

Full SAP Calculation Printout



Property Reference	001	Issued on Date	11/02/2025
Assessment Reference	00001	Prop Type Ref	
Property	Adj. Lyncorte, Bentons Lane, Dial Post, RH13 8NW		
SAP Rating	84 B	DER	3.14
Environmental	97 A	% DER < TER	62.62
CO ₂ Emissions (t/year)	0.51	DFEE	39.98
Compliance Check	See BREL	% DFEE < TFEE	2.99
% DPER < TPER	25.96	DPER	32.73
Assessor Details	Mr. Ian Bacon	Assessor ID	T238-0001
Client			

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	97.3800 (1b)	x 2.4000 (2b)	= 233.7120 (1b) - (3b)
First floor	75.8600 (1c)	x 2.4000 (2c)	= 182.0640 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	173.2400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 415.7760 (5)

2. Ventilation rate

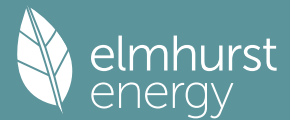
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.0962 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2962 (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) = 0.2962 (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	0.3777	0.3703	0.3629	0.3258	0.3184	0.2814	0.2814	0.2740	0.2962	0.3184	0.3332	0.3480 (22b)
Effective ac	0.5713	0.5685	0.5658	0.5531	0.5507	0.5396	0.5396	0.5375	0.5439	0.5507	0.5555	0.5606 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Windows & gl. doors (Uw = 1.40)			37.0900	1.3258	49.1723		(27)
Solid door			2.0000	1.4000	2.8000		(26)
Opening			2.0000	1.2357	2.4715		(27a)
Opening			0.6700	1.2357	0.8279		(27a)
Heatloss Floor 1			97.3800	0.1100	10.7118	75.0000	7303.5000 (28a)
External Wall 1	182.5600	39.0900	143.4700	0.1900	27.2593	60.0000	8608.2000 (29a)
External Wall sheltered	9.5000		9.5000	0.1100	1.0450	9.0000	85.5000 (29a)
External Roof pitched	57.2100	2.6700	54.5400	0.1500	8.1810	9.0000	490.8600 (30)
External Roof sheltered	21.5200		21.5200	0.1100	2.3672	9.0000	193.6800 (30)
External Roof loft	43.8600		43.8600	0.1100	4.8246	9.0000	394.7400 (30)
Total net area of external elements Aum(A, m ²)			412.0300				(31)
Fabric heat loss, W/K = Sum (A x k)				(26)...(30) + (32) =	109.6607		(33)
Internal Wall 1			64.6200			9.0000	581.5800 (32c)
Internal Wall 2			9.3600			75.0000	702.0000 (32c)
Internal Floor 1			75.8600			18.0000	1365.4800 (32d)
Internal Ceiling 1			75.8600			9.0000	682.7400 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20408.2800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							117.8035 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	25.0000	0.0250	0.6250
E3 Sill	24.0500	0.0220	0.5291
E4 Jamb	51.4000	0.0170	0.8738
E5 Ground floor (normal)	47.4000	0.0670	3.1758
E6 Intermediate floor within a dwelling	48.2000	0.0010	0.0482
E16 Corner (normal)	27.4000	0.0420	1.1508
E17 Corner (inverted - internal area greater than external area)	10.2500	-0.0850	-0.8713
E10 Eaves (insulation at ceiling level)	7.8000	0.0570	0.4446
E11 Eaves (insulation at rafter level)	34.8000	0.0180	0.6264
E12 Gable (insulation at ceiling level)	10.3400	0.0430	0.4446
E13 Gable (insulation at rafter level)	7.2000	0.0430	0.3096
R1 Head of roof window	2.7600	0.2400	0.6624
R2 Sill of roof window	2.7600	0.2400	0.6624
R3 Jamb of roof window	8.1600	0.2400	1.9584
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.6399 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	120.3005 (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	78.3878	78.0079	77.6354	75.8861	75.5588	74.0353	74.0353	73.7531	74.6221	75.5588	76.2209	76.9131	(38)
Heat transfer coeff	198.6884	198.3084	197.9360	196.1867	195.8594	194.3358	194.3358	194.0537	194.9227	195.8594	196.5215	197.2137	(39)
Average = Sum(39)m / 12 =												196.1851	
HLP	1.1469	1.1447	1.1426	1.1325	1.1306	1.1218	1.1218	1.1201	1.1252	1.1306	1.1344	1.1384	(40)
HLP (average)												1.1324	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9669 (42)
Hot water usage for mixer showers	73.9649	72.8533	71.2336	68.1345	65.8475	63.2970	61.8473	63.4547	65.2168	67.9553	71.1210	73.6815	(42a)
Hot water usage for baths	31.9305	31.4563	30.7885	29.5572	28.6353	27.6130	27.0607	27.7239	28.4459	29.5398	30.7964	31.8226	(42b)
Hot water usage for other uses	45.0139	43.3771	41.7402	40.1033	38.4665	36.8296	36.8296	38.4665	40.1033	41.7402	43.3771	45.0139	(42c)
Average daily hot water use (litres/day)												138.7196	(43)
Daily hot water use	150.9094	147.6867	143.7623	137.7951	132.9492	127.7395	125.7376	129.6451	133.7661	139.2353	145.2945	150.5180	(44)
Energy conte	239.0036	210.3039	220.9573	188.6346	178.9752	157.0706	152.0687	160.5277	164.9469	188.9410	206.9986	235.6749	(45)
Energy content (annual)										Total = Sum(45)m =		2304.1030	
Distribution loss (46)m = 0.15 x (45)m	35.8505	31.5456	33.1436	28.2952	26.8463	23.5606	22.8103	24.0792	24.7420	28.3411	31.0498	35.3512	(46)
Water storage loss:													
Store volume												210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5700	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8478	(55)
Total storage loss	26.2818	23.7384	26.2818	25.4340	26.2818	25.4340	26.2818	26.2818	25.4340	26.2818	25.4340	26.2818	(56)
If cylinder contains dedicated solar storage	26.2818	23.7384	26.2818	25.4340	26.2818	25.4340	26.2818	26.2818	25.4340	26.2818	25.4340	26.2818	(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	288.5478	255.0535	270.5015	236.5806	228.5194	205.0166	201.6129	210.0719	212.8929	238.4852	254.9446	285.2191	(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	288.5478	255.0535	270.5015	236.5806	228.5194	205.0166	201.6129	210.0719	212.8929	238.4852	254.9446	285.2191	(64)
										Total per year (kWh/year) = Sum(64)m =		2887.4460	(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	119.1040	105.7257	113.1037	101.0778	99.1446	90.5828	90.1982	93.0108	93.2017	102.4582	107.1838	117.9973	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	40.9387	36.3613	29.5710	22.3872	16.7347	14.1281	15.2659	19.8432	26.6335	33.8174	39.4699	42.0765	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	514.6862	520.0270	506.5683	477.9162	441.7482	407.7553	385.0460	379.7052	393.1639	421.8159	457.9840	491.9768	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	(71)
Water heating gains (Table 5)	160.0861	157.3300	152.0211	140.3858	133.2589	125.8094	121.2342	125.0145	129.4467	137.7127	148.8664	158.5985	(72)
Total internal gains	830.8170	828.8244	803.2665	755.7953	706.8478	662.7990	636.6522	639.6690	664.3503	708.4521	761.4264	807.7579	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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Northeast			5.8200		11.2829		0.6400		0.7000		0.7700		20.3872 (75)
Southeast			7.5300		36.7938		0.6400		0.7000		0.7700		86.0164 (77)
Southwest			11.1100		36.7938		0.6400		0.7000		0.7700		126.9113 (79)
Northwest			12.6300		11.2829		0.6400		0.7000		0.7700		44.2422 (81)
Northeast			0.6700		16.3666		0.7200		0.7000		1.0000		4.9740 (82)
Southeast			2.0000		39.9751		0.7200		0.7000		1.0000		36.2654 (82)

