

Full SAP Calculation Printout



Property Reference	At Design				Issued on Date	13/10/2025
Assessment Reference	Mr A. Pearce 'As Built'			Prop Type Ref		
Property	St. Michaels Barn, Oldwood Road, St. Michaels, TENBURY WELLS, WR15 8PH					
SAP Rating	78 C	DER	3.97	TER		
Environmental	95 A	% DER < TER				N/A
CO ₂ Emissions (t/year)	1.49	DFEE	42.44	TFEE		
Compliance Check	N/A	% DFEE < TFEE				
% DPER < TPER		DPER	40.89	TPER		
Assessor Details	Ms. Hazel Weston				Assessor ID	AY28-0001
Client	Mr S. Elliot, MR S. Elliot					

SAP 10 WORKSHEET FOR Conversion (As Built) (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)
Main dwelling			
Ground floor	265.7910 (1b)	x 2.7700 (2b)	= 736.2410 (1b) - (3b)
First floor	146.1100 (1c)	x 2.5500 (2c)	= 372.5805 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	411.9010		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 1108.8215 (5)

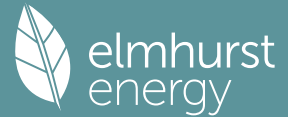
2. Ventilation rate

	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	0 * 10 = 0.0000 (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) = 0.0000 / (5) = 0.0000 (8)											
Pressure test	Yes											
Pressure Test Method	Blower Door											
Measured/design AP50	2.9200 (17)											
Infiltration rate	0.1460 (18)											
Number of sides sheltered	0 (19)											
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)											
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1460 (21)											
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1861	0.1825	0.1789	0.1606	0.1569	0.1387	0.1387	0.1351	0.1460	0.1569	0.1642	0.1716 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												46.2000 (23c)
Effective ac	0.4551	0.4515	0.4479	0.4296	0.4259	0.4077	0.4077	0.4041	0.4150	0.4259	0.4333	0.4405 (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							
GF SW 1			6.8900	0.9985	6.8794		(27)
GF SW 2			6.8900	0.9985	6.8794		(27)
GF SW 3			12.9400	0.9985	12.9201		(27)
FF SW 2			4.8600	0.9985	4.8525		(27)
FF SW 3			13.3600	0.9985	13.3395		(27)
GF SE			6.4500	0.9985	6.4401		(27)
FF SE			3.7700	0.9985	3.7642		(27)
GF NW			6.4500	0.9985	6.4401		(27)
FF NW			3.7700	0.9985	3.7642		(27)
FF SW 1			4.8600	0.9985	4.8525		(27)
SE 1			1.0900	1.2357	1.3470		(27a)
SE 2			1.0900	1.2357	1.3470		(27a)
SE 3			1.0900	1.2357	1.3470		(27a)
SE 4			1.0900	1.2357	1.3470		(27a)

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SE 5			1.0900	1.2357	1.3470				(27a)
SE 6			1.0900	1.2357	1.3470				(27a)
NW 1			1.0900	1.2357	1.3470				(27a)
NW 2			1.0900	1.2357	1.3470				(27a)
NW 3			1.0900	1.2357	1.3470				(27a)
NW 4			1.0900	1.2357	1.3470				(27a)
NW 5			1.0900	1.2357	1.3470				(27a)
NW 6			1.0900	1.2357	1.3470				(27a)
Main			265.7910	0.1100	29.2370	110.0000	29237.0100		(28a)
Main		265.2000	194.9600	0.0900	17.5464	9.0000	1754.6401		(29a)
Main		275.0730	261.9930	0.1200	31.4392	9.0000	2357.9370		(30)
Total net area of external elements Aum(A, m2)			806.0640						(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		164.5182				(33)
Main dwelling									
GF			306.5000			9.0000	2758.5000		(32c)
FF			212.7400			9.0000	1914.6600		(32c)
FF			178.3300			18.0000	3209.9400		(32d)
GF			178.3300			9.0000	1604.9700		(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 42837.6571 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 103.9999 (35)

List of Thermal Bridges				Length	Psi-value	Total	
K1 Element							
E5 Ground floor (normal)				67.0200	0.3200	21.4464	
E6 Intermediate floor within a dwelling				52.2100	0.1400	7.3094	
E16 Corner (normal)				12.6400	0.1800	2.2752	
E1 Steel lintel with perforated steel base plate				36.0200	1.0000	36.0200	
E3 Sill				23.5200	0.1000	2.3520	
E4 Jamb				37.6620	0.1000	3.7662	
E11 Eaves (insulation at rafter level)				25.7800	0.1500	3.8670	
E13 Gable (insulation at rafter level)				41.2400	0.2500	10.3100	
R1 Head of roof window				9.3600	0.2400	2.2464	
R2 Sill of roof window				9.3600	0.2400	2.2464	
R3 Jamb of roof window				33.6000	0.2400	8.0640	
R4 Ridge (vaulted ceiling)				20.6200	0.1200	2.4744	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						102.3774	(36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	266.8956 (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
	166.5444	165.2089	163.8733	157.1954	155.8598	149.1820	149.1820	147.8464	151.8531	155.8598	158.5310	161.2021
Heat transfer coeff	433.4400	432.1044	430.7689	424.0910	422.7554	416.0775	416.0775	414.7420	418.7487	422.7554	425.4266	428.0977
Average = Sum(39)m / 12 =												423.7571

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0523	1.0490	1.0458	1.0296	1.0264	1.0101	1.0101	1.0069	1.0166	1.0264	1.0328	1.0393
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												3.2774 (42)
Hot water usage for mixer showers												
	108.8604	107.2244	104.8405	100.2793	96.9133	93.1595	91.0258	93.3917	95.9852	100.0156	104.6747	108.4433 (42a)
Hot water usage for baths												
	34.1694	33.6620	32.9473	31.6297	30.6431	29.5491	28.9582	29.6678	30.4404	31.6110	32.9558	34.0539 (42b)
Hot water usage for other uses												
	48.1939	46.4414	44.6889	42.9364	41.1838	39.4313	39.4313	41.1838	42.9364	44.6889	46.4414	48.1939 (42c)
Average daily hot water use (litres/day)												175.8587 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	191.2237	187.3277	182.4767	174.8454	168.7402	162.1399	159.4154	164.2433	169.3619	176.3155	184.0719	190.6911 (44)
Energy conte	302.8515	266.7522	280.4599	239.3546	227.1568	199.3700	192.7991	203.3676	208.8402	239.2584	262.2442	298.5761 (45)
Energy content (annual)												
Total = Sum(45)m =											2921.0305	
Distribution loss (46)m = 0.15 x (45)m												
	45.4277	40.0128	42.0690	35.9032	34.0735	29.9055	28.9199	30.5051	31.3260	35.8888	39.3366	44.7864 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1340 (55)
Total storage loss												
	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (56)
If cylinder contains dedicated solar storage												
	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (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												
	361.2679	319.5154	338.8763	295.8866	285.5732	255.9020	251.2155	261.7840	265.3722	297.6748	318.7762	356.9925 (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	-49.6173	-110.2779	-232.9853	-367.7854	-497.3795	-501.0714	-490.1727	-404.5552	-284.5339	-157.9329	-66.3613	-38.3814 (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												
	311.6507	209.2375	105.8910	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	139.7420	252.4149	318.6111 (64)
Total per year (kWh/year) = Sum(64)m =											1337.5470 (64)	
12Total per year (kWh/year)												1338 (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												
	147.4313	130.9057	139.9860	124.8110	122.2627	111.5161	110.8388	114.3528	114.6650	126.2866	132.4218	146.0097 (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	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	275.0702	304.5420	275.0702	284.2392	275.0702	284.2392	275.0702	275.0702	284.2392	275.0702	284.2392	275.0702 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	543.6376	549.2788	535.0631	504.7993	466.5968	430.6918	406.7051	401.0638	415.2796	445.5434	483.7459	519.6509 (68)

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Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5											
	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	(69)
Pumps, fans	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)											
	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	(71)
Water heating gains (Table 5)	198.1603	194.8001	188.1533	173.3486	164.3316	154.8835	148.9769	153.7001	159.2569	169.7400	(72)
Total internal gains	1089.0291	1120.7820	1070.4475	1034.5482	978.1597	941.9755	902.9132	901.9951	930.9367	962.5146	(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			
Southwest				6.8900	36.7938	0.6300	0.7000	0.7700	77.4758 (79)			
Southwest				6.8900	36.7938	0.6300	0.7000	0.7700	77.4758 (79)			
Southwest				12.9400	36.7938	0.6300	0.7000	0.7700	145.5061 (79)			
Southwest				4.8600	36.7938	0.6300	0.7000	0.7700	54.6491 (79)			
Southwest				13.3600	36.7938	0.6300	0.7000	0.7700	150.2288 (79)			
Southeast				6.4500	36.7938	0.6300	0.7000	0.7700	72.5281 (77)			
Southeast				3.7700	36.7938	0.6300	0.7000	0.7700	42.3924 (77)			
Northwest				6.4500	11.2829	0.6300	0.7000	0.7700	22.2410 (81)			
Northwest				3.7700	11.2829	0.6300	0.7000	0.7700	12.9998 (81)			
Southwest				4.8600	36.7938	0.6300	0.7000	0.7700	54.6491 (79)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Solar gains	848.2609	1501.5037	2191.3812	2922.9241	3447.6674	3494.9357	3339.7561	2940.0316	2444.8945	1697.7020	1026.6532	718.8792 (83)
Total gains	1937.2900	2622.2857	3261.8288	3957.4723	4425.8271	4436.9113	4242.6693	3842.0267	3375.8313	2660.2165	2050.7185	1782.0108 (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	27.4533	27.5381	27.6235	28.0585	28.1471	28.5989	28.5989	28.6910	28.4164	28.1471	27.9704	27.7959
alpha	2.8302	2.8359	2.8416	2.8706	2.8765	2.9066	2.9066	2.9127	2.8944	2.8765	2.8647	2.8531
util living area	0.9823	0.9599	0.9178	0.8289	0.6966	0.5372	0.4094	0.4618	0.6829	0.8914	0.9680	0.9859 (86)
Living	18.8910	19.2251	19.6697	20.1934	20.5723	20.7881	20.8587	20.8437	20.6723	20.1270	19.4098	18.8451
Non living	17.5313	17.9568	18.5171	19.1692	19.6134	19.8552	19.9187	19.9111	19.7414	19.1056	18.2043	17.4801
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	31	28	31	0	0	0	0	0	0	0	14	31
16 / 9	0	0	0	30	0	0	0	0	0	5	16	0
MIT	21.0000	21.0000	21.0000	20.5431	20.5723	20.7881	20.8587	20.8437	20.6723	20.1880	20.5197	21.0000 (87)
Th 2	20.0400	20.0427	20.0453	20.0587	20.0614	20.0749	20.0749	20.0776	20.0695	20.0614	20.0561	20.0507 (88)
util rest of house	0.9795	0.9538	0.9054	0.8038	0.6539	0.4746	0.3308	0.3803	0.6237	0.8695	0.9622	0.9837 (89)
MIT 2	20.0400	20.0427	20.0453	19.6661	19.6134	19.8552	19.9187	19.9111	19.7414	19.1917	19.6202	20.0507 (90)
Living area fraction									fLA = Living area / (4) =			0.3667 (91)
MIT	20.3920	20.3937	20.3954	19.9877	19.9650	20.1973	20.2634	20.2530	20.0827	19.5570	19.9500	20.3988 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3920	20.3937	20.3954	19.9877	19.9650	20.1973	20.2634	20.2530	20.0827	19.5570	19.9500	20.3988 (93)

