains (Table 5)												
	163.2674	160.6945	155.8612	147.7846	141.3275	132.6473	125.9377	132.8319	136.0367	144.7316	155.1648	162.9707 (72)
Total internal gains												
	820.5375	818.4993	793.6544	750.3821	702.9757	658.5652	630.9179	637.2775	660.4939	704.3845	755.7669	799.3032 (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							

Full SAP Calculation Printout



North	4.7900	10.6334	0.7000	0.7000	0.7700	17.2956 (74)
East	12.5500	19.6403	0.7000	0.7000	0.7700	83.6990 (76)
South	2.3500	46.7521	0.7000	0.7000	0.7700	37.3077 (78)
West	8.3500	19.6403	0.7000	0.7000	0.7700	55.6882 (80)
South	2.4000	26.0000	0.7000	0.7000	1.0000	27.5184 (82)

Solar gains	221.5089	423.9777	684.6525	991.8541	1219.0273	1251.6203	1189.9148	1018.1558	792.8120	498.6490	274.2854	183.5074 (83)
Total gains	1042.0464	1242.4770	1478.3069	1742.2362	1922.0030	1910.1854	1820.8326	1655.4333	1453.3059	1203.0335	1030.0522	982.8106 (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	90.4409	90.6230	90.8022	91.6534	91.8145	92.5716	92.5716	92.7132	92.2785	91.8145	91.4893	91.1517
alpha	7.0294	7.0415	7.0535	7.1102	7.1210	7.1714	7.1714	7.1809	7.1519	7.1210	7.0993	7.0768
util living area	0.9997	0.9989	0.9940	0.9592	0.8279	0.6124	0.4466	0.5115	0.8156	0.9871	0.9992	0.9998 (86)
MIT	20.2125	20.3242	20.5119	20.7488	20.9056	20.9514	20.9561	20.9555	20.9228	20.6919	20.4039	20.1933 (87)
Th 2	19.9567	19.9586	19.9604	19.9691	19.9707	19.9783	19.9783	19.9796	19.9753	19.9707	19.9674	19.9640 (88)
util rest of house	0.9996	0.9984	0.9907	0.9382	0.7632	0.5189	0.3433	0.3993	0.7241	0.9772	0.9986	0.9997 (89)
MIT 2	19.0350	19.1796	19.4202	19.7171	19.8801	19.9206	19.9225	19.9238	19.9021	19.6564	19.2894	19.0164 (90)
Living area fraction	19.2297	19.3689	19.6008	19.8877	20.0497	20.0911	20.0935	20.0945	20.0709	19.8277	19.4737	19.2110 (91)
MIT	19.2297	19.3689	19.6008	19.8877	20.0497	20.0911	20.0935	20.0945	20.0709	19.8277	19.4737	19.2110 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2297	19.3689	19.6008	19.8877	20.0497	20.0911	20.0935	20.0945	20.0709	19.8277	19.4737	19.2110 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9994	0.9979	0.9891	0.9362	0.7687	0.5294	0.3550	0.4121	0.7336	0.9752	0.9982	0.9996 (94)
Useful gains	1041.4580	1239.8583	1462.2533	1631.0020	1477.4450	1011.3038	646.4524	682.1673	1066.1613	1173.2389	1028.2414	982.4435 (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	2828.8602	2736.0301	2472.4339	2054.3954	1558.4216	1016.4913	646.7014	682.8624	1108.8271	1722.2878	2317.6835	2822.0827 (97)
Space heating kWh	1329.8272	1005.4274	751.5744	304.8432	60.2466	0.0000	0.0000	0.0000	0.0000	408.4924	928.3983	1368.6915 (98a)
Space heating requirement - total per year (kWh/year)												6157.5011
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	1329.8272	1005.4274	751.5744	304.8432	60.2466	0.0000	0.0000	0.0000	0.0000	408.4924	928.3983	1368.6915 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6157.5011
Space heating per m2										(98c) / (4) =		37.5114 (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 %)												249.9000 (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	1329.8272	1005.4274	751.5744	304.8432	60.2466	0.0000	0.0000	0.0000	0.0000	408.4924	928.3983	1368.6915 (98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)
Space heating fuel (main heating system)	532.1437	402.3319	300.7501	121.9861	24.1083	0.0000	0.0000	0.0000	0.0000	163.4624	371.5079	547.6957 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	279.0921	246.8832	262.5201	236.5626	229.9995	203.7841	195.5634	210.9900	211.1236	237.6166	252.5436	278.4282 (64)
Efficiency of water heater	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000 (216)
Fuel for water heating, kWh/month	159.3901	140.9955	149.9258	135.1014	131.3532	116.3816	111.6867	120.4968	120.5731	135.7034	144.2282	159.0110 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	36.4968	29.2791	26.3626	19.3144	14.9190	12.1889	13.6096	17.6903	22.9779	30.1482	34.0524	37.5112 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2463.9860 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)

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Efficiency of water heater	175.1000	
Water heating fuel used	1624.8470	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	294.5503	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4383.3832	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2463.9860	16.4900	406.3113	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1624.8470	16.4900	267.9373	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	294.5503	16.4900	48.5713	(250)
Additional standing charges			0.0000	(251)
Total energy cost			722.8199	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2442	(257)
SAP value		79.8322	
SAP rating (Section 12)		80	(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	2463.9860	0.1564	385.3566	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1624.8470	0.1408	228.8581	(264)
Space and water heating			614.2147	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	294.5503	0.1443	42.5127	(268)
Total CO2, kg/year			656.7274	(272)
CO2 emissions per m2			4.0000	(273)
EI value			95.7924	
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