Solar gains	318.7965	571.1506	853.8642	1175.5491	1421.2980	1456.2951	1385.2361	1195.4564	964.5037	650.9844	387.0220	269.4431	(83)
Total gains	1149.6135	1399.9750	1657.1306	1931.3445	2128.1459	2119.0941	2021.8883	1835.1255	1628.8540	1359.4365	1148.4484	1077.2009	(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	28.5320	28.5866	28.6404	28.8958	28.9441	29.1710	29.1710	29.2134	29.0832	28.9441	28.8465	28.7453	
alpha	2.9021	2.9058	2.9094	2.9264	2.9296	2.9447	2.9447	2.9476	2.9389	2.9296	2.9231	2.9164	
util living area	0.9694	0.9467	0.9032	0.8164	0.6850	0.5294	0.4029	0.4547	0.6710	0.8722	0.9524	0.9742	(86)
Living	19.1353	19.4028	19.7968	20.2560	20.6034	20.7977	20.8632	20.8490	20.6930	20.2123	19.5825	19.0830	
Non living	17.7750	18.1131	18.6056	19.1691	19.5688	19.7764	19.8324	19.8247	19.6799	19.1333	18.3506	17.7136	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.0461	19.4028	19.7968	20.2560	20.6034	20.7977	20.8632	20.8490	20.6930	20.2123	19.5825	19.3511	(87)
Th 2	19.9627	19.9645	19.9662	19.9744	19.9759	19.9831	19.9831	19.9844	19.9803	19.9759	19.9728	19.9696	(88)
util rest of house	0.9642	0.9381	0.8876	0.7874	0.6372	0.4603	0.3170	0.3652	0.6046	0.8448	0.9432	0.9698	(89)
MIT 2	19.0905	18.1131	18.6056	19.1691	19.5688	19.7764	19.8324	19.8247	19.6799	19.1333	18.3506	18.1201	(90)
Living area fraction									fLA = Living area /	(4) =		0.1328	(91)
MIT	19.2174	18.2843	18.7638	19.3134	19.7062	19.9120	19.9692	19.9607	19.8144	19.2765	18.5141	18.2836	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2174	18.2843	18.7638	19.3134	19.7062	19.9120	19.9692	19.9607	19.8144	19.2765	18.5141	18.2836	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9598	0.9198	0.8652	0.7659	0.6234	0.4552	0.3158	0.3630	0.5927	0.8219	0.9257	0.9604	(94)
Useful gains	1103.4147	1287.6311	1433.7060	1479.1347	1326.7221	964.6640	638.5714	666.2326	965.3717	1117.2800	1063.0820	1034.5151	(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	2963.9124	2654.2176	2427.4377	2042.9652	1568.0867	1032.3158	654.7631	690.9594	1113.8740	1699.3749	2243.1250	2777.4709	(97)
Space heating kWh	1384.2103	918.3461	739.3363	405.9580	179.5753	0.0000	0.0000	0.0000	0.0000	433.0786	849.6310	1296.7591	(98a)
Space heating requirement - total per year (kWh/year)												6206.8946	
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	1384.2103	918.3461	739.3363	405.9580	179.5753	0.0000	0.0000	0.0000	0.0000	433.0786	849.6310	1296.7591	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6206.8946	
Space heating per m2										(98c) / (4) =		35.8283	(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 %)													345.5517 (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	1384.2103	918.3461	739.3363	405.9580	179.5753	0.0000	0.0000	0.0000	0.0000	433.0786	849.6310	1296.7591	(98)
Space heating efficiency (main heating system 1)	345.5517	345.5517	345.5517	345.5517	345.5517	0.0000	0.0000	0.0000	0.0000	345.5517	345.5517	345.5517	(210)
Space heating fuel (main heating system)	400.5798	265.7623	213.9582	117.4811	51.9677	0.0000	0.0000	0.0000	0.0000	125.3296	245.8766	375.2721	(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	288.5478	255.0535	270.5015	236.5806	228.5194	205.0166	201.6129	210.0719	212.8929	238.4852	254.9446	285.2191	(64)
Efficiency of water heater	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	(216)
Fuel for water heating, kWh/month	151.2378	133.6823	141.7791	124.0000	119.7748	107.4563	105.6723	110.1059	111.5845	124.9983	133.6252	149.4931	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	35.8334	28.7469	25.8834	18.9633	14.6478	11.9673	13.3622	17.3687	22.5602	29.6002	33.4333	36.8293	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)