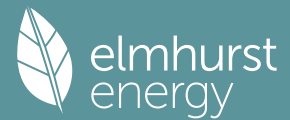
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9806	0.9562	0.9102	0.8017	0.6491	0.4832	0.3473	0.3964	0.6246	0.8555	0.9615	0.9845 (94)
Useful gains	1899.7469	2507.3338	2968.9440	3172.8255	2872.9664	2144.0564	1473.4878	1523.0921	2108.5963	2275.7856	1971.6898	1754.4303 (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	6974.9121	6694.8894	5985.6964	4702.1900	3494.0631	2328.9001	1524.2510	1598.0157	2505.2535	3786.6219	5466.7183	6934.6572 (97)
Space heating kWh	3775.9230	2814.0373	2244.4638	1101.1424	462.0960	0.0000	0.0000	0.0000	0.0000	1124.0622	2516.4205	3854.0888 (98a)
Space heating requirement - total per year (kWh/year)												17892.2340
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	3775.9230	2814.0373	2244.4638	1101.1424	462.0960	0.0000	0.0000	0.0000	0.0000	1124.0622	2516.4205	3854.0888 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												17892.2340
Space heating per m2										(98c) / (4) =		43.4382 (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 %)												277.5603 (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	3775.9230	2814.0373	2244.4638	1101.1424	462.0960	0.0000	0.0000	0.0000	0.0000	1124.0622	2516.4205	3854.0888 (98)

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Space heating efficiency (main heating system 1)	277.5603	277.5603	277.5603	277.5603	0.0000	0.0000	0.0000	0.0000	277.5603	277.5603	277.5603	(210)
Space heating fuel (main heating system)	1360.3975	1013.8473	808.6402	396.7219	166.4849	0.0000	0.0000	0.0000	0.0000	404.9795	906.6213	1388.5593 (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	(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	(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	(215)
Water heating												
Water heating requirement	311.6507	209.2375	105.8910	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	139.7420	252.4149	318.6111 (64)
Efficiency of water heater	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224 (216)
Fuel for water heating, kWh/month	158.6635	106.5242	53.9098	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	71.1436	128.5061	162.2071 (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	(221)
Pumps and Fa	574.4607	518.8677	574.4607	555.9297	574.4607	555.9297	574.4607	555.9297	574.4607	555.9297	574.4607	574.4607 (231)
Lighting	69.5059	55.7602	50.2059	36.7830	28.4122	23.2130	25.9186	33.6900	43.7599	57.4154	64.8506	71.4377 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-162.7621	-245.2990	-369.3116	-411.8512	-433.6864	-387.5669	-386.8616	-360.5219	-311.0414	-275.3277	-182.1881	-138.6094 (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	(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	(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	(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	(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	(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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												6446.2520 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												196.4224
Water heating fuel used												680.9543 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)												
mechanical ventilation fans (SFP = 5.0000)												6763.8113 (230a)
Total electricity for the above, kWh/year												6763.8113 (231)
Electricity for lighting (calculated in Appendix L)												560.9525 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3665.0272 (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												10786.9430 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP												
	Energy	Emission factor	Emissions									
	kWh/year	kg CO2/kWh	kg CO2/year									
Space heating - main system 1	6446.2520	0.1559	1004.7018	(261)								
Total CO2 associated with community systems			0.0000	(373)								
Water heating (other fuel)	680.9543	0.1567	106.6739	(264)								
Space and water heating			1111.3757	(265)								
Pumps, fans and electric keep-hot	6763.8113	0.1387	938.2240	(267)								
Energy for lighting	560.9525	0.1443	80.9628	(268)								
Energy saving/generation technologies												
PV Unit electricity used in dwelling	-3665.0272	0.1347	-493.7475									
PV Unit electricity exported	0.0000	0.0000	0.0000									
Total			-493.7475	(269)								
Total CO2, kg/year			1636.8150	(272)								
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.9700	(273)								

13a. Primary energy - Individual heating systems including micro-CHP												
	Energy	Primary energy factor	Primary energy									
	kWh/year	kg CO2/kWh	kWh/year									
Space heating - main system 1	6446.2520	1.5770	10165.7654	(275)								
Total CO2 associated with community systems			0.0000	(473)								
Water heating (other fuel)	680.9543	1.5798	1075.7953	(278)								
Space and water heating			11241.5607	(279)								
Pumps, fans and electric keep-hot	6763.8113	1.5128	10232.2938	(281)								
Energy for lighting	560.9525	1.5338	860.4077	(282)								
Energy saving/generation technologies												
PV Unit electricity used in dwelling	-3665.0272	1.4979	-5489.9572									
PV Unit electricity exported	0.0000	0.0000	0.0000									
Total			-5489.9572	(283)								
Total Primary energy kWh/year			16844.3049	(286)								
Dwelling Primary energy Rate (DPER)			40.8900	(287)								

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CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	265.7910 (1b)	x 2.7700 (2b)	= 736.2410 (1b) - (3b)
First floor	146.1100 (1c)	x 2.5500 (2c)	= 372.5805 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	411.9010		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 1108.8215 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.0361 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		2.9200 (17)
Infiltration rate		0.1821 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1821 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000	(22)
Wind factor	1.2750 1.2500 1.2250 1.1000 1.0750 0.9500 0.9500 0.9250 1.0000 1.0750 1.1250 1.1750	(22a)
Adj infilt rate	0.2321 0.2276 0.2230 0.2003 0.1957 0.1730 0.1730 0.1684 0.1821 0.1957 0.2048 0.2139	(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	0.5269 0.5259 0.5249 0.5201 0.5192 0.5150 0.5150 0.5142 0.5166 0.5192 0.5210 0.5229	(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							
GF SW 1			6.8900	0.9985	6.8794		(27)
GF SW 2			6.8900	0.9985	6.8794		(27)
GF SW 3			12.9400	0.9985	12.9201		(27)
FF SW 2			4.8600	0.9985	4.8525		(27)
FF SW 3			13.3600	0.9985	13.3395		(27)
GF SE			6.4500	0.9985	6.4401		(27)
FF SE			3.7700	0.9985	3.7642		(27)
GF NW			6.4500	0.9985	6.4401		(27)
FF NW			3.7700	0.9985	3.7642		(27)
FF SW 1			4.8600	0.9985	4.8525		(27)
SE 1			1.0900	1.2357	1.3470		(27a)
SE 2			1.0900	1.2357	1.3470		(27a)
SE 3			1.0900	1.2357	1.3470		(27a)
SE 4			1.0900	1.2357	1.3470		(27a)
SE 5			1.0900	1.2357	1.3470		(27a)
SE 6			1.0900	1.2357	1.3470		(27a)
NW 1			1.0900	1.2357	1.3470		(27a)
NW 2			1.0900	1.2357	1.3470		(27a)
NW 3			1.0900	1.2357	1.3470		(27a)
NW 4			1.0900	1.2357	1.3470		(27a)
NW 5			1.0900	1.2357	1.3470		(27a)
NW 6			1.0900	1.2357	1.3470		(27a)
Main			265.7910	0.1100	29.2370	110.0000	29237.0100 (28a)
Main	265.2000	70.2400	194.9600	0.0900	17.5464	9.0000	1754.6401 (29a)
Main	275.0730	13.0800	261.9930	0.1200	31.4392	9.0000	2357.9370 (30)
Total net area of external elements Aum(A, m ²)			806.0640				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	164.5182		(33)
Main dwelling							
GF			306.5000			9.0000	2758.5000 (32c)
FF			212.7400			9.0000	1914.6600 (32c)
FF			178.3300			18.0000	3209.9400 (32d)
GF			178.3300			9.0000	1604.9700 (32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
(28)...(30) + (32) + (32a)...(32e) = 42837.6571 (34)
103.9999 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	67.0200	0.3200	21.4464
E6 Intermediate floor within a dwelling	52.2100	0.1400	7.3094
E16 Corner (normal)	12.6400	0.1800	2.2752
E1 Steel lintel with perforated steel base plate	36.0200	1.0000	36.0200
E3 Sill	23.5200	0.1000	2.3520
E4 Jamb	37.6620	0.1000	3.7662
E11 Eaves (insulation at rafter level)	25.7800	0.1500	3.8670
E13 Gable (insulation at rafter level)	41.2400	0.2500	10.3100
R1 Head of roof window	9.3600	0.2400	2.2464
R2 Sill of roof window	9.3600	0.2400	2.2464
R3 Jamb of roof window	33.6000	0.2400	8.0640
R4 Ridge (vaulted ceiling)	20.6200	0.1200	2.4744

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Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
Total fabric heat loss