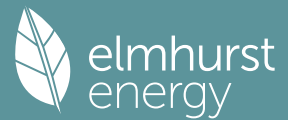
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	58.1600 (1b)	x 2.4000 (2b)	= 139.5840 (1b) - (3b)	
First floor	56.8200 (1c)	x 2.6000 (2c)	= 147.7320 (1c) - (3c)	
Second floor	49.1700 (1d)	x 2.9000 (2d)	= 142.5930 (1d) - (3d)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	164.1500		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	429.9090 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
		Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0930 (8)
Pressure test		Yes
Pressure Test Method		Blower Door

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Measured/design AP50 5.0000 (17)
Infiltration rate 0.3430 (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) = 0.2916 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.3000	4.2000	4.3000	3.9000	3.9000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Adj infilt rate	1.0750	1.0500	1.0750	0.9750	0.9750	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Effective ac	0.3135	0.3062	0.3135	0.2843	0.2843	0.2478	0.2406	0.2406	0.2478	0.2770	0.2770	0.2843 (22b)
	0.5491	0.5469	0.5491	0.5404	0.5404	0.5307	0.5289	0.5289	0.5307	0.5384	0.5384	0.5404 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Door			2.0000	1.3000	2.6000		(26)
Window			28.0400	1.2357	34.6502		(27)
Roof Light			2.4000	1.2357	2.9658		(27a)
Heatloss Floor 1			58.1600	0.1200	6.9792	110.0000	6397.6000 (28a)
External Wall	233.4600	30.0400	203.4200	0.1800	36.6156	140.0000	28478.8009 (29a)
External Roof	61.4600	2.4000	59.0600	0.1600	9.4496	9.0000	531.5400 (30)
Total net area of external elements Aum(A, m2)			353.0800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 93.2604		(33)
Main dwelling							
Internal Wall			234.2200			100.0000	23422.0001 (32c)
Internal Floor			56.8200			18.0000	1022.7600 (32d)
Internal Floor			49.1700			18.0000	885.0600 (32d)
Internal Ceiling			56.8200			9.0000	511.3800 (32e)
Internal Ceiling			49.1700			9.0000	442.5300 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 61691.6711 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 375.8250 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	20.6000	0.0300	0.6180
E3 Sill	19.6500	0.0400	0.7860
E4 Jamb	56.2000	0.0500	2.8100
E5 Ground floor (normal)	32.0100	0.1600	5.1216
E6 Intermediate floor within a dwelling	40.7000	0.0010	0.0407
E16 Corner (normal)	44.6000	0.0900	4.0140
E17 Corner (inverted - internal area greater than external area)	13.0000	-0.0900	-1.1700
E11 Eaves (insulation at rafter level)	13.4000	0.0400	0.5360
E13 Gable (insulation at rafter level)	26.4800	0.0400	1.0592
R1 Head of roof window	3.2000	0.0800	0.2560
R2 Sill of roof window	3.2000	0.0600	0.1920
R3 Jamb of roof window	6.0000	0.0800	0.4800
R4 Ridge (vaulted ceiling)	14.7000	0.0500	0.7350

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 15.4785 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 108.7389 (37)

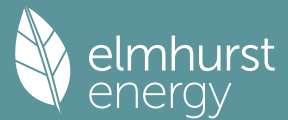
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	77.9047	77.5843	77.9047	76.6683	76.6683	75.2924	75.0399	75.0399	75.2924	76.3780	76.3780	76.6683 (38)
Average = Sum(39)m / 12 =	186.6435	186.3231	186.6435	185.4072	185.4072	184.0313	183.7788	183.7788	184.0313	185.1169	185.1169	185.4072 (39)
												185.1405

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1370	1.1351	1.1370	1.1295	1.1295	1.1211	1.1196	1.1196	1.1211	1.1277	1.1277	1.1295 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9547 (42)
Hot water usage for mixer showers												
Hot water usage for baths	71.8962	70.7955	69.1733	66.6779	64.4420	61.3141	58.8401	61.7323	63.1870	66.2851	69.5115	71.8314 (42a)
Hot water usage for other uses	31.1325	30.6625	29.9939	28.9927	28.0904	26.8482	25.9058	27.0582	27.6630	28.8938	30.1734	31.1078 (42b)
Average daily hot water use (litres/day)	44.8887	43.2563	41.6240	39.9917	38.3594	36.7271	36.7271	38.3594	39.9917	41.6240	43.2563	44.8887 (42c)
												135.9578 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	147.9174	144.7144	140.7913	135.6623	130.8918	124.8894	121.4730	127.1499	130.8417	136.8029	142.9413	147.8278 (44)
Energy content (annual)	217.7599	191.4864	201.1879	177.2089	168.6673	144.4304	134.2312	149.6578	151.7698	176.2844	193.1899	217.0960 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	32.6640	28.7230	30.1782	26.5813	25.3001	21.6646	20.1347	22.4487	22.7655	26.4427	28.9785	32.5644 (46)
Store volume												300.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0103 (51)
Volume factor from Table 2a												0.7368 (52)
Temperature factor from Table 2b												0.5400 (53)
Enter (49) or (54) in (55)												1.2281 (55)
Total storage loss	38.0698	34.3856	38.0698	36.8417	38.0698	36.8417	38.0698	38.0698	36.8417	38.0698	36.8417	38.0698 (56)
If cylinder contains dedicated solar storage												
Primary loss	38.0698	34.3856	38.0698	36.8417	38.0698	36.8417	38.0698	38.0698	36.8417	38.0698	36.8417	38.0698 (57)
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
WWHRS	279.0921	246.8832	262.5201	236.5626	229.9995	203.7841	195.5634	210.9900	211.1236	237.6166	252.5436	278.4282 (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)
												0.0000 (63d)