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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												1796.2274	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												190.7908	
Water heating fuel used												1513.4096	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												289.1958	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3598.8327	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1796.2274	16.4900	296.1979	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1513.4096	16.4900	249.5612	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	289.1958	16.4900	47.6884	(250)
Additional standing charges			0.0000	(251)
Total energy cost			593.4475	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.9789	(257)
SAP value		84.1316	
SAP rating (Section 12)		84	(258)
SAP band		B	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1796.2274	0.1556	279.5532	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1513.4096	0.1410	213.3895	(264)
Space and water heating			492.9427	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	289.1958	0.1443	41.7399	(268)
Total CO2, kg/year			534.6825	(272)
CO2 emissions per m2			3.0900	(273)
EI value			96.7170	
EI rating			97	(274)
EI band			A	

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	97.3800 (1b)	x 2.4000 (2b)	= 233.7120 (1b) - (3b)	
First floor	75.8600 (1c)	x 2.4000 (2c)	= 182.0640 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	173.2400		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	415.7760 (5)	

2. Ventilation rate

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

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.0962 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 4.0000 (17)
Infiltration rate 0.2962 (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) = 0.2962 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.2000	3.9000	3.9000	3.7000	3.7000	3.3000	3.4000	3.1000	3.2000	3.5000	3.4000	3.8000	(22)
Wind factor	1.0500	0.9750	0.9750	0.9250	0.9250	0.8250	0.8500	0.7750	0.8000	0.8750	0.8500	0.9500	(22a)
Adj infilt rate													
	0.3110	0.2888	0.2888	0.2740	0.2740	0.2444	0.2518	0.2296	0.2370	0.2592	0.2518	0.2814	(22b)
Effective ac	0.5484	0.5417	0.5417	0.5375	0.5375	0.5299	0.5317	0.5263	0.5281	0.5336	0.5317	0.5396	(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	
Windows & gl. doors (Uw = 1.40)			37.0900	1.3258	49.1723			(27)
Solid door			2.0000	1.4000	2.8000			(26)
Opening			2.0000	1.2357	2.4715			(27a)
Opening			0.6700	1.2357	0.8279			(27a)
Heatloss Floor 1			97.3800	0.1100	10.7118	75.0000	7303.5000	(28a)
External Wall 1	182.5600	39.0900	143.4700	0.1900	27.2593	60.0000	8608.2000	(29a)
External Wall sheltered	9.5000		9.5000	0.1100	1.0450	9.0000	85.5000	(29a)
External Roof pitched	57.2100	2.6700	54.5400	0.1500	8.1810	9.0000	490.8600	(30)
External Roof sheltered	21.5200		21.5200	0.1100	2.3672	9.0000	193.6800	(30)
External Roof loft	43.8600		43.8600	0.1100	4.8246	9.0000	394.7400	(30)
Total net area of external elements Aum(A, m2)			412.0300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	109.6607			(33)
Internal Wall 1			64.6200			9.0000	581.5800	(32c)
Internal Wall 2			9.3600			75.0000	702.0000	(32c)
Internal Floor 1			75.8600			18.0000	1365.4800	(32d)
Internal Ceiling 1			75.8600			9.0000	682.7400	(32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 20408.2800 (34)
List of Thermal Bridges 117.8035 (35)

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	25.0000	0.0250	0.6250	
E3 Sill	24.0500	0.0220	0.5291	
E4 Jamb	51.4000	0.0170	0.8738	
E5 Ground floor (normal)	47.4000	0.0670	3.1758	
E6 Intermediate floor within a dwelling	48.2000	0.0010	0.0482	
E16 Corner (normal)	27.4000	0.0420	1.1508	
E17 Corner (inverted - internal area greater than external area)	10.2500	-0.0850	-0.8713	
E10 Eaves (insulation at ceiling level)	7.8000	0.0570	0.4446	
E11 Eaves (insulation at rafter level)	34.8000	0.0180	0.6264	
E12 Gable (insulation at ceiling level)	10.3400	0.0430	0.4446	
E13 Gable (insulation at rafter level)	7.2000	0.0430	0.3096	
R1 Head of roof window	2.7600	0.2400	0.6624	
R2 Sill of roof window	2.7600	0.2400	0.6624	
R3 Jamb of roof window	8.1600	0.2400	1.9584	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.6399 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 120.3005 (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	
	75.2391	74.3249	74.3249	73.7531	73.7531	72.6998	72.9518	72.2182	72.4553	73.2114	72.9518	74.0353	(38)
Heat transfer coeff	195.5396	194.6255	194.6255	194.0537	194.0537	193.0003	193.2524	192.5188	192.7558	193.5119	193.2524	194.3358	(39)
Average = Sum(39)m / 12 =												193.7938	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1287	1.1234	1.1234	1.1201	1.1201	1.1141	1.1155	1.1113	1.1127	1.1170	1.1155	1.1218	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9669 (42)
Hot water usage for mixer showers													
	73.9649	72.8533	71.2336	68.1345	65.8475	63.2970	61.8473	63.4547	65.2168	67.9553	71.1210	73.6815	(42a)
Hot water usage for baths													
	31.9305	31.4563	30.7885	29.5572	28.6353	27.6130	27.0607	27.7239	28.4459	29.5398	30.7964	31.8226	(42b)
Hot water usage for other uses													
	45.0139	43.3771	41.7402	40.1033	38.4665	36.8296	36.8296	38.4665	40.1033	41.7402	43.3771	45.0139	(42c)
Average daily hot water use (litres/day)												138.7196	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	150.9094	147.6867	143.7623	137.7951	132.9492	127.7395	125.7376	129.6451	133.7661	139.2353	145.2945	150.5180	(44)
Energy conte	239.0036	210.3039	220.9573	188.6346	178.9752	157.0706	152.0687	160.5277	164.9469	188.9410	206.9986	235.6749	(45)
Energy content (annual)										Total = Sum(45)m =		2304.1030	
Distribution loss (46)m = 0.15 x (45)m													
	35.8505	31.5456	33.1436	28.2952	26.8463	23.5606	22.8103	24.0792	24.7420	28.3411	31.0498	35.3512	(46)
Water storage loss:													
Store volume												210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5700	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8478	(55)
Total storage loss													
	26.2818	23.7384	26.2818	25.4340	26.2818	25.4340	26.2818	26.2818	25.4340	26.2818	25.4340	26.2818	(56)
If cylinder contains dedicated solar storage													
	26.2818	23.7384	26.2818	25.4340	26.2818	25.4340	26.2818	26.2818	25.4340	26.2818	25.4340	26.2818	(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)