(33) + (36) + (36a) = 102.3774 (36)
0.0000
266.8956 (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	192.8152	192.4324	192.0571	190.2944	189.9646	188.4294	188.4294	188.1451	189.0207	189.9646	190.6318	191.3293	(38)
Heat transfer coeff	459.7108	459.3280	458.9527	457.1900	456.8602	455.3249	455.3249	455.0406	455.9163	456.8602	457.5274	458.2249	(39)
Average = Sum(39)m / 12 =												457.1884	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1161	1.1151	1.1142	1.1100	1.1092	1.1054	1.1054	1.1047	1.1069	1.1092	1.1108	1.1125	(40)
HLP (average)												1.1099	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													3.2774 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
34.1694	33.6620	32.9473	31.6297	30.6431	29.5491	28.9582	29.6678	30.4404	31.6110	32.9558	34.0539	34.0539	(42b)
Hot water usage for other uses													
48.1939	46.4414	44.6889	42.9364	41.1838	39.4313	39.4313	41.1838	42.9364	44.6889	46.4414	48.1939	48.1939	(42c)
Average daily hot water use (litres/day)												75.4930	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
82.3633	80.1033	77.6362	74.5661	71.8269	68.9804	68.3895	70.8516	73.3768	76.2999	79.3972	82.2478	82.2478	(44)
Energy conte	130.4433	114.0661	119.3239	102.0772	96.6929	84.8195	82.7112	87.7291	90.4809	103.5383	113.1158	128.7801	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
110.8768	96.9561	101.4254	86.7656	82.1889	72.0966	70.3045	74.5698	76.9088	88.0075	96.1484	109.4631	109.4631	(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													
110.8768	96.9561	101.4254	86.7656	82.1889	72.0966	70.3045	74.5698	76.9088	88.0075	96.1484	109.4631	109.4631	(64)
12Total per year (kWh/year)													
Electric shower(s)													
63.4029	56.4925	61.6877	58.8678	59.9724	57.2079	59.1148	59.9724	58.8678	61.6877	60.5277	63.4029	63.4029	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												721.2046	(64a)
Heat gains from water heating, kWh/month													
43.5699	38.3622	40.7783	36.4084	35.5403	32.3261	32.3548	33.6355	33.9441	37.4238	39.1690	43.2165	43.2165	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	163.8701	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
275.0702	304.5420	275.0702	284.2392	275.0702	284.2392	275.0702	275.0702	275.0702	284.2392	275.0702	284.2392	275.0702	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
543.6376	549.2788	535.0631	504.7993	466.5968	430.6918	406.7051	401.0638	415.2796	445.5434	483.7459	519.6509	519.6509	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	39.3870	(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)													
-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	(71)
Water heating gains (Table 5)													
58.5617	57.0866	54.8095	50.5672	47.7693	44.8974	43.4877	45.2091	47.1446	50.3008	54.4014	58.0867	58.0867	(72)
Total internal gains													
949.4305	983.0684	937.1037	911.7667	861.5973	831.9894	797.4240	793.5041	818.8245	843.0754	894.5475	924.9688	924.9688	(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	
Southwest	6.8900	36.7938	0.6300	0.7000	0.7700	77.4758	(79)
Southwest	6.8900	36.7938	0.6300	0.7000	0.7700	77.4758	(79)
Southwest	12.9400	36.7938	0.6300	0.7000	0.7700	145.5061	(79)
Southwest	4.8600	36.7938	0.6300	0.7000	0.7700	54.6491	(79)
Southwest	13.3600	36.7938	0.6300	0.7000	0.7700	150.2288	(79)
Southeast	6.4500	36.7938	0.6300	0.7000	0.7700	72.5281	(77)
Southeast	3.7700	36.7938	0.6300	0.7000	0.7700	42.3924	(77)
Northwest	6.4500	11.2829	0.6300	0.7000	0.7700	22.2410	(81)
Northwest	3.7700	11.2829	0.6300	0.7000	0.7700	12.9998	(81)
Southwest	4.8600	36.7938	0.6300	0.7000	0.7700	54.6491	(79)
Southeast	1.0900	32.2347	0.6300	0.7000	1.0000	13.9454	(82)
Southeast	1.0900	32.2347	0.6300	0.7000	1.0000	13.9454	(82)
Southeast	1.0900	32.2347	0.6300	0.7000	1.0000	13.9454	(82)
Southeast	1.0900	32.2347	0.6300	0.7000	1.0000	13.9454	(82)
Southeast	1.0900	32.2347	0.6300	0.7000	1.0000	13.9454	(82)
Southeast	1.0900	32.2347	0.6300	0.7000	1.0000	13.9454	(82)
Northwest	1.0900	20.9739	0.6300	0.7000	1.0000	9.0738	(82)
Northwest	1.0900	20.9739	0.6300	0.7000	1.0000	9.0738	(82)
Northwest	1.0900	20.9739	0.6300	0.7000	1.0000	9.0738	(82)

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Northwest			1.0900		20.9739		0.6300		0.7000		1.0000		9.0738 (82)
Northwest			1.0900		20.9739		0.6300		0.7000		1.0000		9.0738 (82)
Northwest			1.0900		20.9739		0.6300		0.7000		1.0000		9.0738 (82)

Solar gains	848.2609	1501.5037	2191.3812	2922.9241	3447.6674	3494.9357	3339.7561	2940.0316	2444.8945	1697.7020	1026.6532	718.8792	(83)
Total gains	1797.6915	2484.5721	3128.4850	3834.6908	4309.2647	4326.9251	4137.1801	3733.5357	3263.7190	2540.7773	1921.2008	1643.8479	(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	25.8844	25.9060	25.9272	26.0271	26.0459	26.1338	26.1338	26.1501	26.0999	26.0459	26.0080	25.9684	
alpha	2.7256	2.7271	2.7285	2.7351	2.7364	2.7423	2.7423	2.7433	2.7400	2.7364	2.7339	2.7312	
util living area	0.9853	0.9655	0.9281	0.8490	0.7272	0.5772	0.4476	0.5038	0.7190	0.9071	0.9732	0.9884	(86)
MIT	18.1117	18.5557	19.1643	19.8843	20.4533	20.7954	20.9256	20.8957	20.6079	19.8007	18.8002	18.0261	(87)
Th 2	19.9877	19.9885	19.9892	19.9927	19.9934	19.9964	19.9964	19.9970	19.9952	19.9934	19.9920	19.9907	(88)
util rest of house	0.9829	0.9600	0.9166	0.8248	0.6837	0.5088	0.3576	0.4115	0.6581	0.8868	0.9681	0.9865	(89)
MIT 2	17.3249	17.7649	18.3629	19.0573	19.5802	19.8709	19.9636	19.9477	19.7304	18.9942	18.0134	17.2417	(90)
Living area fraction									FLA = Living area / (4) =			0.3667	(91)
MIT	17.6134	18.0548	18.6568	19.3606	19.9003	20.2099	20.3163	20.2953	20.0522	19.2899	18.3019	17.5293	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.6134	18.0548	18.6568	19.3606	19.9003	20.2099	20.3163	20.2953	20.0522	19.2899	18.3019	17.5293	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9747	0.9459	0.8975	0.8072	0.6793	0.5241	0.3874	0.4403	0.6620	0.8692	0.9561	0.9796	(94)
Useful gains	1752.1878	2350.0433	2807.9154	3095.2906	2927.1738	2267.8663	1602.8382	1644.0129	2160.4578	2208.3417	1836.8992	1610.2672	(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	6120.2926	6042.3853	5579.3782	4782.4661	3746.4096	2554.3177	1692.1422	1772.5366	2713.6966	3970.0700	5125.1701	6107.8024	(97)
Space heating kWh	3249.8700	2481.2538	2061.9683	1214.7664	609.5115	0.0000	0.0000	0.0000	0.0000	1310.7258	2367.5550	3346.1661	(98a)
Space heating requirement - total per year (kWh/year)												16641.8170	
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	3249.8700	2481.2538	2061.9683	1214.7664	609.5115	0.0000	0.0000	0.0000	0.0000	1310.7258	2367.5550	3346.1661	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												16641.8170	
Space heating per m2										(98c) / (4) =		40.4025	(99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	4280.0545	3369.4046	3458.3088	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7695	0.8308	0.7920	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	3293.6050	2799.1497	2738.9157	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	4747.4604	4540.5619	4102.7162	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	1046.7759	1295.6106	1014.6676	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	261.6933	323.9019	253.6663	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												839.2615	(107)
Energy for space heating												40.4025	(99)
Energy for space cooling												2.0375	(108)
Total												42.4400	(109)
Fabric Energy Efficiency (DFEE)												42.4	(109)

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

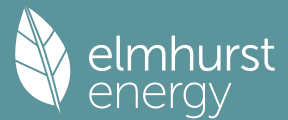
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	265.7910 (1b)	x 2.7700 (2b)	= 736.2410 (1b) - (3b)	
First floor	146.1100 (1c)	x 2.5500 (2c)	= 372.5805 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	411.9010			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	1108.8215	(5)

2. Ventilation rate

m3 per hour

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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	0 * 10 =	0.0000 (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) =	0.0000	Air changes per hour	0.0000 (8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50				2.9200 (17)
Infiltration rate				0.1460 (18)
Number of sides sheltered				0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)		
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1460 (21)		

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1861	0.1825	0.1789	0.1606	0.1569	0.1387	0.1387	0.1351	0.1460	0.1569	0.1642	0.1716	(22b)
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													46.2000 (23c)
Effective ac	0.4551	0.4515	0.4479	0.4296	0.4259	0.4077	0.4077	0.4041	0.4150	0.4259	0.4333	0.4405	(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							
GF SW 1			6.8900	0.9985	6.8794		(27)
GF SW 2			6.8900	0.9985	6.8794		(27)
GF SW 3			12.9400	0.9985	12.9201		(27)
FF SW 2			4.8600	0.9985	4.8525		(27)
FF SW 3			13.3600	0.9985	13.3395		(27)
GF SE			6.4500	0.9985	6.4401		(27)
FF SE			3.7700	0.9985	3.7642		(27)
GF NW			6.4500	0.9985	6.4401		(27)
FF NW			3.7700	0.9985	3.7642		(27)
FF SW 1			4.8600	0.9985	4.8525		(27)
SE 1			1.0900	1.2357	1.3470		(27a)
SE 2			1.0900	1.2357	1.3470		(27a)
SE 3			1.0900	1.2357	1.3470		(27a)
SE 4			1.0900	1.2357	1.3470		(27a)
SE 5			1.0900	1.2357	1.3470		(27a)
SE 6			1.0900	1.2357	1.3470		(27a)
NW 1			1.0900	1.2357	1.3470		(27a)
NW 2			1.0900	1.2357	1.3470		(27a)
NW 3			1.0900	1.2357	1.3470		(27a)
NW 4			1.0900	1.2357	1.3470		(27a)
NW 5			1.0900	1.2357	1.3470		(27a)
NW 6			1.0900	1.2357	1.3470		(27a)
Main			265.7910	0.1100	29.2370	110.0000	29237.0100 (28a)
Main	265.2000	70.2400	194.9600	0.0900	17.5464	9.0000	1754.6401 (23a)
Main	275.0730	13.0800	261.9930	0.1200	31.4392	9.0000	2357.9370 (30)
Total net area of external elements Aum(A, m2)			806.0640				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	164.5182		(33)
Main dwelling							
GF			306.5000			9.0000	2758.5000 (32c)
FF			212.7400			9.0000	1914.6600 (32c)
FF			178.3300			18.0000	3209.9400 (32d)
GF			178.3300			9.0000	1604.9700 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	42837.6571 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		103.9999 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	67.0200	0.3200	21.4464
E6 Intermediate floor within a dwelling	52.2100	0.1400	7.3094
E16 Corner (normal)	12.6400	0.1800	2.2752
E1 Steel lintel with perforated steel base plate	36.0200	1.0000	36.0200
E3 Sill	23.5200	0.1000	2.3520
E4 Jamb	37.6620	0.1000	3.7662
E11 Eaves (insulation at rafter level)	25.7800	0.1500	3.8670
E13 Gable (insulation at rafter level)	41.2400	0.2500	10.3100
R1 Head of roof window	9.3600	0.2400	2.2464
R2 Sill of roof window	9.3600	0.2400	2.2464
R3 Jamb of roof window	33.6000	0.2400	8.0640
R4 Ridge (vaulted ceiling)	20.6200	0.1200	2.4744

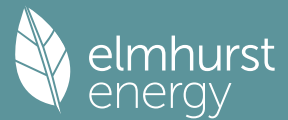
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		102.3774 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	266.8956 (37)

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	(38)
Heat transfer coeff	166.5444	165.2089	163.8733	157.1954	155.8598	149.1820	149.1820	147.8464	151.8531	155.8598	158.5310	161.2021	(38)
Average = Sum(39)m / 12 =	433.4400	432.1044	430.7689	424.0910	422.7554	416.0775	416.0775	414.7420	418.7487	422.7554	425.4266	428.0977	(39)
												423.7571	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	1.0523	1.0490	1.0458	1.0296	1.0264	1.0101	1.0101	1.0069	1.0166	1.0264	1.0328	1.0393	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