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Output from w/h	279.0921	246.8832	262.5201	236.5626	229.9995	203.7841	195.5634	210.9900	211.1236	237.6166	252.5436	278.4282 (64)
	Total per year (kWh/year) = Sum(64)m = 2845.1070 (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	121.4709	107.9867	115.9607	106.4049	105.1476	95.5061	93.6976	98.8270	97.9465	107.6803	111.7186	121.2502 (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	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	41.6966	37.0346	30.1185	22.8017	17.0445	14.3897	15.5486	20.2106	27.1267	34.4435	40.2007	42.8555	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	500.7977	505.9944	492.8989	465.0200	429.8279	396.7524	374.6558	369.4591	382.5547	410.4335	445.6256	478.7012	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	(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)	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	(71)
Water heating gains (Table 5)	163.2674	160.6945	155.8612	147.7846	141.3275	132.6473	125.9377	132.8319	136.0367	144.7316	155.1648	162.9707	(72)
Total internal gains	820.5375	818.4993	793.6544	750.3821	702.9757	658.5652	630.9179	637.2775	660.4939	704.3845	755.7669	799.3032	(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					4.7900	9.3942		0.7000	0.7000		0.7700		15.2800 (74)	
East					12.5500	17.3606		0.7000	0.7000		0.7700		73.9839 (76)	
South					2.3500	41.2355		0.7000	0.7000		0.7700		32.9055 (78)	
West					8.3500	17.3606		0.7000	0.7000		0.7700		49.2244 (80)	
South					2.4000	23.0000		0.7000	0.7000		1.0000		24.3432 (82)	
Solar gains	195.7370	384.3467	648.4954	958.2795	1148.7620	1207.4500	1120.2900	952.8661	778.4999	483.1032	257.3895	174.5741	(83)	
Total gains	1016.2746	1202.8459	1442.1498	1708.6616	1851.7377	1866.0152	1751.2079	1590.1436	1438.9938	1187.4877	1013.1564	973.8773	(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	91.8145	91.9723	91.8145	92.4267	92.4267	93.1177	93.2457	93.2457	93.1177	92.5716	92.5716	92.4267
alpha	7.1210	7.1315	7.1210	7.1618	7.1618	7.2078	7.2164	7.2164	7.2078	7.1714	7.1714	7.1618
util living area	0.9997	0.9988	0.9932	0.9472	0.7763	0.5394	0.4089	0.4727	0.7838	0.9829	0.9990	0.9998 (86)
MIT	20.2648	20.3708	20.5485	20.7891	20.9275	20.9549	20.9567	20.9563	20.9328	20.7293	20.4471	20.2434 (87)
Th 2	19.9707	19.9723	19.9707	19.9768	19.9768	19.9836	19.9849	19.9849	19.9836	19.9783	19.9783	19.9768 (88)
util rest of house	0.9995	0.9982	0.9893	0.9197	0.6983	0.4415	0.3027	0.3564	0.6841	0.9692	0.9983	0.9997 (89)
MIT 2	19.1138	19.2509	19.4753	19.7706	19.9041	19.9277	19.9295	19.9295	19.9171	19.7089	19.3538	19.0915 (90)
Living area fraction	fLA = Living area / (4) = 0.1654 (91)											
MIT	19.3041	19.4361	19.6528	19.9390	20.0734	20.0976	20.0994	20.0993	20.0851	19.8776	19.5346	19.2820 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.3041	19.4361	19.6528	19.9390	20.0734	20.0976	20.0994	20.0993	20.0851	19.8776	19.5346	19.2820 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9994	0.9977	0.9876	0.9185	0.7062	0.4526	0.3147	0.3696	0.6950	0.9674	0.9979	0.9996	(94)
Useful gains	1015.6257	1200.0461	1424.2979	1569.3334	1307.6423	844.5484	551.1408	587.6818	1000.1086	1148.7368	1010.9937	973.4422	(95)
Ext temp.	5.0000	5.6000	7.1000	9.7000	12.8000	15.5000	17.1000	16.9000	14.5000	11.2000	7.7000	4.8000	(96)
Heat loss rate W	2669.7743	2577.9879	2342.9019	1898.3872	1348.5364	846.0968	551.2309	587.9642	1027.8350	1606.3768	2190.7914	2685.0668	(97)
Space heating kWh	1230.6865	925.9769	683.4414	236.9187	30.4252	0.0000	0.0000	0.0000	0.0000	340.4841	849.4543	1273.4487	(98a)
Space heating requirement - total per year (kWh/year)												5570.8359	
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	1230.6865	925.9769	683.4414	236.9187	30.4252	0.0000	0.0000	0.0000	0.0000	340.4841	849.4543	1273.4487	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5570.8359	
Space heating per m2												(98c) / (4) = 33.9375	(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 %)												249.9000	(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	1230.6865	925.9769	683.4414	236.9187	30.4252	0.0000	0.0000	0.0000	0.0000	340.4841	849.4543	1273.4487	(98)
Space heating efficiency (main heating system 1)													

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	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	492.4716	370.5390	273.4860	94.8054	12.1750	0.0000	0.0000	0.0000	0.0000	136.2481	339.9177	509.5833	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	279.0921	246.8832	262.5201	236.5626	229.9995	203.7841	195.5634	210.9900	211.1236	237.6166	252.5436	278.4282	(64)
Efficiency of water heater	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(216)
Fuel for water heating, kWh/month	159.3901	140.9955	149.9258	135.1014	131.3532	116.3816	111.6867	120.4968	120.5731	135.7034	144.2282	159.0110	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	36.4968	29.2791	26.3626	19.3144	14.9190	12.1889	13.6096	17.6903	22.9779	30.1482	34.0524	37.5112	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2229.2260	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1624.8470	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												294.5503	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4148.6233	(238)

10a. Fuel costs - using BEDF prices (572)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2229.2260	26.0600	580.9363	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1624.8470	26.0600	423.4351	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	294.5503	26.0600	76.7598	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1081.1312	(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	2229.2260	0.1568	349.4861	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1624.8470	0.1408	228.8581	(264)
Space and water heating			578.3443	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	294.5503	0.1443	42.5127	(268)
Total CO2, kg/year			620.8570	(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	2229.2260	1.5804	3523.0711	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1624.8470	1.5208	2471.0756	(278)
Space and water heating			5994.1467	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	294.5503	1.5338	451.7910	(282)
Total Primary energy kWh/year			6445.9378	(286)