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Total heat required for water heating calculated for each month												
	288.5478	255.0535	270.5015	236.5806	228.5194	205.0166	201.6129	210.0719	212.8929	238.4852	254.9446	285.2191 (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	288.5478	255.0535	270.5015	236.5806	228.5194	205.0166	201.6129	210.0719	212.8929	238.4852	254.9446	285.2191 (64)
Total per year (kWh/year) = Sum(64)m =												2887.4460 (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	119.1040	105.7257	113.1037	101.0778	99.1446	90.5828	90.1982	93.0108	93.2017	102.4582	107.1838	117.9973 (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	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	40.9387	36.3613	29.5710	22.3872	16.7347	14.1281	15.2659	19.8432	26.6335	33.8174	39.4699	42.0765 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	514.6862	520.0270	506.5683	477.9162	441.7482	407.7553	385.0460	379.7052	393.1639	421.8159	457.9840	491.9768 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757 (71)
Water heating gains (Table 5)	160.0861	157.3300	152.0211	140.3858	133.2589	125.8094	121.2342	125.0145	129.4467	137.7127	148.8664	158.5985 (72)
Total internal gains	830.8170	828.8244	803.2665	755.7953	706.8478	662.7990	636.6522	639.6690	664.3503	708.4521	761.4264	807.7579 (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		
				5.8200	13.7578	0.6400	0.7000		0.7700	24.8590 (75)		
				7.5300	42.5203	0.6400	0.7000		0.7700	99.4037 (77)		
				11.1100	42.5203	0.6400	0.7000		0.7700	146.6634 (79)		
				12.6300	13.7578	0.6400	0.7000		0.7700	53.9465 (81)		
				0.6700	20.0123	0.7200	0.7000		1.0000	6.0820 (82)		
				2.0000	47.2983	0.7200	0.7000		1.0000	42.9090 (82)		
Solar gains	373.8635	587.4905	878.2271	1253.0964	1479.9651	1648.5913	1533.5666	1335.0519	1061.1395	710.9844	447.5354	305.3400 (83)
Total gains	1204.6805	1416.3149	1681.4935	2008.8917	2186.8130	2311.3903	2170.2188	1974.7209	1725.4898	1419.4365	1208.9619	1113.0978 (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	28.9914	29.1276	29.1276	29.2134	29.2134	29.3728	29.3345	29.4463	29.4101	29.2952	29.3345	29.1710
alpha	2.9328	2.9418	2.9418	2.9476	2.9476	2.9582	2.9556	2.9631	2.9607	2.9530	2.9556	2.9447
util living area	0.9628	0.9421	0.8928	0.7904	0.6437	0.4599	0.3452	0.3665	0.6188	0.8432	0.9400	0.9692 (86)
Living	19.2835	19.4959	19.8961	20.3464	20.6700	20.8351	20.8768	20.8745	20.7469	20.3324	19.7403	19.2309
Non living	17.9730	18.2425	18.7398	19.2828	19.6474	19.8142	19.8461	19.8489	19.7410	19.2843	18.5594	17.9109
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.1219	19.4959	19.8961	20.3464	20.6700	20.8351	20.8768	20.8745	20.7469	20.3324	19.7403	19.4783 (87)
Th 2	19.9774	19.9817	19.9817	19.9844	19.9844	19.9894	19.9882	19.9916	19.9905	19.9870	19.9882	19.9831 (88)
util rest of house	0.9565	0.9328	0.8755	0.7583	0.5919	0.3907	0.2622	0.2771	0.5482	0.8100	0.9283	0.9639 (89)
MIT 2	19.1783	18.2425	18.7398	19.2828	19.6474	19.8142	19.8461	19.8489	19.7410	19.2843	18.5594	18.2843 (90)
Living area fraction	19.3036	18.4089	18.8934	19.4240	19.7832	19.9497	19.9829	19.9851	19.8746	19.4235	18.7161	0.1328 (91)
MIT	19.3036	18.4089	18.8934	19.4240	19.7832	19.9497	19.9829	19.9851	19.8746	19.4235	18.7161	18.4428 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3036	18.4089	18.8934	19.4240	19.7832	19.9497	19.9829	19.9851	19.8746	19.4235	18.7161	18.4428 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9516	0.9141	0.8531	0.7383	0.5808	0.3879	0.2617	0.2765	0.5393	0.7880	0.9092	0.9534 (94)
Useful gains	1146.4119	1294.5994	1434.5612	1483.1566	1270.0074	896.4838	568.0028	546.0595	930.5931	1118.5294	1099.1455	1061.2731 (95)
Ext temp.	4.8000	5.2000	6.9000	9.3000	12.3000	15.1000	17.0000	17.1000	14.5000	11.2000	7.7000	4.8000 (96)
Heat loss rate W	2836.0320	2570.7932	2334.2142	1964.5980	1452.1409	935.9975	576.4621	555.4299	1035.9773	1591.3371	2128.8958	2651.2918 (97)
Space heating kWh	1257.0774	857.6022	669.3418	346.6378	135.5073	0.0000	0.0000	0.0000	0.0000	351.7690	741.4202	1182.9739 (98a)
Space heating requirement - total per year (kWh/year)												5542.3296
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	1257.0774	857.6022	669.3418	346.6378	135.5073	0.0000	0.0000	0.0000	0.0000	351.7690	741.4202	1182.9739 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5542.3296
Space heating per m ²												31.9922 (99)