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Assumed occupancy												3.2774 (42)
Hot water usage for mixer showers	108.8604	107.2244	104.8405	100.2793	96.9133	93.1595	91.0258	93.3917	95.9852	100.0156	104.6747	108.4433 (42a)
Hot water usage for baths	34.1694	33.6620	32.9473	31.6297	30.6431	29.5491	28.9582	29.6678	30.4404	31.6110	32.9558	34.0539 (42b)
Hot water usage for other uses	48.1939	46.4414	44.6889	42.9364	41.1838	39.4313	39.4313	41.1838	42.9364	44.6889	46.4414	48.1939 (42c)
Average daily hot water use (litres/day)												175.8587 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	191.2237	187.3277	182.4767	174.8454	168.7402	162.1399	159.4154	164.2433	169.3619	176.3155	184.0719	190.6911 (44)
Energy content (annual)	302.8515	266.7522	280.4599	239.3546	227.1568	199.3700	192.7991	203.3676	208.8402	239.2584	262.2442	298.5761 (45)
Distribution loss (46)m = 0.15 x (45)m	45.4277	40.0128	42.0690	35.9032	34.0735	29.9055	28.9199	30.5051	31.3260	35.8888	39.3366	44.7864 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1340 (55)
Total storage loss	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (56)
If cylinder contains dedicated solar storage	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (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	361.2679	319.5154	338.8763	295.8866	285.5732	255.9020	251.2155	261.7840	265.3722	297.6748	318.7762	356.9925 (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	-49.6173	-110.2779	-232.9853	-367.7854	-497.3795	-501.0714	-490.1727	-404.5552	-284.5339	-157.9329	-66.3613	-38.3814 (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	311.6507	209.2375	105.8910	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	139.7420	252.4149	318.6111 (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	147.4313	130.9057	139.9860	124.8110	122.2627	111.5161	110.8388	114.3528	114.6650	126.2866	132.4218	146.0097 (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	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.4086	70.5300	57.3589	43.4244	32.4602	27.4043	29.6113	38.4899	51.6610	65.5956	76.5597	81.6156 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	811.3994	819.8192	798.6016	753.4318	696.4132	642.8236	607.0225	598.6028	619.8204	664.9901	722.0088	775.5983 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418 (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)	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961 (71)
Water heating gains (Table 5)	198.1603	194.8001	188.1533	173.3486	164.3316	154.8835	148.9769	153.7001	159.2569	169.7400	183.9191	196.2496 (72)
Total internal gains	1212.4581	1208.6391	1167.6036	1093.6947	1016.6949	948.6012	909.1006	914.2825	954.2281	1023.8155	1105.9775	1176.9533 (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			
Southwest				6.8900	36.7938	0.6300	0.7000	0.7700	77.4758 (79)			
Southwest				6.8900	36.7938	0.6300	0.7000	0.7700	77.4758 (79)			
Southwest				12.9400	36.7938	0.6300	0.7000	0.7700	145.5061 (79)			
Southwest				4.8600	36.7938	0.6300	0.7000	0.7700	54.6491 (79)			
Southwest				13.3600	36.7938	0.6300	0.7000	0.7700	150.2288 (79)			
Southeast				6.4500	36.7938	0.6300	0.7000	0.7700	72.5281 (77)			
Southeast				3.7700	36.7938	0.6300	0.7000	0.7700	42.3924 (77)			
Northwest				6.4500	11.2829	0.6300	0.7000	0.7700	22.2410 (81)			
Northwest				3.7700	11.2829	0.6300	0.7000	0.7700	12.9998 (81)			
Southwest				4.8600	36.7938	0.6300	0.7000	0.7700	54.6491 (79)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Southeast				1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Northwest				1.0900	20.9739	0.6300	0.7000	1.0000	9.0738 (82)			
Solar gains	848.2609	1501.5037	2191.3812	2922.9241	3447.6674	3494.9357	3339.7561	2940.0316	2444.8945	1697.7020	1026.6532	718.8792 (83)
Total gains	2060.7191	2710.1429	3358.9848	4016.6188	4464.3623	4443.5370	4248.8567	3854.3141	3399.1227	2721.5175	2132.6307	1895.8325 (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	27.4533	27.5381	27.6235	28.0585	28.1471	28.5989	28.5989	28.6910	28.4164	28.1471	27.9704	27.7959
alpha	2.8302	2.8359	2.8416	2.8706	2.8765	2.9066	2.9066	2.9127	2.8944	2.8765	2.8647	2.8531

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util living area	0.9794	0.9567	0.9126	0.8244	0.6932	0.5366	0.4088	0.4605	0.6802	0.8864	0.9649	0.9835 (86)
Living	18.9342	19.2536	19.6967	20.2052	20.5767	20.7884	20.8588	20.8441	20.6747	20.1425	19.4372	18.8857
Non living	17.5862	17.9924	18.5502	19.1829	19.6179	19.8555	19.9188	19.9113	19.7438	19.1239	18.2387	17.5317
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	31	28	31	0	0	0	0	0	0	0	14	31
16 / 9	0	0	0	30	0	0	0	0	0	5	16	0
MIT	21.0000	21.0000	21.0000	20.5498	20.5767	20.7884	20.8588	20.8441	20.6747	20.2025	20.5279	21.0000 (87)
Th 2	20.0400	20.0427	20.0453	20.0587	20.0614	20.0749	20.0749	20.0776	20.0695	20.0614	20.0561	20.0507 (88)
util rest of house												
MIT	0.9762	0.9502	0.8996	0.7990	0.6503	0.4740	0.3304	0.3792	0.6209	0.8638	0.9586	0.9809 (89)
MIT 2	20.0400	20.0427	20.0453	19.6722	19.6179	19.8555	19.9188	19.9113	19.7438	19.2083	19.6283	20.0507 (90)
Living area fraction									fLA = Living area / (4) =			0.3667 (91)
MIT	20.3920	20.3937	20.3954	19.9940	19.9695	20.1976	20.2635	20.2533	20.0851	19.5729	19.9581	20.3988 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3920	20.3937	20.3954	19.9940	19.9695	20.1976	20.2635	20.2533	20.0851	19.5729	19.9581	20.3988 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9774	0.9527	0.9047	0.7971	0.6458	0.4827	0.3468	0.3953	0.6219	0.8498	0.9578	0.9819	(94)
Useful gains	2014.2286	2582.0281	3038.7261	3201.5464	2883.1278	2144.7375	1473.6999	1523.7460	2114.0271	2312.8385	2042.6845	1861.5450	(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	6974.9121	6694.8894	5985.6964	4704.8512	3495.9613	2329.0205	1524.2886	1598.1317	2506.2595	3793.3243	5470.1933	6934.6572	(97)
Space heating kWh	3690.7486	2763.8428	2192.5459	1082.3794	455.9481	0.0000	0.0000	0.0000	0.0000	1101.4814	2467.8064	3774.3955	(98a)
Space heating requirement - total per year (kWh/year)												17529.1481	
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	3690.7486	2763.8428	2192.5459	1082.3794	455.9481	0.0000	0.0000	0.0000	0.0000	1101.4814	2467.8064	3774.3955	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												17529.1481	
Space heating per m2										(98c) / (4) =		42.5567	(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 %)		277.5603	(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	3690.7486	2763.8428	2192.5459	1082.3794	455.9481	0.0000	0.0000	0.0000	0.0000	1101.4814	2467.8064	3774.3955	(98)
Space heating efficiency (main heating system 1)	277.5603	277.5603	277.5603	277.5603	277.5603	0.0000	0.0000	0.0000	0.0000	277.5603	277.5603	277.5603	(210)
Space heating fuel (main heating system)	1329.7107	995.7631	789.9351	389.9620	164.2699	0.0000	0.0000	0.0000	0.0000	396.8441	889.1065	1359.8472	(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	311.6507	209.2375	105.8910	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	139.7420	252.4149	318.6111	(64)
Efficiency of water heater												196.4224	(216)
(217)m	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	(217)
Fuel for water heating, kWh/month	158.6635	106.5242	53.9098	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	71.1436	128.5061	162.2071	(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	574.4607	518.8677	574.4607	555.9297	574.4607	555.9297	574.4607	574.4607	555.9297	574.4607	555.9297	574.4607	(231)
Lighting	69.5059	55.7602	50.2059	36.7830	28.4122	23.2130	25.9186	33.6900	43.7599	57.4154	64.8506	71.4377	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-162.5062	-244.8902	-368.3596	-411.1382	-433.3294	-387.5669	-386.8616	-360.5219	-311.0414	-274.9388	-181.9318	-138.4247	(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												6315.4387	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												196.4224	
Water heating fuel used												680.9543	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)													
mechanical ventilation fans (SFP = 5.0000)												6763.8113	(230a)
Total electricity for the above, kWh/year												6763.8113	(231)
Electricity for lighting (calculated in Appendix L)												560.9525	(232)

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3661.5106	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)

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Appendix Q - special features

Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	10659.6462 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	6315.4387	16.4900	1041.4158 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	680.9543	16.4900	112.2894 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	6763.8113	16.4900	1115.3525 (249)
Energy for lighting	560.9525	16.4900	92.5011 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3661.5106	16.4900	-603.7831
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-603.7831 (252)
Total energy cost			1757.7757 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.3850 (257)
SAP value		77.5495
SAP rating (Section 12)		78 (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	6315.4387	0.1558	984.2542 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	680.9543	0.1567	106.6739 (264)
Space and water heating			1090.9281 (265)
Pumps, fans and electric keep-hot	6763.8113	0.1387	938.2240 (267)
Energy for lighting	560.9525	0.1443	80.9628 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3661.5106	0.1347	-493.2240
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-493.2240 (269)
Total CO2, kg/year			1616.8910 (272)
CO2 emissions per m2			3.9300 (273)
EI value			95.2580
EI rating			95 (274)
EI band			A

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

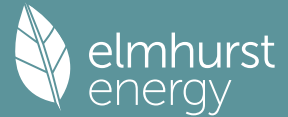
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	265.7910 (1b)	x 2.7700 (2b)	= 736.2410 (1b) - (3b)
First floor	146.1100 (1c)	x 2.5500 (2c)	= 372.5805 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	411.9010		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	1108.8215 (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	0 * 10 = 0.0000 (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) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.9200 (17)
Infiltration rate	0.1460 (18)
Number of sides sheltered	0 (19)