SAP 10 EPC IMPROVEMENTS

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Church Lane, Middleton

Current energy efficiency rating:
Current environmental impact rating:

C 80
A 96

N Solar water heating
U Solar photovoltaic panels
V2 Wind turbine

Recommended
Recommended
Not applicable

Recommended measures:

N Solar water heating	SAP change	Cost change	CO2 change
U Solar photovoltaic panels	+ 1.3	-£ 71	-33 kg (5.4%)
	+ 4.4	-£ 238	-123 kg (20.8%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£71	0.20 kg/m²	B 81 A 96
Solar photovoltaic panels	£238	0.75 kg/m²	B 86 A 97
Total Savings	£309	0.95 kg/m²	

Potential energy efficiency rating: B 86
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 572 TEST (30 May 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, North West England):

	Current	Potential	Saving
Electricity	£1081	£1011	£71
Space heating	£581	£602	-£21
Water heating	£423	£331	£92
Lighting	£77	£77	£0
Generated (PV)	-£0	-£238	£238
Total cost of fuels	£1081	£773	£309
Total cost of uses	£1081	£772	£309
Delivered energy	25 kWh/m²	18 kWh/m²	7 kWh/m²
Carbon dioxide emissions	0.6 tonnes	0.5 tonnes	0.2 tonnes
CO2 emissions per m²	4 kg/m²	3 kg/m²	1 kg/m²
Primary energy	39 kWh/m²	29 kWh/m²	11 kWh/m²

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

1. Overall dwelling characteristics

Main dwelling	Area (m²)	Storey height (m)	Volume (m³)
Ground floor	58.1600 (1b)	x 2.4000 (2b)	= 139.5840 (1b) - (3b)
First floor	56.8200 (1c)	x 2.6000 (2c)	= 147.7320 (1c) - (3c)
Second floor	49.1700 (1d)	x 2.9000 (2d)	= 142.5930 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	164.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 429.9090 (5)

2. Ventilation rate

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

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.0930 (8)

Pressure test

Pressure Test Method

Measured/design AP50

Infiltration rate

Number of sides sheltered

Shelter factor

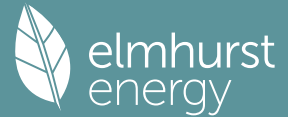
Infiltration rate adjusted to include shelter factor

(20) = 1 - [0.075 x (19)] = 0.8500 (20)

(21) = (18) x (20) = 0.2916 (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	0.3718	0.3645	0.3572	0.3207	0.3135	0.2770	0.2770	0.2697	0.2916	0.3135	0.3280	0.3426 (22b)
Effective ac	0.5691	0.5664	0.5638	0.5514	0.5491	0.5384	0.5384	0.5364	0.5425	0.5491	0.5538	0.5587 (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	
Main dwelling								
Door			2.0000	1.3000	2.6000			(26)
Window			28.0400	1.2357	34.6502			(27)
Roof Light			2.4000	1.2357	2.9658			(27a)
Heatloss Floor 1			58.1600	0.1200	6.9792	110.0000	6397.6000	(28a)
External Wall	233.4600	30.0400	203.4200	0.1800	36.6156	140.0000	28478.8009	(29a)
External Roof	61.4600	2.4000	59.0600	0.1600	9.4496	9.0000	531.5400	(30)
Total net area of external elements Aum(A, m2)			353.0800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	93.2604			(33)
Main dwelling								
Internal Wall			234.2200			100.0000	23422.0001	(32c)
Internal Floor			56.8200			18.0000	1022.7600	(32d)
Internal Floor			49.1700			18.0000	885.0600	(32d)
Internal Ceiling			56.8200			9.0000	511.3800	(32e)
Internal Ceiling			49.1700			9.0000	442.5300	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 61691.6711 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 375.8250 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	20.6000	0.0300	0.6180
E3 Sill	19.6500	0.0400	0.7860
E4 Jamb	56.2000	0.0500	2.8100
E5 Ground floor (normal)	32.0100	0.1600	5.1216
E6 Intermediate floor within a dwelling	40.7000	0.0010	0.0407
E16 Corner (normal)	44.6000	0.0900	4.0140
E17 Corner (inverted - internal area greater than external area)	13.0000	-0.0900	-1.1700
E11 Eaves (insulation at rafter level)	13.4000	0.0400	0.5360
E13 Gable (insulation at rafter level)	26.4800	0.0400	1.0592
R1 Head of roof window	3.2000	0.0800	0.2560
R2 Sill of roof window	3.2000	0.0600	0.1920
R3 Jamb of roof window	6.0000	0.0800	0.4800
R4 Ridge (vaulted ceiling)	14.7000	0.0500	0.7350

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 15.4785 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 108.7389 (37)

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

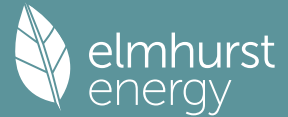
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	80.7393	80.3586	79.9854	78.2326	77.9047	76.3780	76.3780	76.0953	76.9661	77.9047	78.5681	79.2616	(38)
Heat transfer coeff	189.4781	189.0974	188.7242	186.9715	186.6435	185.1169	185.1169	184.8342	185.7049	186.6435	187.3069	188.0005	(39)
Average = Sum(39)m / 12 =													186.9699