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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 %)												345.3111	(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	1257.0774	857.6022	669.3418	346.6378	135.5073	0.0000	0.0000	0.0000	0.0000	351.7690	741.4202	1182.9739	(98)
Space heating efficiency (main heating system 1)	345.3111	345.3111	345.3111	345.3111	345.3111	0.0000	0.0000	0.0000	0.0000	345.3111	345.3111	345.3111	(210)
Space heating fuel (main heating system)	364.0420	248.3564	193.8373	100.3842	39.2421	0.0000	0.0000	0.0000	0.0000	101.8702	214.7108	342.5821	(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	288.5478	255.0535	270.5015	236.5806	228.5194	205.0166	201.6129	210.0719	212.8929	238.4852	254.9446	285.2191	(64)
Efficiency of water heater	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	(216)
Fuel for water heating, kWh/month	151.2402	133.6845	141.7814	124.0020	119.7768	107.4580	105.6740	110.1077	111.5863	125.0003	133.6274	149.4955	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	35.8334	28.7469	25.8834	18.9633	14.6478	11.9673	13.3622	17.3687	22.5602	29.6002	33.4333	36.8293	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1605.0252	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												190.7877	
Water heating fuel used												1513.4340	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												289.1958	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
FV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3407.6550	(238)

10a. Fuel costs - using BEDF prices (561)

	Fuel	Fuel price	Fuel cost	
	kWh/year	p/kWh	£/year	
Space heating - main system 1	1605.0252	26.0600	418.2696	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1513.4340	26.0600	394.4009	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	289.1958	26.0600	75.3644	(250)
Additional standing charges			0.0000	(251)
Total energy cost			888.0349	(255)

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	1605.0252	0.1560	250.3845	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1513.4340	0.1410	213.3930	(264)
Space and water heating			463.7774	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	289.1958	0.1443	41.7399	(268)
Total CO2, kg/year			505.5173	(272)

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	1605.0252	1.5775	2531.9388	(275)
Total CO2 associated with community systems			0.0000	(473)

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Water heating (other fuel)	1513.4340	1.5214	2302.4912 (278)
Space and water heating			4834.4300 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	289.1958	1.5338	443.5781 (282)
Total Primary energy kWh/year			5278.0081 (286)

SAP 10 EPC IMPROVEMENTS

00001

Current energy efficiency rating: B 84
Current environmental impact rating: A 97

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

Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 1.2	-£ 85	-40 kg (8.0%)
U Solar photovoltaic panels	+ 4.2	-£ 261	-134 kg (28.9%)

	Typical annual savings	Energy efficiency	Environmental impact
Recommended measures			
Solar water heating	£85	0.23 kg/m²	B 85 A 97
Solar photovoltaic panels	£261	0.78 kg/m²	B 90 A 98
Total Savings	£346	1.01 kg/m²	

Potential energy efficiency rating: B 90
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 561 TEST (31 Jan 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current	Potential	Saving
Electricity	£888	£803	£85
Space heating	£418	£439	-£21
Water heating	£394	£289	£106
Lighting	£75	£75	£0
Generated (PV)	-£0	-£261	£261
Total cost of fuels	£888	£542	£346
Total cost of uses	£887	£542	£346
Delivered energy	20 kWh/m²	12 kWh/m²	8 kWh/m²
Carbon dioxide emissions	0.5 tonnes	0.3 tonnes	0.2 tonnes
CO2 emissions per m²	3 kg/m²	2 kg/m²	1 kg/m²
Primary energy	30 kWh/m²	19 kWh/m²	11 kWh/m²

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

1. Overall dwelling characteristics

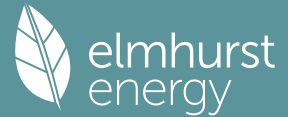
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	97.3800 (1b)	x 2.4000 (2b)	= 233.7120 (1b) - (3b)
First floor	75.8600 (1c)	x 2.4000 (2c)	= 182.0640 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	173.2400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 415.7760 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0962 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.2962	(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) =	0.2962	(21)

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Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
	0.3777	0.3703	0.3629	0.3258	0.3184	0.2814	0.2814	0.2740	0.2962	0.3184	0.3332	0.3480 (22b)
Effective ac	0.5713	0.5685	0.5658	0.5531	0.5507	0.5396	0.5396	0.5375	0.5439	0.5507	0.5555	0.5606 (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
Windowes & gl. doors (Uw = 1.40)			37.0900	1.3258	49.1723		(27)
Solid door			2.0000	1.4000	2.8000		(26)
Opening			2.0000	1.2357	2.4715		(27a)
Opening			0.6700	1.2357	0.8279		(27a)
Heatloss Floor 1			97.3800	0.1100	10.7118	75.0000	7303.5000 (28a)
External Wall 1	182.5600	39.0900	143.4700	0.1900	27.2593	60.0000	8608.2000 (29a)
External Wall sheltered	9.5000		9.5000	0.1100	1.0450	9.0000	85.5000 (29a)
External Roof pitched	57.2100	2.6700	54.5400	0.1500	8.1810	9.0000	490.8600 (30)
External Roof sheltered	21.5200		21.5200	0.1100	2.3672	9.0000	193.6800 (30)
External Roof loft	43.8600		43.8600	0.1100	4.8246	9.0000	394.7400 (30)
Total net area of external elements Aum(A, m2)			412.0300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	109.6607		(33)
Internal Wall 1			64.6200			9.0000	581.5800 (32c)
Internal Wall 2			9.3600			75.0000	702.0000 (32c)
Internal Floor 1			75.8600			18.0000	1365.4800 (32d)
Internal Ceiling 1			75.8600			9.0000	682.7400 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 20408.2800 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 117.8035 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	25.0000	0.0250	0.6250
E3 Sill	24.0500	0.0220	0.5291
E4 Jamb	51.4000	0.0170	0.8738
E5 Ground floor (normal)	47.4000	0.0670	3.1758
E6 Intermediate floor within a dwelling	48.2000	0.0010	0.0482
E16 Corner (normal)	27.4000	0.0420	1.1508
E17 Corner (inverted - internal area greater than external area)	10.2500	-0.0850	-0.8713
E10 Eaves (insulation at ceiling level)	7.8000	0.0570	0.4446
E11 Eaves (insulation at rafter level)	34.8000	0.0180	0.6264
E12 Gable (insulation at ceiling level)	10.3400	0.0430	0.4446
E13 Gable (insulation at rafter level)	7.2000	0.0430	0.3096
R1 Head of roof window	2.7600	0.2400	0.6624
R2 Sill of roof window	2.7600	0.2400	0.6624
R3 Jamb of roof window	8.1600	0.2400	1.9584