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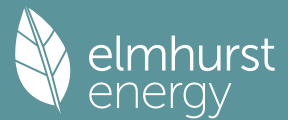
Shelter factor												(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.1460 (21)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.2000	4.2000	4.1000	3.7000	3.6000	3.2000	3.1000	3.0000	3.1000	3.5000	3.5000	3.8000 (22)	
Wind factor	1.0500	1.0500	1.0250	0.9250	0.9000	0.8000	0.7750	0.7500	0.7750	0.8750	0.8750	0.9500 (22a)	
Adj infilt rate													
	0.1533	0.1533	0.1496	0.1351	0.1314	0.1168	0.1132	0.1095	0.1132	0.1278	0.1278	0.1387 (22b)	
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation												0.5000 (23a)	
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)	
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												46.2000 (23c)	
Effective ac	0.4223	0.4223	0.4186	0.4041	0.4004	0.3858	0.3821	0.3785	0.3821	0.3968	0.3968	0.4077 (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							
GF SW 1			6.8900	0.9985	6.8794		(27)
GF SW 2			6.8900	0.9985	6.8794		(27)
GF SW 3			12.9400	0.9985	12.9201		(27)
FF SW 2			4.8600	0.9985	4.8525		(27)
FF SW 3			13.3600	0.9985	13.3395		(27)
GF SE			6.4500	0.9985	6.4401		(27)
FF SE			3.7700	0.9985	3.7642		(27)
GF NW			6.4500	0.9985	6.4401		(27)
FF NW			3.7700	0.9985	3.7642		(27)
FF SW 1			4.8600	0.9985	4.8525		(27)
SE 1			1.0900	1.2357	1.3470		(27a)
SE 2			1.0900	1.2357	1.3470		(27a)
SE 3			1.0900	1.2357	1.3470		(27a)
SE 4			1.0900	1.2357	1.3470		(27a)
SE 5			1.0900	1.2357	1.3470		(27a)
SE 6			1.0900	1.2357	1.3470		(27a)
NW 1			1.0900	1.2357	1.3470		(27a)
NW 2			1.0900	1.2357	1.3470		(27a)
NW 3			1.0900	1.2357	1.3470		(27a)
NW 4			1.0900	1.2357	1.3470		(27a)
NW 5			1.0900	1.2357	1.3470		(27a)
NW 6			1.0900	1.2357	1.3470		(27a)
Main			265.7910	0.1100	29.2370	110.0000	29237.0100 (28a)
Main	265.2000	70.2400	194.9600	0.0900	17.5464	9.0000	1754.6401 (29a)
Main	275.0730	13.0800	261.9930	0.1200	31.4392	9.0000	2357.9370 (30)
Total net area of external elements Aum(A, m2)			806.0640				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	164.5182		(33)
Main dwelling							
GF			306.5000			9.0000	2758.5000 (32c)
FF			212.7400			9.0000	1914.6600 (32c)
FF			178.3300			18.0000	3209.9400 (32d)
GF			178.3300			9.0000	1604.9700 (32e)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0231	1.0231	1.0199	1.0069	1.0037	0.9907	0.9874	0.9842	0.9874	1.0004	1.0004	1.0101 (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												3.2774 (42)
Hot water usage for mixer showers												
Hot water usage for baths	108.8604	107.2244	104.8405	100.2793	96.9133	93.1595	91.0258	93.3917	95.9852	100.0156	104.6747	108.4433 (42a)
Hot water usage for other uses	34.1694	33.6620	32.9473	31.6297	30.6431	29.5491	28.9582	29.6678	30.4404	31.6110	32.9558	34.0539 (42b)
Average daily hot water use (litres/day)	48.1939	46.4414	44.6889	42.9364	41.1838	39.4313	39.4313	41.1838	42.9364	44.6889	46.4414	48.1939 (42c)
												175.8587 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	191.2237	187.3277	182.4767	174.8454	168.7402	162.1399	159.4154	164.2433	169.3619	176.3155	184.0719	190.6911 (44)
Energy content (annual)	302.8515	266.7522	280.4599	239.3546	227.1568	199.3700	192.7991	203.3676	208.8402	239.2584	262.2442	298.5761 (45)
Distribution loss (46)m = 0.15 x (45)m	45.4277	40.0128	42.0690	35.9032	34.0735	29.9055	28.9199	30.5051	31.3260	35.8888	39.3366	44.7864 (46)
Water storage loss:												

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store volume											300.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):											2.1000 (48)	
Temperature factor from Table 2b											0.5400 (49)	
Enter (49) or (54) in (55)											1.1340 (55)	
Total storage loss	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (56)
If cylinder contains dedicated solar storage	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (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	361.2679	319.5154	338.8763	295.8866	285.5732	255.9020	251.2155	261.7840	265.3722	297.6748	318.7762	356.9925 (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	-59.5532	-113.9041	-249.2280	-389.7675	-506.9725	-550.0325	-513.6636	-438.0007	-307.2053	-171.6195	-79.3238	-45.4720 (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	301.7147	205.6113	89.6483	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	126.0554	239.4524	311.5205 (64)
	Total per year (kWh/year) = Sum(64)m =										1274.0026 (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	147.4313	130.9057	139.9860	124.8110	122.2627	111.5161	110.8388	114.3528	114.6650	126.2866	132.4218	146.0097 (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	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.4086	70.5300	57.3589	43.4244	32.4602	27.4043	29.6113	38.4899	51.6610	65.5956	76.5597	81.6156 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	811.3994	819.8192	798.6016	753.4318	696.4132	642.8236	607.0225	598.6028	619.8204	664.9901	722.0088	775.5983 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418 (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)	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961 (71)
Water heating gains (Table 5)	198.1603	194.8001	188.1533	173.3486	164.3316	154.8835	148.9769	153.7001	159.2569	169.7400	183.9191	196.2496 (72)
Total internal gains	1212.4581	1208.6391	1167.6036	1093.6947	1016.6949	948.6012	909.1006	914.2825	954.2281	1023.8155	1105.9775	1176.9533 (73)

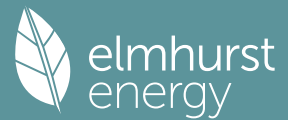
6. Solar gains

[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			
Southwest				6.8900	41.1901	0.6300	0.7000	0.7700	86.7329 (79)			
Southwest				6.8900	41.1901	0.6300	0.7000	0.7700	86.7329 (79)			
Southwest				12.9400	41.1901	0.6300	0.7000	0.7700	162.8917 (79)			
Southwest				4.8600	41.1901	0.6300	0.7000	0.7700	61.1788 (79)			
Southwest				13.3600	41.1901	0.6300	0.7000	0.7700	168.1787 (79)			
Southeast				6.4500	41.1901	0.6300	0.7000	0.7700	81.1941 (77)			
Southeast				3.7700	41.1901	0.6300	0.7000	0.7700	47.4576 (77)			
Northwest				6.4500	12.9561	0.6300	0.7000	0.7700	25.5392 (81)			
Northwest				3.7700	12.9561	0.6300	0.7000	0.7700	14.9276 (81)			
Southwest				4.8600	41.1901	0.6300	0.7000	0.7700	61.1788 (79)			
Southeast				1.0900	36.8949	0.6300	0.7000	1.0000	15.9615 (82)			
Southeast				1.0900	36.8949	0.6300	0.7000	1.0000	15.9615 (82)			
Southeast				1.0900	36.8949	0.6300	0.7000	1.0000	15.9615 (82)			
Southeast				1.0900	36.8949	0.6300	0.7000	1.0000	15.9615 (82)			
Southeast				1.0900	36.8949	0.6300	0.7000	1.0000	15.9615 (82)			
Southeast				1.0900	36.8949	0.6300	0.7000	1.0000	15.9615 (82)			
Northwest				1.0900	24.2429	0.6300	0.7000	1.0000	10.4880 (82)			
Northwest				1.0900	24.2429	0.6300	0.7000	1.0000	10.4880 (82)			
Northwest				1.0900	24.2429	0.6300	0.7000	1.0000	10.4880 (82)			
Northwest				1.0900	24.2429	0.6300	0.7000	1.0000	10.4880 (82)			
Northwest				1.0900	24.2429	0.6300	0.7000	1.0000	10.4880 (82)			
Northwest				1.0900	24.2429	0.6300	0.7000	1.0000	10.4880 (82)			
Solar gains	954.7091	1521.3532	2284.4975	3039.1511	3490.3752	3750.5428	3456.1534	3111.9849	2571.7464	1786.7427	1153.5642	801.1787 (83)
Total gains	2167.1672	2729.9924	3452.1010	4132.8458	4507.0700	4699.1440	4365.2540	4026.2675	3525.9745	2810.5582	2259.5416	1978.1320 (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	28.2363	28.2363	28.3261	28.6910	28.7837	29.1605	29.2562	29.3526	29.2562	28.8770	28.8770	28.5989
alpha	2.8824	2.8824	2.8884	2.9127	2.9189	2.9440	2.9504	2.9568	2.9504	2.9251	2.9251	2.9066
util living area	0.9762	0.9554	0.9042	0.8063	0.6742	0.4944	0.3999	0.4445	0.6624	0.8762	0.9591	0.9813 (86)
Living	19.0448	19.3112	19.7834	20.2838	20.6190	20.8165	20.8635	20.8517	20.6998	20.1988	19.5352	18.9887
Non living	17.7431	18.0801	18.6731	19.2910	19.6809	19.8963	19.9411	19.9354	19.7898	19.2075	18.3807	17.6792
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	31	28	31	0	0	0	0	0	0	0	9	31
16 / 9	0	0	0	30	0	0	0	0	0	3	21	0
MIT	21.0000	21.0000	21.0000	20.5944	20.6190	20.8165	20.8635	20.8517	20.6998	20.2325	20.4193	21.0000 (87)
Th 2	20.0641	20.0641	20.0668	20.0776	20.0803	20.0911	20.0938	20.0965	20.0938	20.0830	20.0830	20.0749 (88)
util rest of house	0.9725	0.9488	0.8903	0.7793	0.6304	0.4331	0.3259	0.3682	0.6047	0.8525	0.9519	0.9784 (89)
MIT 2	20.0641	20.0641	20.0668	19.7304	19.6809	19.8963	19.9411	19.9354	19.7898	19.2548	19.5570	20.0749 (90)
Living area fraction	fLA = Living area / (4) =											0.3667 (91)
MIT	20.4073	20.4073	20.4090	20.0472	20.0248	20.2337	20.2793	20.2714	20.1235	19.6133	19.8732	20.4141 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.4073	20.4073	20.4090	20.0472	20.0248	20.2337	20.2793	20.2714	20.1235	19.6133	19.8732	20.4141 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9740	0.9513	0.8957	0.7783	0.6276	0.4431	0.3415	0.3835	0.6068	0.8382	0.9501	0.9795	(94)
Useful gains	2110.7416	2597.1034	3092.1233	3216.5879	2828.6514	2082.0093	1490.6076	1543.9413	2139.4214	2355.7480	2146.7737	1937.6494	(95)
Ext temp.	4.4000	4.9000	6.6000	9.1000	11.9000	14.8000	16.5000	16.3000	14.0000	10.6000	7.1000	4.3000	(96)
Heat loss rate W	6745.7832	6535.0733	5800.9347	4540.2580	3358.8574	2217.3152	1537.1547	1609.9641	2490.5883	3714.1135	5263.4570	6704.7139	(97)
Space heating kWh	3448.4710	2646.3157	2015.3557	953.0425	394.4733	0.0000	0.0000	0.0000	0.0000	1010.6240	2244.0120	3546.6960	(98a)
Space heating requirement - total per year (kWh/year)												16258.9901	
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	3448.4710	2646.3157	2015.3557	953.0425	394.4733	0.0000	0.0000	0.0000	0.0000	1010.6240	2244.0120	3546.6960	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												16258.9901	
Space heating per m2										(98c) / (4) =		39.4731	(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 %)													287.8356	(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	3448.4710	2646.3157	2015.3557	953.0425	394.4733	0.0000	0.0000	0.0000	0.0000	1010.6240	2244.0120	3546.6960	(98)	
Space heating efficiency (main heating system 1)	287.8356	287.8356	287.8356	287.8356	287.8356	0.0000	0.0000	0.0000	0.0000	287.8356	287.8356	287.8356	(210)	
Space heating fuel (main heating system)	1198.0698	919.3846	700.1761	331.1066	137.0481	0.0000	0.0000	0.0000	0.0000	351.1116	779.6160	1232.1953	(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	301.7147	205.6113	89.6483	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	126.0554	239.4524	311.5205	(64)	
Efficiency of water heater (217)m	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	(216)	
Fuel for water heating, kWh/month	153.6908	104.7366	45.6660	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	64.2115	121.9749	158.6857	(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	574.4607	518.8677	574.4607	555.9297	574.4607	555.9297	574.4607	574.4607	555.9297	574.4607	555.9297	574.4607	(231)	
Lighting	69.5059	55.7602	50.2059	36.7830	28.4122	23.2130	25.9186	33.6900	43.7599	57.4154	64.8506	71.4377	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-179.9799	-247.5834	-376.0819	-415.4068	-432.0920	-400.4194	-393.4042	-371.6300	-321.2859	-284.3582	-199.7928	-152.4466	(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													5648.7081	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													196.3129	
Water heating fuel used													648.9654	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)														
mechanical ventilation fans (SFP = 5.0000)													6763.8113	(230a)
Total electricity for the above, kWh/year													6763.8113	(231)
Electricity for lighting (calculated in Appendix L)													560.9525	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-3774.4811	(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													9847.9562	(238)