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1543	1.1520	1.1497	1.1390	1.1370	1.1277	1.1277	1.1260	1.1313	1.1370	1.1411	1.1453	(40)
HLP (average)													1.1390
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9547 (42)
Hot water usage for mixer showers													
71.8962	70.7955	69.1733	66.6779	64.4420	61.3141	58.8401	61.7323	63.1870	66.2851	69.5115	71.8314		(42a)
Hot water usage for baths													
31.1325	30.6625	29.9939	28.9927	28.0904	26.8482	25.9058	27.0582	27.6630	28.8938	30.1734	31.1078		(42b)
Hot water usage for other uses													
44.8887	43.2563	41.6240	39.9917	38.3594	36.7271	36.7271	38.3594	39.9917	41.6240	43.2563	44.8887		(42c)
Average daily hot water use (litres/day)													135.9578 (43)
Daily hot water use													
147.9174	144.7144	140.7913	135.6623	130.8918	124.8894	121.4730	127.1499	130.8417	136.8029	142.9413	147.8278		(44)
Energy conte	217.7599	191.4864	201.1879	177.2089	168.6673	144.4304	134.2312	149.6578	151.7698	176.2844	193.1899	217.0960	(45)
Energy content (annual)													2122.9699
Distribution loss (46)m = 0.15 x (45)m													
32.6640	28.7230	30.1782	26.5813	25.3001	21.6646	20.1347	22.4487	22.7655	26.4427	28.9785	32.5644		(46)
Water storage loss:													
Store volume													300.0000 (47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)													0.0103 (51)
Volume factor from Table 2a													0.7368 (52)
Temperature factor from Table 2b													0.5400 (53)
Enter (49) or (54) in (55)													1.2281 (55)
Total storage loss													
38.0698	34.3856	38.0698	36.8417	38.0698	36.8417	38.0698	38.0698	36.8417	38.0698	36.8417	38.0698		(56)
If cylinder contains dedicated solar storage													
38.0698	34.3856	38.0698	36.8417	38.0698	36.8417	38.0698	38.0698	36.8417	38.0698	36.8417	38.0698		(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(61)
Total heat required for water heating calculated for each month													
279.0921	246.8832	261.1243	229.8090	217.2052	191.1774	182.5364	198.8935	205.7207	236.2208	252.5436	278.4282		(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000		(63b)
Aperture area of solar collector													3.0000 (H1)
Zero-loss collector efficiency													0.8000 (H2)
Collector linear heat loss coefficient													1.8000 (H3)
Collector 2nd order heat loss coefficient													0.0000 (H4)
Collector loop efficiency													0.9000 (H5)
Incidence angle modifier													1.0000 (H6)
Overshading factor													0.8000 (H8)
Overall heat loss coefficient of system													6.5000 (H10)
Heat loss coefficient of collector loop													3.9667 (H11)
Dedicated solar storage volume													75.0000 (H12)
Effective solar volume													75.0000 (H14)
Reference volume													225.0000 (H15)
Storage tank correction coefficient													1.3161 (H16)
Heat delivered to hot water													588.7611 (H24)
Heat delivered to space heating													0.0000 (H29)
Solar input													588.7611
Solar input	-0.0000	-10.1072	-52.1087	-77.5145	-103.3439	-93.9480	-91.0332	-81.6722	-54.2051	-24.8284	-0.0000	-0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)
Output from w/h													
279.0921	236.7760	209.0157	152.2945	113.8613	97.2294	91.5033	117.2213	151.5156	211.3925	252.5436	278.4282		(64)

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Electric shower(s)											Total per year (kWh/year) = Sum(64)m = 2190.8735 (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)	0.0000 (64a)
Heat gains from water heating, kWh/month											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)	
121.4709	107.9867	114.8441	101.0021	94.9122	85.4207	83.2761	89.1498	93.6242	106.5637	111.7186	121.2502 (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	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	41.6966	37.0346	30.1185	22.8017	17.0445	14.3897	15.5486	20.2106	27.1267	34.4435	40.2007	42.8555 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	500.7977	505.9944	492.8989	465.0200	429.8279	396.7524	374.6558	369.4591	382.5547	410.4335	445.6256	478.7012 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826 (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)												
	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863 (71)
Water heating gains (Table 5)												
	163.2674	160.6945	154.3604	140.2806	127.5701	118.6399	111.9302	119.8250	130.0335	143.2308	155.1648	162.9707 (72)
Total internal gains												
	820.5375	818.4993	792.1536	742.8781	689.2184	644.5577	616.9104	624.2705	654.4907	702.8837	755.7669	799.3032 (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					4.7900	10.6334	0.7000		0.7000	0.7700		17.2956 (74)	
East					12.5500	19.6403	0.7000		0.7000	0.7700		83.6990 (76)	
South					2.3500	46.7521	0.7000		0.7000	0.7700		37.3077 (78)	
West					8.3500	19.6403	0.7000		0.7000	0.7700		55.6882 (80)	
South					2.4000	26.0000	0.7000		0.7000	1.0000		27.5184 (82)	
Solar gains	221.5089	423.9777	684.6525	991.8541	1219.0273	1251.6203	1189.9148	1018.1558	792.8120	498.6490	274.2854	183.5074 (83)	
Total gains	1042.0464	1242.4770	1476.8061	1734.7322	1908.2456	1896.1780	1806.8252	1642.4263	1447.3027	1201.5327	1030.0522	982.8106 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	90.4409	90.6230	90.8022	91.6534	91.8145	92.5716	92.5716	92.7132	92.2785	91.8145	91.4893	91.1517
alpha	7.0294	7.0415	7.0535	7.1102	7.1210	7.1714	7.1714	7.1809	7.1519	7.1210	7.0993	7.0768
util living area												
	0.9997	0.9989	0.9940	0.9601	0.8316	0.6166	0.4500	0.5155	0.8178	0.9872	0.9992	0.9998 (86)
MIT												
	20.2125	20.3242	20.5114	20.7468	20.9041	20.9512	20.9561	20.9554	20.9222	20.6914	20.4039	20.1933 (87)
Th 2												
	19.9567	19.9586	19.9604	19.9691	19.9707	19.9783	19.9783	19.9796	19.9753	19.9707	19.9674	19.9640 (88)
util rest of house												
	0.9996	0.9984	0.9908	0.9394	0.7674	0.5226	0.3460	0.4025	0.7265	0.9773	0.9986	0.9997 (89)
MIT 2												
	19.0350	19.1796	19.4196	19.7149	19.8789	19.9205	19.9225	19.9238	19.9017	19.6558	19.2894	19.0164 (90)
Living area fraction												
	FLA = Living area / (4) =											0.1654 (91)
MIT												
	19.2297	19.3689	19.6002	19.8855	20.0485	20.0910	20.0935	20.0944	20.0705	19.8271	19.4737	19.2110 (92)
Temperature adjustment												
	adjusted MIT	19.2297	19.3689	19.6002	19.8855	20.0485	20.0910	20.0935	20.0944	20.0705	19.8271	19.4737
												19.2110 (93)