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.6399 (36)

Point Thermal bridges 0.0000 (36a) =

Total fabric heat loss (33) + (36) + (36a) = 120.3005 (37)

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

(38)m	Jan 78.3878	Feb 78.0079	Mar 77.6354	Apr 75.8861	May 75.5588	Jun 74.0353	Jul 74.0353	Aug 73.7531	Sep 74.6221	Oct 75.5588	Nov 76.2209	Dec 76.9131 (38)
Heat transfer coeff	198.6884	198.3084	197.9360	196.1867	195.8594	194.3358	194.3358	194.0537	194.9227	195.8594	196.5215	197.2137 (39)
Average = Sum(39)m / 12 =												196.1851

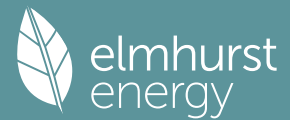
HLP	Jan 1.1469	Feb 1.1447	Mar 1.1426	Apr 1.1325	May 1.1306	Jun 1.1218	Jul 1.1218	Aug 1.1201	Sep 1.1252	Oct 1.1306	Nov 1.1344	Dec 1.1384 (40)
HLP (average)												1.1324
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9669 (42)
Hot water usage for mixer showers												
73.9649	72.8533	71.2336	68.1345	65.8475	63.2970	61.8473	63.4547	65.2168	67.9553	71.1210	73.6815 (42a)	
Hot water usage for baths												
31.9305	31.4563	30.7885	29.5572	28.6353	27.6130	27.0607	27.7239	28.4459	29.5398	30.7964	31.8226 (42b)	
Hot water usage for other uses												
45.0139	43.3771	41.7402	40.1033	38.4665	36.8296	36.8296	38.4665	40.1033	41.7402	43.3771	45.0139 (42c)	
Average daily hot water use (litres/day)												138.7196 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	150.9094	147.6867	143.7623	137.7951	132.9492	127.7395	125.7376	129.6451	133.7661	139.2353	145.2945	150.5180 (44)
Energy content (annual)	239.0036	210.3039	220.9573	188.6346	178.9752	157.0706	152.0687	160.5277	164.9469	188.9410	206.9986	235.6749 (45)
Distribution loss (46)m = 0.15 x (45)m	35.8505	31.5456	33.1436	28.2952	26.8463	23.5606	22.8103	24.0792	24.7420	28.3411	31.0498	35.3512 (46)
Water storage loss:												
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5700 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8478 (55)
Total storage loss	26.2818	23.7384	26.2818	25.4340	26.2818	25.4340	26.2818	26.2818	25.4340	26.2818	25.4340	26.2818 (56)
If cylinder contains dedicated solar storage	26.2818	23.7384	26.2818	25.4340	26.2818	25.4340	26.2818	26.2818	25.4340	26.2818	25.4340	26.2818 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	288.5478	255.0535	269.1058	229.8270	215.7250	192.4099	188.5860	197.9754	207.4900	237.0895	254.9446	285.2191 (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)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)