10a. Fuel costs - using BEDF prices (583)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5648.7081	28.4300	1605.9277	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	648.9654	28.4300	184.5009	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	6763.8113	28.4300	1922.9516	(249)
Energy for lighting	560.9525	28.4300	159.4788	(250)

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Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3774.4811	28.4300	-1073.0850
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-1073.0850 (252)
Total energy cost			2799.7740 (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	5648.7081	0.1560	881.2735 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	648.9654	0.1569	101.8131 (264)
Space and water heating			983.0866 (265)
Pumps, fans and electric keep-hot	6763.8113	0.1387	938.2240 (267)
Energy for lighting	560.9525	0.1443	80.9628 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3774.4811	0.1349	-509.1578
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-509.1578 (269)
Total CO2, kg/year			1493.1156 (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	5648.7081	1.5776	8911.3020 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	648.9654	1.5807	1025.8051 (278)
Space and water heating			9937.1071 (279)
Pumps, fans and electric keep-hot	6763.8113	1.5128	10232.2938 (281)
Energy for lighting	560.9525	1.5338	860.4077 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3774.4811	1.4986	-5656.3548
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-5656.3548 (283)
Total Primary energy kWh/year			15373.4538 (286)

SAP 10 EPC IMPROVEMENTS

Mr A. Pearce 'As Built'

Current energy efficiency rating:	C 78
Current environmental impact rating:	A 95

N Solar water heating	SAP increase too small
U Solar photovoltaic panels	Already installed
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
Measures omitted - SAP change or cost saving too small:			
N Solar water heating	+ -1.5	-£-204	+ 98 kg (6.6%)

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

Potential energy efficiency rating:	C 78
Potential environmental impact rating:	A 95

Fuel prices for cost data on this page from database revision number 583 TEST (01 Oct 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current £3873	Potential £3873	Saving £0
Electricity			
Space heating	£3529	£3529	£0
Water heating	£185	£185	£0
Lighting	£159	£159	£0
Generated (PV)	-£1073	-£1073	£0
Total cost of fuels	£2800	£2800	£0
Total cost of uses	£2800	£2800	£0
Delivered energy	24 kWh/m²	24 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.5 tonnes	1.5 tonnes	0.0 tonnes
CO2 emissions per m²	4 kg/m²	4 kg/m²	0 kg/m²
Primary energy	37 kWh/m²	37 kWh/m²	0 kWh/m²

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1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	265.7910 (1b)	x 2.7700 (2b)	= 736.2410 (1b) - (3b)
First floor	146.1100 (1c)	x 2.5500 (2c)	= 372.5805 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	411.9010		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 1108.8215 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

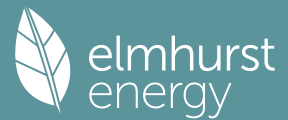
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			2.9200 (17)
Infiltration rate			0.1460 (18)
Number of sides sheltered			0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.1460 (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	0.1861	0.1825	0.1789	0.1606	0.1569	0.1387	0.1387	0.1351	0.1460	0.1569	0.1642	0.1716 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												46.2000 (23c)
Effective ac	0.4551	0.4515	0.4479	0.4296	0.4259	0.4077	0.4077	0.4041	0.4150	0.4259	0.4333	0.4405 (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							
GF SW 1			6.8900	0.9985	6.8794		(27)
GF SW 2			6.8900	0.9985	6.8794		(27)
GF SW 3			12.9400	0.9985	12.9201		(27)
FF SW 2			4.8600	0.9985	4.8525		(27)
FF SW 3			13.3600	0.9985	13.3395		(27)
GF SE			6.4500	0.9985	6.4401		(27)
FF SE			3.7700	0.9985	3.7642		(27)
GF NW			6.4500	0.9985	6.4401		(27)
FF NW			3.7700	0.9985	3.7642		(27)
FF SW 1			4.8600	0.9985	4.8525		(27)
SE 1			1.0900	1.2357	1.3470		(27a)
SE 2			1.0900	1.2357	1.3470		(27a)
SE 3			1.0900	1.2357	1.3470		(27a)
SE 4			1.0900	1.2357	1.3470		(27a)
SE 5			1.0900	1.2357	1.3470		(27a)
SE 6			1.0900	1.2357	1.3470		(27a)
NW 1			1.0900	1.2357	1.3470		(27a)
NW 2			1.0900	1.2357	1.3470		(27a)
NW 3			1.0900	1.2357	1.3470		(27a)
NW 4			1.0900	1.2357	1.3470		(27a)
NW 5			1.0900	1.2357	1.3470		(27a)
NW 6			1.0900	1.2357	1.3470		(27a)
Main			265.7910	0.1100	29.2370	110.0000	29237.0100 (28a)
Main	265.2000	70.2400	194.9600	0.0900	17.5464	9.0000	1754.6401 (29a)
Main	275.0730	13.0800	261.9930	0.1200	31.4392	9.0000	2357.9370 (30)
Total net area of external elements Aum(A, m2)			806.0640				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	164.5182		(33)
Main dwelling							
GF			306.5000			9.0000	2758.5000 (32c)
FF			212.7400			9.0000	1914.6600 (32c)
FF			178.3300			18.0000	3209.9400 (32d)
GF			178.3300			9.0000	1604.9700 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	42837.6571 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							103.9999 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E5 Ground floor (normal)				67.0200	0.3200		21.4464
E6 Intermediate floor within a dwelling				52.2100	0.1400		7.3094
E16 Corner (normal)				12.6400	0.1800		2.2752
E1 Steel lintel with perforated steel base plate				36.0200	1.0000		36.0200
E3 Sill				23.5200	0.1000		2.3520
E4 Jamb				37.6620	0.1000		3.7662
E11 Eaves (insulation at rafter level)				25.7800	0.1500		3.8670
E13 Gable (insulation at rafter level)				41.2400	0.2500		10.3100
R1 Head of roof window				9.3600	0.2400		2.2464
R2 Sill of roof window				9.3600	0.2400		2.2464

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R3 Jamb of roof window	33.6000	0.2400	8.0640
R4 Ridge (vaulted ceiling)	20.6200	0.1200	2.4744
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			102.3774 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	266.8956 (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	166.5444	165.2089	163.8733	157.1954	155.8598	149.1820	149.1820	147.8464	151.8531	155.8598	158.5310	161.2021 (38)
Average = Sum(39)m / 12 =	433.4400	432.1044	430.7689	424.0910	422.7554	416.0775	416.0775	414.7420	418.7487	422.7554	425.4266	428.0977 (39)
												423.7571
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0523	1.0490	1.0458	1.0296	1.0264	1.0101	1.0101	1.0069	1.0166	1.0264	1.0328	1.0393 (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												3.2774 (42)
Hot water usage for mixer showers												
Hot water usage for baths	108.8604	107.2244	104.8405	100.2793	96.9133	93.1595	91.0258	93.3917	95.9852	100.0156	104.6747	108.4433 (42a)
Hot water usage for other uses	34.1694	33.6620	32.9473	31.6297	30.6431	29.5491	28.9582	29.6678	30.4404	31.6110	32.9558	34.0539 (42b)
Average daily hot water use (litres/day)	48.1939	46.4414	44.6889	42.9364	41.1838	39.4313	39.4313	41.1838	42.9364	44.6889	46.4414	48.1939 (42c)
												175.8587 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	191.2237	187.3277	182.4767	174.8454	168.7402	162.1399	159.4154	164.2433	169.3619	176.3155	184.0719	190.6911 (44)
Energy content (annual)	302.8515	266.7522	280.4599	239.3546	227.1568	199.3700	192.7991	203.3676	208.8402	239.2584	262.2442	298.5761 (45)
Distribution loss (46)m = 0.15 x (45)m	45.4277	40.0128	42.0690	35.9032	34.0735	29.9055	28.9199	30.5051	31.3260	35.8888	39.3366	44.7864 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1340 (55)
Total storage loss	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (56)
If cylinder contains dedicated solar storage	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (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	361.2679	319.5154	338.8763	295.8866	285.5732	255.9020	251.2155	261.7840	265.3722	297.6748	318.7762	356.9925 (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	-49.6173	-110.2779	-232.9853	-367.7854	-497.3795	-501.0714	-490.1727	-404.5552	-284.5339	-157.9329	-66.3613	-38.3814 (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	311.6507	209.2375	105.8910	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	139.7420	252.4149	318.6111 (64)
										Total per year (kWh/year) = Sum(64)m =		1337.5470 (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	147.4313	130.9057	139.9860	124.8110	122.2627	111.5161	110.8388	114.3528	114.6650	126.2866	132.4218	146.0097 (65)

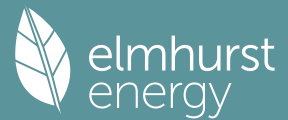
5. Internal gains (see Table 5 and 5a)

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	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	79.4086	70.5300	57.3589	43.4244	32.4602	27.4043	29.6113	38.4899	51.6610	65.5956	76.5597	81.6156 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	811.3994	819.8192	798.6016	753.4318	696.4132	642.8236	607.0225	598.6028	619.8204	664.9901	722.0088	775.5983 (68)
Pumps, fans	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961 (71)
Total internal gains	198.1603	194.8001	188.1533	173.3486	164.3316	154.8835	148.9769	153.7001	159.2569	169.7400	183.9191	196.2496 (72)
	1212.4581	1208.6391	1167.6036	1093.6947	1016.6949	948.6012	909.1006	914.2825	954.2281	1023.8155	1105.9775	1176.9533 (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
Southwest	6.8900	36.7938	0.6300	0.7000	0.7700	77.4758 (79)
Southwest	6.8900	36.7938	0.6300	0.7000	0.7700	77.4758 (79)
Southwest	12.9400	36.7938	0.6300	0.7000	0.7700	145.5061 (79)
Southwest	4.8600	36.7938	0.6300	0.7000	0.7700	54.6491 (79)
Southwest	13.3600	36.7938	0.6300	0.7000	0.7700	150.2288 (79)
Southeast	6.4500	36.7938	0.6300	0.7000	0.7700	72.5281 (77)
Southeast	3.7700	36.7938	0.6300	0.7000	0.7700	42.3924 (77)
Northwest	6.4500	11.2829	0.6300	0.7000	0.7700	22.2410 (81)
Northwest	3.7700	11.2829	0.6300	0.7000	0.7700	12.9998 (81)
Southwest	4.8600	36.7938	0.6300	0.7000	0.7700	54.6491 (79)
Southeast	1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)
Southeast	1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)
Southeast	1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)
Southeast	1.0900	32.2347	0.6300	0.7000	1.0000	13.9454 (82)