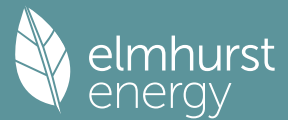
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9994	0.9979	0.9892	0.9373	0.7727	0.5332	0.3578	0.4153	0.7360	0.9754	0.9982	0.9996 (94)
Useful gains	1041.4580	1239.8583	1460.8571	1625.9776	1474.5476	1011.0462	646.4379	682.1270	1065.2235	1171.9610	1028.2414	982.4435 (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												
	2828.8602	2736.0301	2472.3185	2053.9824	1558.1912	1016.4700	646.7000	682.8585	1108.7522	1722.1828	2317.6835	2822.0827 (97)
Space heating kWh												
	1329.8272	1005.4274	752.5273	308.1635	62.2308	0.0000	0.0000	0.0000	0.0000	409.3651	928.3983	1368.6915 (98a)
Space heating requirement - total per year (kWh/year)												
												6164.6312
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												
	1329.8272	1005.4274	752.5273	308.1635	62.2308	0.0000	0.0000	0.0000	0.0000	409.3651	928.3983	1368.6915 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												
												6164.6312
Space heating per m2												
										(98c) / (4) =		37.5549 (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 %)												249.9000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												
	1329.8272	1005.4274	752.5273	308.1635	62.2308	0.0000	0.0000	0.0000	0.0000	409.3651	928.3983	1368.6915 (98)
Space heating efficiency (main heating system 1)												
	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)
Space heating fuel (main heating system)												

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Space heating efficiency (main heating system 2)	532.1437	402.3319	301.1314	123.3147	24.9023	0.0000	0.0000	0.0000	0.0000	163.8116	371.5079	547.6957	(211)
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	(212)
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	(213)
Water heating requirement	279.0921	236.7760	209.0157	152.2945	113.8613	97.2294	91.5033	117.2213	151.5156	211.3925	252.5436	278.4282	(64)
Efficiency of water heater	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(216)
Fuel for water heating, kWh/month	159.3901	135.2233	119.3693	86.9757	65.0264	55.5279	52.2577	66.9453	86.5309	120.7267	144.2282	159.0110	(217)
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	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	36.4968	29.2791	26.3626	19.3144	14.9190	12.1889	13.6096	17.6903	22.9779	30.1482	34.0524	37.5112	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-40.6264	-61.9243	-94.0072	-107.1004	-112.6783	-104.1360	-102.4267	-95.8357	-83.4879	-70.9303	-45.9542	-34.6215	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2466.8392	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	(216)
Water heating fuel used												1251.2128	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												294.5503	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-953.7289	(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												3138.8734	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2466.8392	16.4900	406.7818 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1251.2128	16.4900	206.3250 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	16.4900	13.1920 (249)
Energy for lighting	294.5503	16.4900	48.5713 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-953.7289	16.4900	-157.2699
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-157.2699 (252)
Total energy cost			517.6002 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.8909 (257)
SAP value		85.5582
SAP rating (Section 12)		86 (258)
SAP band		B

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	2466.8392	0.1564	385.7572 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1251.2128	0.1451	181.5355 (264)
Space and water heating			567.2927 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	294.5503	0.1443	42.5127 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-953.7289	0.1343	-128.1157
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-128.1157 (269)
Total CO2, kg/year			492.7867 (272)
CO2 emissions per m2			3.0000 (273)

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EI value 96.8428
EI rating 97 (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

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	58.1600 (1b)	x 2.4000 (2b)	= 139.5840 (1b) - (3b)
First floor	56.8200 (1c)	x 2.6000 (2c)	= 147.7320 (1c) - (3c)
Second floor	49.1700 (1d)	x 2.9000 (2d)	= 142.5930 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	164.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	429.9090 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.0930 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3430 (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) = 0.2916 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.3000	3.9000	3.9000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000
Wind factor	1.0750	1.0500	1.0750	0.9750	0.9750	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750
Adj infilt rate	0.3135	0.3062	0.3135	0.2843	0.2843	0.2478	0.2406	0.2406	0.2478	0.2770	0.2770	0.2843
Effective ac	0.5491	0.5469	0.5491	0.5404	0.5404	0.5307	0.5289	0.5289	0.5307	0.5384	0.5384	0.5404

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
Main dwelling							
Door			2.0000	1.3000	2.6000		(26)
Window			28.0400	1.2357	34.6502		(27)
Roof Light			2.4000	1.2357	2.9658		(27a)
Heatloss Floor 1			58.1600	0.1200	6.9792	110.0000	6397.6000 (28a)
External Wall	233.4600	30.0400	203.4200	0.1800	36.6156	140.0000	28478.8009 (29a)
External Roof	61.4600	2.4000	59.0600	0.1600	9.4496	9.0000	531.5400 (30)
Total net area of external elements Aum(A, m2)			353.0800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		93.2604		(33)
Main dwelling							
Internal Wall			234.2200			100.0000	23422.0001 (32c)
Internal Floor			56.8200			18.0000	1022.7600 (32d)
Internal Floor			49.1700			18.0000	885.0600 (32d)
Internal Ceiling			56.8200			9.0000	511.3800 (32e)
Internal Ceiling			49.1700			9.0000	442.5300 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 61691.6711 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 375.8250 (35)