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Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												629.8210 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												629.8210
Solar input	-0.0000	-16.1954	-58.7765	-81.1254	-106.3804	-98.0629	-97.3372	-84.9005	-58.3087	-28.7340	-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	288.5478	238.8581	210.3293	148.7016	109.3447	94.3470	91.2488	113.0750	149.1813	208.3555	254.9446	285.2191 (64)
								Total per year (kWh/year) = Sum(64)m =				2192.1526 (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	119.1040	105.7257	111.9871	95.6749	88.9091	80.4974	79.7767	83.3337	88.8793	101.3416	107.1838	117.9973 (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	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135	178.0135 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	40.9387	36.3613	29.5710	22.3872	16.7347	14.1281	15.2659	19.8432	26.6335	33.8174	39.4699	42.0765 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	514.6862	520.0270	506.5683	477.9162	441.7482	407.7553	385.0460	379.7052	393.1639	421.8159	457.9840	491.9768 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757 (71)
Water heating gains (Table 5)												
	160.0861	157.3300	150.5203	132.8818	119.5015	111.8020	107.2267	112.0076	123.4435	136.2119	148.8664	158.5985 (72)
Total internal gains	830.8170	828.8244	801.7657	748.2913	693.0905	648.7915	622.6447	626.6621	658.3471	706.9513	761.4264	807.7579 (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	
Northeast						5.8200	11.2829	0.6400	0.7000	0.7700	20.3872 (75)	
Southeast						7.5300	36.7938	0.6400	0.7000	0.7700	86.0164 (77)	
Southwest						11.1100	36.7938	0.6400	0.7000	0.7700	126.9113 (79)	
Northwest						12.6300	11.2829	0.6400	0.7000	0.7700	44.2422 (81)	
Northeast						0.6700	16.3666	0.7200	0.7000	1.0000	4.9740 (82)	
Southeast						2.0000	39.9751	0.7200	0.7000	1.0000	36.2654 (82)	
Solar gains	318.7965	571.1506	853.8642	1175.5491	1421.2980	1456.2951	1385.2361	1195.4564	964.5037	650.9844	387.0220	269.4431 (83)
Total gains	1149.6135	1399.9750	1655.6298	1923.8405	2114.3885	2105.0866	2007.8808	1822.1185	1622.8508	1357.9357	1148.4484	1077.2009 (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	28.5320	28.5866	28.6404	28.8958	28.9441	29.1710	29.1710	29.2134	29.0832	28.9441	28.8465	28.7453
alpha	2.9021	2.9058	2.9094	2.9264	2.9296	2.9447	2.9447	2.9476	2.9389	2.9296	2.9231	2.9164
util living area	0.9694	0.9467	0.9034	0.8176	0.6876	0.5321	0.4054	0.4575	0.6725	0.8725	0.9524	0.9742 (86)
Living	19.1353	19.4028	19.7960	20.2529	20.6003	20.7964	20.8626	20.8483	20.6917	20.2115	19.5825	19.0830
Non living	17.7750	18.1131	18.6046	19.1656	19.5657	19.7753	19.8321	19.8242	19.6788	19.1324	18.3506	17.7136
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.0461	19.4028	19.7960	20.2529	20.6003	20.7964	20.8626	20.8483	20.6917	20.2115	19.5825	19.3511 (87)
Th 2	19.9627	19.9645	19.9662	19.9744	19.9759	19.9831	19.9831	19.9844	19.9803	19.9759	19.9728	19.9696 (88)
util rest of house	0.9642	0.9381	0.8878	0.7887	0.6399	0.4629	0.3191	0.3676	0.6062	0.8451	0.9432	0.9698 (89)
MIT 2	19.0905	18.1131	18.6046	19.1656	19.5657	19.7753	19.8321	19.8242	19.6788	19.1324	18.3506	18.1201 (90)
Living area fraction									fLA = Living area / (4) =			0.1328 (91)
MIT	19.2174	18.2843	18.7628	19.3100	19.7030	19.9109	19.9689	19.9602	19.8133	19.2757	18.5141	18.2836 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2174	18.2843	18.7628	19.3100	19.7030	19.9109	19.9689	19.9602	19.8133	19.2757	18.5141	18.2836 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9598	0.9198	0.8654	0.7671	0.6260	0.4577	0.3179	0.3654	0.5941	0.8222	0.9257	0.9604 (94)
Useful gains	1103.4147	1287.6311	1432.7556	1475.8434	1323.5087	963.4817	638.2278	665.7182	964.1814	1116.4673	1063.0820	1034.5151 (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	2963.9124	2654.2176	2427.2400	2042.2983	1567.4667	1032.0980	654.6990	690.8636	1113.6452	1699.2075	2243.1250	2777.4709 (97)
Space heating kWh	1384.2103	918.3461	739.8963	407.8475	181.5048	0.0000	0.0000	0.0000	0.0000	433.5588	849.6310	1296.7591 (98a)
Space heating requirement - total per year (kWh/year)												6211.7538
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	1384.2103	918.3461	739.8963	407.8475	181.5048	0.0000	0.0000	0.0000	0.0000	433.5588	849.6310	1296.7591 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6211.7538
Space heating per m ²												35.8563 (99)

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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 %)												345.5517	(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	1384.2103	918.3461	739.8963	407.8475	181.5048	0.0000	0.0000	0.0000	0.0000	433.5588	849.6310	1296.7591	(98)
Space heating efficiency (main heating system 1)	345.5517	345.5517	345.5517	345.5517	345.5517	0.0000	0.0000	0.0000	0.0000	345.5517	345.5517	345.5517	(210)
Space heating fuel (main heating system)	400.5798	265.7623	214.1203	118.0279	52.5261	0.0000	0.0000	0.0000	0.0000	125.4686	245.8766	375.2721	(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	288.5478	238.8581	210.3293	148.7016	109.3447	94.3470	91.2488	113.0750	149.1813	208.3555	254.9446	285.2191	(64)
Efficiency of water heater	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	190.7908	(216)
Fuel for water heating, kWh/month	151.2378	125.1937	110.2408	77.9396	57.3113	49.4505	47.8266	59.2665	78.1910	109.2063	133.6252	149.4931	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	35.8334	28.7469	25.8834	18.9633	14.6478	11.9673	13.3622	17.3687	22.5602	29.6002	33.4333	36.8293	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-40.0799	-60.3599	-91.8060	-106.8113	-115.2786	-104.3214	-102.7749	-95.8032	-83.4165	-69.9234	-44.9969	-34.0387	(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													1797.6336 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													190.7908
Water heating fuel used													1148.9824 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
pump for solar water heating													80.0000 (230g)
Total electricity for the above, kWh/year													80.0000 (231)
Electricity for lighting (calculated in Appendix L)													289.1958 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-949.6107 (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													2366.2011 (238)

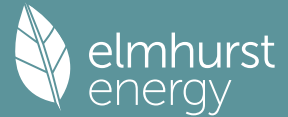
10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1797.6336	16.4900	296.4298 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1148.9824	16.4900	189.4672 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	16.4900	13.1920 (249)
Energy for lighting	289.1958	16.4900	47.6884 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-949.6107	16.4900	-156.5908
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-156.5908 (252)
Total energy cost			390.1866 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		0.6436 (257)
SAP value		89.5667
SAP rating (Section 12)		90 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1797.6336	0.1556	279.7487 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1148.9824	0.1454	167.0769 (264)
Space and water heating			446.8256 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	289.1958	0.1443	41.7399 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-949.6107	0.1342	-127.4135
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-127.4135 (269)
Total CO2, kg/year			372.2490 (272)
CO2 emissions per m2			2.1500 (273)
EI value			97.7144
EI rating			98 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	97.3800 (1b)	x 2.4000 (2b)	= 233.7120 (1b) - (3b)
First floor	75.8600 (1c)	x 2.4000 (2c)	= 182.0640 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	173.2400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 415.7760 (5)