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Southeast			1.0900		32.2347		0.6300		0.7000		1.0000		13.9454 (82)
Southeast			1.0900		32.2347		0.6300		0.7000		1.0000		13.9454 (82)
Northwest			1.0900		20.9739		0.6300		0.7000		1.0000		9.0738 (82)
Northwest			1.0900		20.9739		0.6300		0.7000		1.0000		9.0738 (82)
Northwest			1.0900		20.9739		0.6300		0.7000		1.0000		9.0738 (82)
Northwest			1.0900		20.9739		0.6300		0.7000		1.0000		9.0738 (82)
Northwest			1.0900		20.9739		0.6300		0.7000		1.0000		9.0738 (82)
Northwest			1.0900		20.9739		0.6300		0.7000		1.0000		9.0738 (82)
Northwest			1.0900		20.9739		0.6300		0.7000		1.0000		9.0738 (82)

Solar gains	848.2609	1501.5037	2191.3812	2922.9241	3447.6674	3494.9357	3339.7561	2940.0316	2444.8945	1697.7020	1026.6532	718.8792 (83)
Total gains	2060.7191	2710.1429	3358.9848	4016.6188	4464.3623	4443.5370	4248.8567	3854.3141	3399.1227	2721.5175	2132.6307	1895.8325 (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	27.4533	27.5381	27.6235	28.0585	28.1471	28.5989	28.5989	28.6910	28.4164	28.1471	27.9704	27.7959
alpha	2.8302	2.8359	2.8416	2.8706	2.8765	2.9066	2.9066	2.9127	2.8944	2.8765	2.8647	2.8531
util living area	0.9794	0.9567	0.9126	0.8244	0.6932	0.5366	0.4088	0.4605	0.6802	0.8864	0.9649	0.9835 (86)
Living	18.9342	19.2536	19.6967	20.2052	20.5767	20.7884	20.8588	20.8441	20.6747	20.1425	19.4372	18.8857
Non living	17.5862	17.9924	18.5502	19.1829	19.6179	19.8555	19.9188	19.9113	19.7438	19.1239	18.2387	17.5317
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	31	28	31	0	0	0	0	0	0	0	14	31
16 / 9	0	0	0	30	0	0	0	0	0	5	16	0
MIT	21.0000	21.0000	21.0000	20.5498	20.5767	20.7884	20.8588	20.8441	20.6747	20.2025	20.5279	21.0000 (87)
Th 2	20.0400	20.0427	20.0453	20.0587	20.0614	20.0749	20.0749	20.0776	20.0695	20.0614	20.0561	20.0507 (88)
util rest of house	0.9762	0.9502	0.8996	0.7990	0.6503	0.4740	0.3304	0.3792	0.6209	0.8638	0.9586	0.9809 (89)
MIT 2	20.0400	20.0427	20.0453	19.6722	19.6179	19.8555	19.9188	19.9113	19.7438	19.2083	19.6283	20.0507 (90)
Living area fraction									fLA = Living area / (4) =			0.3667 (91)
MIT	20.3920	20.3937	20.3954	19.9940	19.9695	20.1976	20.2635	20.2533	20.0851	19.5729	19.9581	20.3988 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3920	20.3937	20.3954	19.9940	19.9695	20.1976	20.2635	20.2533	20.0851	19.5729	19.9581	20.3988 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9774	0.9527	0.9047	0.7971	0.6458	0.4827	0.3468	0.3953	0.6219	0.8498	0.9578	0.9819 (94)
Useful gains	2014.2286	2582.0281	3038.7261	3201.5464	2883.1278	2144.7375	1473.6999	1523.7460	2114.0271	2312.8385	2042.6845	1861.5450 (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	6974.9121	6694.8894	5985.6964	4704.8512	3495.9613	2329.0205	1524.2886	1598.1317	2506.2595	3793.3243	5470.1933	6934.6572 (97)
Space heating kWh	3690.7486	2763.8428	2192.5459	1082.3794	455.9481	0.0000	0.0000	0.0000	0.0000	1101.4814	2467.8064	3774.3955 (98a)
Space heating requirement - total per year (kWh/year)												17529.1481
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	3690.7486	2763.8428	2192.5459	1082.3794	455.9481	0.0000	0.0000	0.0000	0.0000	1101.4814	2467.8064	3774.3955 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												17529.1481
Space heating per m2										(98c) / (4) =		42.5567 (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 %)

277.5603 (206)

Efficiency of main space heating system 2 (in %)

0.0000 (207)

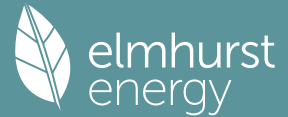
Efficiency of secondary/supplementary heating system, %

0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	3690.7486	2763.8428	2192.5459	1082.3794	455.9481	0.0000	0.0000	0.0000	0.0000	1101.4814	2467.8064	3774.3955 (98)
Space heating efficiency (main heating system 1)	277.5603	277.5603	277.5603	277.5603	277.5603	0.0000	0.0000	0.0000	0.0000	277.5603	277.5603	277.5603 (210)
Space heating fuel (main heating system)	1329.7107	995.7631	789.9351	389.9620	164.2699	0.0000	0.0000	0.0000	0.0000	396.8441	889.1065	1359.8472 (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	311.6507	209.2375	105.8910	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	139.7420	252.4149	318.6111 (64)
Efficiency of water heater	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224	196.4224 (216)
Fuel for water heating, kWh/month	158.6635	106.5242	53.9098	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	71.1436	128.5061	162.2071 (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	574.4607	518.8677	574.4607	555.9297	574.4607	555.9297	574.4607	574.4607	555.9297	574.4607	555.9297	574.4607 (231)
Lighting	69.5059	55.7602	50.2059	36.7830	28.4122	23.2130	25.9186	33.6900	43.7599	57.4154	64.8506	71.4377 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-162.5062	-244.8902	-368.3596	-411.1382	-433.3294	-387.5669	-386.8616	-360.5219	-311.0414	-274.9388	-181.9318	-138.4247 (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)

		Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling				
Ground floor		265.7910 (1b)	x 2.7700 (2b)	= 736.2410 (1b) - (3b)
First floor		146.1100 (1c)	x 2.5500 (2c)	= 372.5805 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	411.9010			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	1108.8215 (5)

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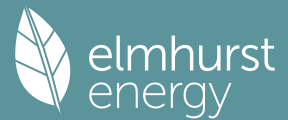
2. Ventilation rate

												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												0 * 10 =	0.0000 (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) =												0.0000 / (5) =	0.0000 (8)
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												2.9200 (17)	
Infiltration rate												0.1460 (18)	
Number of sides sheltered												0 (19)	
Shelter factor												(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.1460 (21)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.2000	4.2000	4.1000	3.7000	3.6000	3.2000	3.1000	3.0000	3.1000	3.5000	3.5000	3.8000 (22)	
Wind factor	1.0500	1.0500	1.0250	0.9250	0.9000	0.8000	0.7750	0.7500	0.7750	0.8750	0.8750	0.9500 (22a)	
Adj infilt rate													
	0.1533	0.1533	0.1496	0.1351	0.1314	0.1168	0.1132	0.1095	0.1132	0.1278	0.1278	0.1387 (22b)	
Balanced mechanical ventilation with heat recovery													
If mechanical ventilation													0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													46.2000 (23c)
Effective ac	0.4223	0.4223	0.4186	0.4041	0.4004	0.3858	0.3821	0.3785	0.3821	0.3968	0.3968	0.4077 (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							
GF SW 1			6.8900	0.9985	6.8794		(27)
GF SW 2			6.8900	0.9985	6.8794		(27)
GF SW 3			12.9400	0.9985	12.9201		(27)
FF SW 2			4.8600	0.9985	4.8525		(27)
FF SW 3			13.3600	0.9985	13.3395		(27)
GF SE			6.4500	0.9985	6.4401		(27)
FF SE			3.7700	0.9985	3.7642		(27)
GF NW			6.4500	0.9985	6.4401		(27)
FF NW			3.7700	0.9985	3.7642		(27)
FF SW 1			4.8600	0.9985	4.8525		(27)
SE 1			1.0900	1.2357	1.3470		(27a)
SE 2			1.0900	1.2357	1.3470		(27a)
SE 3			1.0900	1.2357	1.3470		(27a)
SE 4			1.0900	1.2357	1.3470		(27a)
SE 5			1.0900	1.2357	1.3470		(27a)
SE 6			1.0900	1.2357	1.3470		(27a)
NW 1			1.0900	1.2357	1.3470		(27a)
NW 2			1.0900	1.2357	1.3470		(27a)
NW 3			1.0900	1.2357	1.3470		(27a)
NW 4			1.0900	1.2357	1.3470		(27a)
NW 5			1.0900	1.2357	1.3470		(27a)
NW 6			1.0900	1.2357	1.3470		(27a)
Main			265.7910	0.1100	29.2370	110.0000	29237.0100
Main	265.2000	70.2400	194.9600	0.0900	17.5464	9.0000	1754.6401
Main	275.0730	13.0800	261.9930	0.1200	31.4392	9.0000	2357.9370
Total net area of external elements Aum(A, m2)							
Fabric heat loss, W/K = Sum (A x U)							
Main dwelling							
GF							
FF							
FF							
GF							
Heat capacity Cm = Sum(A x k)							
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							
List of Thermal Bridges							
K1 Element							
E5 Ground floor (normal)							
E6 Intermediate floor within a dwelling							
E16 Corner (normal)							
E1 Steel lintel with perforated steel base plate							
E3 Sill							
E4 Jamb							
E11 Eaves (insulation at rafter level)							
E13 Gable (insulation at rafter level)							
R1 Head of roof window							
R2 Sill of roof window							
R3 Jamb of roof window							
R4 Ridge (vaulted ceiling)							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							
Point Thermal bridges							
Total fabric heat loss							
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul
Heat transfer coeff	154.5243	154.5243	153.1887	147.8464	146.5108	141.1685	139.8329
Average = Sum(39)m / 12 =	421.4198	421.4198	420.0843	414.7420	413.4064	408.0641	406.7285
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul
HLP (average)	1.0231	1.0231	1.0199	1.0069	1.0037	0.9907	0.9874
Days in mont	31	28	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												3.2774 (42)
Hot water usage for mixer showers	108.8604	107.2244	104.8405	100.2793	96.9133	93.1595	91.0258	93.3917	95.9852	100.0156	104.6747	108.4433 (42a)
Hot water usage for baths	34.1694	33.6620	32.9473	31.6297	30.6431	29.5491	28.9582	29.6678	30.4404	31.6110	32.9558	34.0539 (42b)
Hot water usage for other uses	48.1939	46.4414	44.6889	42.9364	41.1838	39.4313	39.4313	41.1838	42.9364	44.6889	46.4414	48.1939 (42c)
Average daily hot water use (litres/day)												175.8587 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	191.2237	187.3277	182.4767	174.8454	168.7402	162.1399	159.4154	164.2433	169.3619	176.3155	184.0719	190.6911 (44)
Distribution loss (46)m = 0.15 x (45)m	302.8515	266.7522	280.4599	239.3546	227.1568	199.3700	192.7991	203.3676	208.8402	239.2584	262.2442	298.5761 (45)
Water storage loss:	45.4277	40.0128	42.0690	35.9032	34.0735	29.9055	28.9199	30.5051	31.3260	35.8888	39.3366	44.7864 (46)
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1340 (55)
Total storage loss	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (56)
If cylinder contains dedicated solar storage	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (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	361.2679	319.5154	338.8763	295.8866	285.5732	255.9020	251.2155	261.7840	265.3722	297.6748	318.7762	356.9925 (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	-59.5532	-113.9041	-249.2280	-389.7675	-506.9725	-550.0325	-513.6636	-438.0007	-307.2053	-171.6195	-79.3238	-45.4720 (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	301.7147	205.6113	89.6483	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	126.0554	239.4524	311.5205 (64)
Electric shower(s)	Total per year (kWh/year) = Sum(64)m =											1274.0026 (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	147.4313	130.9057	139.9860	124.8110	122.2627	111.5161	110.8388	114.3528	114.6650	126.2866	132.4218	146.0097 (65)