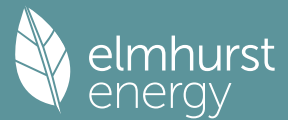
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	20.6000	0.0300	0.6180
E3 Sill	19.6500	0.0400	0.7860
E4 Jamb	56.2000	0.0500	2.8100
E5 Ground floor (normal)	32.0100	0.1600	5.1216
E6 Intermediate floor within a dwelling	40.7000	0.0010	0.0407
E16 Corner (normal)	44.6000	0.0900	4.0140
E17 Corner (inverted - internal area greater than external area)	13.0000	-0.0900	-1.1700
E11 Eaves (insulation at rafter level)	13.4000	0.0400	0.5360
E13 Gable (insulation at rafter level)	26.4800	0.0400	1.0592
R1 Head of roof window	3.2000	0.0800	0.2560
R2 Sill of roof window	3.2000	0.0600	0.1920
R3 Jamb of roof window	6.0000	0.0800	0.4800
R4 Ridge (vaulted ceiling)	14.7000	0.0500	0.7350

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 15.4785 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 108.7389 (37)

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

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(38)m	77.9047	77.5843	77.9047	76.6683	76.6683	75.2924	75.0399	75.0399	75.2924	76.3780	76.3780	76.6683 (38)
Heat transfer coeff	186.6435	186.3231	186.6435	185.4072	185.4072	184.0313	183.7788	183.7788	184.0313	185.1169	185.1169	185.4072 (39)
Average = Sum(39)m / 12 =												185.1405
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1370	1.1351	1.1370	1.1295	1.1295	1.1211	1.1196	1.1196	1.1211	1.1277	1.1277	1.1295 (40)
HLP (average)												1.1279
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9547 (42)
Hot water usage for mixer showers												
71.8962	70.7955	69.1733	66.6779	64.4420	61.3141	58.8401	61.7323	63.1870	66.2851	69.5115	71.8314 (42a)	
Hot water usage for baths												
31.1325	30.6625	29.9939	28.9927	28.0904	26.8482	25.9058	27.0582	27.6630	28.8938	30.1734	31.1078 (42b)	
Hot water usage for other uses												
44.8887	43.2563	41.6240	39.9917	38.3594	36.7271	36.7271	38.3594	39.9917	41.6240	43.2563	44.8887 (42c)	
Average daily hot water use (litres/day)												135.9578 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	147.9174	144.7144	140.7913	135.6623	130.8918	124.8894	121.4730	127.1499	130.8417	136.8029	142.9413	147.8278 (44)
Energy content (annual)	217.7599	191.4864	201.1879	177.2089	168.6673	144.4304	134.2312	149.6578	151.7698	176.2844	193.1899	217.0960 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2122.9699
32.6640	28.7230	30.1782	26.5813	25.3001	21.6646	20.1347	22.4487	22.7655	26.4427	28.9785	32.5644 (46)	
Water storage loss:												
Store volume												300.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0103 (51)
Volume factor from Table 2a												0.7368 (52)
Temperature factor from Table 2b												0.5400 (53)
Enter (49) or (54) in (55)												1.2281 (55)
Total storage loss												
38.0698	34.3856	38.0698	36.8417	38.0698	36.8417	38.0698	38.0698	36.8417	38.0698	36.8417	38.0698 (56)	
If cylinder contains dedicated solar storage												
38.0698	34.3856	38.0698	36.8417	38.0698	36.8417	38.0698	38.0698	36.8417	38.0698	36.8417	38.0698 (57)	
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
279.0921	246.8832	261.1243	229.8090	217.2052	191.1774	182.5364	198.8935	205.7207	236.2208	252.5436	278.4282 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)	
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)
Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												552.8561 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												552.8561
Solar input	-0.0000	-5.6967	-47.8119	-74.6979	-97.4290	-90.9152	-84.9735	-75.1633	-52.9457	-23.2229	-0.0000	-0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h	279.0921	241.1865	213.3124	155.1111	119.7762	100.2622	97.5630	123.7302	152.7750	212.9979	252.5436	278.4282 (64)
										Total per year (kWh/year) = Sum(64)m =		2226.7785 (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												
121.4709	107.9867	114.8441	101.0021	94.9122	85.4207	83.2761	89.1498	93.6242	106.5637	111.7186	121.2502 (65)	

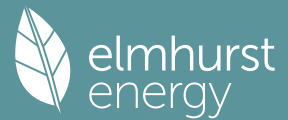
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795	177.2795 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	41.6966	37.0346	30.1185	22.8017	17.0445	14.3897	15.5486	20.2106	27.1267	34.4435	40.2007	42.8555 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	500.7977	505.9944	492.8989	465.0200	429.8279	396.7524	374.6558	369.4591	382.5547	410.4335	445.6256	478.7012 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826	55.6826 (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)	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863	-118.1863 (71)
Water heating gains (Table 5)	163.2674	160.6945	154.3604	140.2806	127.5701	118.6399	111.9302	119.8250	130.0335	143.2308	155.1648	162.9707 (72)
Total internal gains	820.5375	818.4993	792.1536	742.8781	689.2184	644.5577	616.9104	624.2705	654.4907	702.8837	755.7669	799.3032 (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	4.7900	9.3942	0.7000	0.7000	0.7700	15.2800 (74)
East	12.5500	17.3606	0.7000	0.7000	0.7700	73.9839 (76)
South	2.3500	41.2355	0.7000	0.7000	0.7700	32.9055 (78)
West	8.3500	17.3606	0.7000	0.7000	0.7700	49.2244 (80)