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

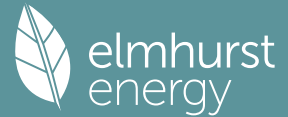
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441	196.6441 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.4086	70.5300	57.3589	43.4244	32.4602	27.4043	29.6113	38.4899	51.6610	65.5956	76.5597	81.6156 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	811.3994	819.8192	798.6016	753.4318	696.4132	642.8236	607.0225	598.6028	619.8204	664.9901	722.0088	775.5983 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418	57.9418 (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)	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961	-131.0961 (71)
Water heating gains (Table 5)	198.1603	194.8001	188.1533	173.3486	164.3316	154.8835	148.9769	153.7001	159.2569	169.7400	183.9191	196.2496 (72)
Total internal gains	1212.4581	1208.6391	1167.6036	1093.6947	1016.6949	948.6012	909.1006	914.2825	954.2281	1023.8155	1105.9775	1176.9533 (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	
Southwest				6.8900	41.1901	0.6300	0.7000		0.7700		86.7329 (79)	
Southwest				6.8900	41.1901	0.6300	0.7000		0.7700		86.7329 (79)	
Southwest				12.9400	41.1901	0.6300	0.7000		0.7700		162.8917 (79)	
Southwest				4.8600	41.1901	0.6300	0.7000		0.7700		61.1788 (79)	
Southwest				13.3600	41.1901	0.6300	0.7000		0.7700		168.1787 (79)	
Southeast				6.4500	41.1901	0.6300	0.7000		0.7700		81.1941 (77)	
Southeast				3.7700	41.1901	0.6300	0.7000		0.7700		47.4576 (77)	
Northwest				6.4500	12.9561	0.6300	0.7000		0.7700		25.5392 (81)	
Northwest				3.7700	12.9561	0.6300	0.7000		0.7700		14.9276 (81)	
Southwest				4.8600	41.1901	0.6300	0.7000		0.7700		61.1788 (79)	
Southeast				1.0900	36.8949	0.6300	0.7000		1.0000		15.9615 (82)	
Southeast				1.0900	36.8949	0.6300	0.7000		1.0000		15.9615 (82)	
Southeast				1.0900	36.8949	0.6300	0.7000		1.0000		15.9615 (82)	
Southeast				1.0900	36.8949	0.6300	0.7000		1.0000		15.9615 (82)	
Southeast				1.0900	36.8949	0.6300	0.7000		1.0000		15.9615 (82)	
Southeast				1.0900	36.8949	0.6300	0.7000		1.0000		15.9615 (82)	
Northwest				1.0900	24.2429	0.6300	0.7000		1.0000		10.4880 (82)	
Northwest				1.0900	24.2429	0.6300	0.7000		1.0000		10.4880 (82)	
Northwest				1.0900	24.2429	0.6300	0.7000		1.0000		10.4880 (82)	
Northwest				1.0900	24.2429	0.6300	0.7000		1.0000		10.4880 (82)	
Northwest				1.0900	24.2429	0.6300	0.7000		1.0000		10.4880 (82)	
Solar gains	954.7091	1521.3532	2284.4975	3039.1511	3490.3752	3750.5428	3456.1534	3111.9849	2571.7464	1786.7427	1153.5642	801.1787 (83)
Total gains	2167.1672	2729.9924	3452.1010	4132.8458	4507.0700	4699.1440	4365.2540	4026.2675	3525.9745	2810.5582	2259.5416	1978.1320 (84)

7. Mean internal temperature (heating season)

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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	28.2363	28.2363	28.3261	28.6910	28.7837	29.1605	29.2562	29.3526	29.2562	28.8770	28.8770	28.5989
alpha	2.8824	2.8824	2.8884	2.9127	2.9189	2.9440	2.9504	2.9568	2.9504	2.9251	2.9251	2.9066
util living area	0.9762	0.9554	0.9042	0.8063	0.6742	0.4944	0.3999	0.4445	0.6624	0.8762	0.9591	0.9813 (86)
Living	19.0448	19.3112	19.7834	20.2838	20.6190	20.8165	20.8635	20.8517	20.6998	20.1988	19.5352	18.9887
Non living	17.7431	18.0801	18.6731	19.2910	19.6809	19.8963	19.9411	19.9354	19.7898	19.2075	18.3807	17.6792
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	31	28	31	0	0	0	0	0	0	0	9	31
16 / 9	0	0	0	30	0	0	0	0	0	3	21	0
MIT	21.0000	21.0000	21.0000	20.5944	20.6190	20.8165	20.8635	20.8517	20.6998	20.2325	20.4193	21.0000 (87)
Th 2	20.0641	20.0641	20.0668	20.0776	20.0803	20.0911	20.0938	20.0965	20.0938	20.0830	20.0830	20.0749 (88)
util rest of house	0.9725	0.9488	0.8903	0.7793	0.6304	0.4331	0.3259	0.3682	0.6047	0.8525	0.9519	0.9784 (89)
MIT 2	20.0641	20.0641	20.0668	19.7304	19.6809	19.8963	19.9411	19.9354	19.7898	19.2548	19.5570	20.0749 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	20.4073	20.4073	20.4090	20.0472	20.0248	20.2337	20.2793	20.2714	20.1235	19.6133	19.8732	20.4141 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4073	20.4073	20.4090	20.0472	20.0248	20.2337	20.2793	20.2714	20.1235	19.6133	19.8732	20.4141 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9740	0.9513	0.8957	0.7783	0.6276	0.4431	0.3415	0.3835	0.6068	0.8382	0.9501	0.9795 (94)
Useful gains	2110.7416	2597.1034	3092.1233	3216.5879	2828.6514	2082.0093	1490.6076	1543.9413	2139.4214	2355.7480	2146.7737	1937.6494 (95)
Ext temp.	4.4000	4.9000	6.6000	9.1000	11.9000	14.8000	16.5000	16.3000	14.0000	10.6000	7.1000	4.3000 (96)
Heat loss rate W	6745.7832	6535.0733	5800.9347	4540.2580	3358.8574	2217.3152	1537.1547	1609.9641	2490.5883	3714.1135	5263.4570	6704.7139 (97)
Space heating kWh	3448.4710	2646.3157	2015.3557	953.0425	394.4733	0.0000	0.0000	0.0000	0.0000	1010.6240	2244.0120	3546.6960 (98a)
Space heating requirement - total per year (kWh/year)												16258.9901
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	3448.4710	2646.3157	2015.3557	953.0425	394.4733	0.0000	0.0000	0.0000	0.0000	1010.6240	2244.0120	3546.6960 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												16258.9901
Space heating per m2										(98c) / (4) =		39.4731 (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 %)												287.8356 (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	3448.4710	2646.3157	2015.3557	953.0425	394.4733	0.0000	0.0000	0.0000	0.0000	1010.6240	2244.0120	3546.6960 (98)
Space heating efficiency (main heating system 1)	287.8356	287.8356	287.8356	287.8356	287.8356	0.0000	0.0000	0.0000	0.0000	287.8356	287.8356	287.8356 (210)
Space heating fuel (main heating system)	1198.0698	919.3846	700.1761	331.1066	137.0481	0.0000	0.0000	0.0000	0.0000	351.1116	779.6160	1232.1953 (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	301.7147	205.6113	89.6483	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	126.0554	239.4524	311.5205 (64)
Efficiency of water heater (217)m	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129	196.3129 (216)
Fuel for water heating, kWh/month	153.6908	104.7366	45.6660	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	64.2115	121.9749	158.6857 (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	574.4607	518.8677	574.4607	555.9297	574.4607	555.9297	574.4607	574.4607	555.9297	574.4607	555.9297	574.4607 (231)
Lighting	69.5059	55.7602	50.2059	36.7830	28.4122	23.2130	25.9186	33.6900	43.7599	57.4154	64.8506	71.4377 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-179.9799	-247.5834	-376.0819	-415.4068	-432.0920	-400.4194	-393.4042	-371.6300	-321.2859	-284.3582	-199.7928	-152.4466 (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												5648.7081 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												196.3129
Water heating fuel used												648.9654 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)												6763.8113 (230a)
mechanical ventilation fans (SFP = 5.0000)												6763.8113 (231)
Total electricity for the above, kWh/year												560.9525 (232)
Electricity for lighting (calculated in Appendix L)												

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	-3774.4811	(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	9847.9562	(238)

10a. Fuel costs - using BEDF prices (583)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	5648.7081	28.4300	1605.9277 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	648.9654	28.4300	184.5009 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	6763.8113	28.4300	1922.9516 (249)
Energy for lighting	560.9525	28.4300	159.4788 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3774.4811	28.4300	-1073.0850
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-1073.0850 (252)
Total energy cost			2799.7740 (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	5648.7081	0.1560	881.2735 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	648.9654	0.1569	101.8131 (264)
Space and water heating			983.0866 (265)
Pumps, fans and electric keep-hot	6763.8113	0.1387	938.2240 (267)
Energy for lighting	560.9525	0.1443	80.9628 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3774.4811	0.1349	-509.1578
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-509.1578 (269)
Total CO2, kg/year			1493.1156 (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	5648.7081	1.5776	8911.3020 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	648.9654	1.5807	1025.8051 (278)
Space and water heating			9937.1071 (279)
Pumps, fans and electric keep-hot	6763.8113	1.5128	10232.2938 (281)
Energy for lighting	560.9525	1.5338	860.4077 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-3774.4811	1.4986	-5656.3548
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-5656.3548 (283)
Total Primary energy kWh/year			15373.4538 (286)