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South	2.4000		23.0000		0.7000		0.7000		1.0000		24.3432 (82)	
Solar gains	195.7370	384.3467	648.4954	958.2795	1148.7620	1207.4500	1120.2900	952.8661	778.4999	483.1032	257.3895	174.5741 (83)
Total gains	1016.2746	1202.8459	1440.6490	1701.1576	1837.9804	1852.0077	1737.2004	1577.1367	1432.9906	1185.9869	1013.1564	973.8773 (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	91.8145	91.9723	91.8145	92.4267	92.4267	93.1177	93.2457	93.2457	93.1177	92.5716	92.5716	92.4267
alpha	7.1210	7.1315	7.1210	7.1618	7.1618	7.2078	7.2164	7.2164	7.2078	7.1714	7.1714	7.1618
util living area	0.9997	0.9988	0.9932	0.9482	0.7805	0.5433	0.4122	0.4765	0.7862	0.9830	0.9990	0.9998 (86)
MIT	20.2648	20.3708	20.5480	20.7872	20.9265	20.9548	20.9567	20.9562	20.9324	20.7288	20.4471	20.2434 (87)
Th 2	19.9707	19.9723	19.9707	19.9768	19.9768	19.9836	19.9849	19.9849	19.9836	19.9783	19.9783	19.9768 (88)
util rest of house	0.9995	0.9982	0.9893	0.9212	0.7027	0.4448	0.3052	0.3593	0.6866	0.9694	0.9983	0.9997 (89)
MIT 2	19.1138	19.2509	19.4747	19.7686	19.9034	19.9276	19.9295	19.9295	19.9169	19.7083	19.3538	19.0915 (90)
Living area fraction	19.3041	19.4361	19.6522	19.9371	20.0727	20.0975	20.0994	20.0993	20.0848	fLA = Living area / (4) =	19.5346	0.1654 (91)
MIT	19.3041	19.4361	19.6522	19.9371	20.0727	20.0975	20.0994	20.0993	20.0848	19.8771	19.5346	19.2820 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3041	19.4361	19.6522	19.9371	20.0727	20.0975	20.0994	20.0993	20.0848	19.8771	19.5346	19.2820 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9994	0.9977	0.9877	0.9199	0.7105	0.4560	0.3173	0.3726	0.6975	0.9676	0.9979	0.9996 (94)
Useful gains	1015.6257	1200.0461	1422.9160	1564.8496	1305.9388	844.4649	551.1351	587.6641	999.4494	1147.5215	1010.9937	973.4422 (95)
Ext temp.	5.0000	5.6000	7.1000	9.7000	12.8000	15.5000	17.1000	16.9000	14.5000	11.2000	7.7000	4.8000 (96)
Heat loss rate W	2669.7743	2577.9879	2342.7887	1898.0226	1348.4017	846.0895	551.2302	587.9623	1027.7823	1606.2776	2190.7914	2685.0668 (97)
Space heating kWh	1230.6865	925.9769	684.3853	239.8846	31.5924	0.0000	0.0000	0.0000	0.0000	341.3145	849.4543	1273.4487 (98a)
Space heating requirement - total per year (kWh/year)												5576.7433
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	1230.6865	925.9769	684.3853	239.8846	31.5924	0.0000	0.0000	0.0000	0.0000	341.3145	849.4543	1273.4487 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5576.7433
Space heating per m2										(98c) / (4) =		33.9735 (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 %)												249.9000 (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	1230.6865	925.9769	684.3853	239.8846	31.5924	0.0000	0.0000	0.0000	0.0000	341.3145	849.4543	1273.4487 (98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)
Space heating fuel (main heating system)	492.4716	370.5390	273.8637	95.9922	12.6420	0.0000	0.0000	0.0000	0.0000	136.5804	339.9177	509.5833 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	279.0921	241.1865	213.3124	155.1111	119.7762	100.2622	97.5630	123.7302	152.7750	212.9979	252.5436	278.4282 (64)
Efficiency of water heater (217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000 (216)
Fuel for water heating, kWh/month	159.3901	137.7422	121.8232	88.5843	68.4045	57.2600	55.7184	70.6626	87.2502	121.6436	144.2282	159.0110 (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	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945 (231)
Lighting	36.4968	29.2791	26.3626	19.3144	14.9190	12.1889	13.6096	17.6903	22.9779	30.1482	34.0524	37.5112 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-36.2167	-56.6765	-89.4686	-103.1385	-107.7404	-102.1064	-99.1630	-92.2129	-82.4829	-68.5515	-43.2623	-32.9728 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2231.5899 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												175.1000
Water heating fuel used												1271.7182 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:	
pump for solar water heating	80.0000 (230g)
Total electricity for the above, kWh/year	80.0000 (231)
Electricity for lighting (calculated in Appendix L)	294.5503 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-913.9925 (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	2963.8659 (238)

10a. Fuel costs - using BEDF prices (572)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2231.5899	26.0600	581.5523 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1271.7182	26.0600	331.4098 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	26.0600	20.8480 (249)
Energy for lighting	294.5503	26.0600	76.7598 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-913.9925	26.0600	-238.1865
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-238.1865 (252)
Total energy cost			772.3834 (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	2231.5899	0.1568	349.8205 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1271.7182	0.1449	184.2107 (264)
Space and water heating			534.0312 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	294.5503	0.1443	42.5127 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-913.9925	0.1340	-122.5116
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-122.5116 (269)
Total CO2, kg/year			465.1293 (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	2231.5899	1.5803	3526.6735 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1271.7182	1.5358	1953.0959 (278)
Space and water heating			5479.7694 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	294.5503	1.5338	451.7910 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-913.9925	1.4954	-1366.7657
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1366.7657 (283)
Total Primary energy kWh/year			4685.8187 (286)