2. Ventilation rate

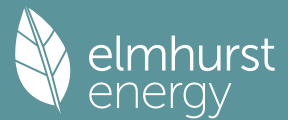
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.0962 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2962 (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) = 0.2962 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	3.9000	3.9000	3.7000	3.7000	3.3000	3.4000	3.1000	3.2000	3.5000	3.4000	3.8000 (22)
Wind factor	1.0500	0.9750	0.9750	0.9250	0.9250	0.8250	0.8500	0.7750	0.8000	0.8750	0.8500	0.9500 (22a)
Adj infilt rate	0.3110	0.2888	0.2888	0.2740	0.2740	0.2444	0.2518	0.2296	0.2370	0.2592	0.2518	0.2814 (22b)
Effective ac	0.5484	0.5417	0.5417	0.5375	0.5375	0.5299	0.5317	0.5263	0.5281	0.5336	0.5317	0.5396 (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
Windows & gl. doors (Uw = 1.40)			37.0900	1.3258	49.1723		(27)
Solid door			2.0000	1.4000	2.8000		(26)
Opening			2.0000	1.2357	2.4715		(27a)
Opening			0.6700	1.2357	0.8279		(27a)
Heatloss Floor 1			97.3800	0.1100	10.7118	75.0000	7303.5000 (28a)
External Wall 1	182.5600	39.0900	143.4700	0.1900	27.2593	60.0000	8608.2000 (29a)
External Wall sheltered	9.5000		9.5000	0.1100	1.0450	9.0000	85.5000 (29a)
External Roof pitched	57.2100	2.6700	54.5400	0.1500	8.1810	9.0000	490.8600 (30)
External Roof sheltered	21.5200		21.5200	0.1100	2.3672	9.0000	193.6800 (30)
External Roof loft	43.8600		43.8600	0.1100	4.8246	9.0000	394.7400 (30)
Total net area of external elements Aum(A, m2)			412.0300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	109.6607		(33)
Internal Wall 1			64.6200			9.0000	581.5800 (32c)
Internal Wall 2			9.3600			75.0000	702.0000 (32c)
Internal Floor 1			75.8600			18.0000	1365.4800 (32d)
Internal Ceiling 1			75.8600			9.0000	682.7400 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20408.2800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							117.8035 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E2 Other lintels (including other steel lintels)	25.0000	0.0250	0.6250										
E3 Sill	24.0500	0.0220	0.5291										
E4 Jamb	51.4000	0.0170	0.8738										
E5 Ground floor (normal)	47.4000	0.0670	3.1758										
E6 Intermediate floor within a dwelling	48.2000	0.0010	0.0482										
E16 Corner (normal)	27.4000	0.0420	1.1508										
E17 Corner (inverted - internal area greater than external area)	10.2500	-0.0850	-0.8713										
E10 Eaves (insulation at ceiling level)	7.8000	0.0570	0.4446										
E11 Eaves (insulation at rafter level)	34.8000	0.0180	0.6264										
E12 Gable (insulation at ceiling level)	10.3400	0.0430	0.4446										
E13 Gable (insulation at rafter level)	7.2000	0.0430	0.3096										
R1 Head of roof window	2.7600	0.2400	0.6624										
R2 Sill of roof window	2.7600	0.2400	0.6624										
R3 Jamb of roof window	8.1600	0.2400	1.9584										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				10.6399 (36)									
Point Thermal bridges			(36a) =	0.0000									
Total fabric heat loss		(33) + (36) + (36a) =		120.3005 (37)									
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 75.2391	Feb 74.3249	Mar 74.3249	Apr 73.7531	May 73.7531	Jun 72.6998	Jul 72.9518	Aug 72.2182	Sep 72.4553	Oct 73.2114	Nov 72.9518	Dec 74.0353	(38)
Heat transfer coeff	195.5396	194.6255	194.6255	194.0537	194.0537	193.0003	193.2524	192.5188	192.7558	193.5119	193.2524	194.3358	(39)
Average = Sum(39)m / 12 =												193.7938	
HLP	Jan 1.1287	Feb 1.1234	Mar 1.1234	Apr 1.1201	May 1.1201	Jun 1.1141	Jul 1.1155	Aug 1.1113	Sep 1.1127	Oct 1.1170	Nov 1.1155	Dec 1.1218	(40)
HLP (average)												1.1186	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

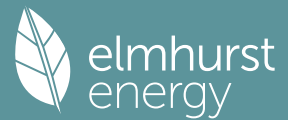
4. Water heating energy requirements (kWh/year)													

Assumed occupancy													2.9669 (42)
Hot water usage for mixer showers	73.9649	72.8533	71.2336	68.1345	65.8475	63.2970	61.8473	63.4547	65.2168	67.9553	71.1210	73.6815	(42a)
Hot water usage for baths	31.9305	31.4563	30.7885	29.5572	28.6353	27.6130	27.0607	27.7239	28.4459	29.5398	30.7964	31.8226	(42b)
Hot water usage for other uses	45.0139	43.3771	41.7402	40.1033	38.4665	36.8296	36.8296	38.4665	40.1033	41.7402	43.3771	45.0139	(42c)
Average daily hot water use (litres/day)													138.7196 (43)
Daily hot water use	Jan 150.9094	Feb 147.6867	Mar 143.7623	Apr 137.7951	May 132.9492	Jun 127.7395	Jul 125.7376	Aug 129.6451	Sep 133.7661	Oct 139.2353	Nov 145.2945	Dec 150.5180	(44)
Energy conte	239.0036	210.3039	220.9573	188.6346	178.9752	157.0706	152.0687	160.5277	164.9469	188.9410	206.9986	235.6749	(45)
Energy content (annual)										Total = Sum(45)m =		2304.1030	
Distribution loss (46)m = 0.15 x (45)m	35.8505	31.5456	33.1436	28.2952	26.8463	23.5606	22.8103	24.0792	24.7420	28.3411	31.0498	35.3512	(46)
Water storage loss:													
Store volume													210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5700 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8478 (55)
Total storage loss	26.2818	23.7384	26.2818	25.4340	26.2818	25.4340	26.2818	26.2818	25.4340	26.2818	25.4340	26.2818	(56)
If cylinder contains dedicated solar storage	26.2818	23.7384	26.2818	25.4340	26.2818	25.4340	26.2818	26.2818	25.4340	26.2818	25.4340	26.2818	(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	288.5478	255.0535	269.1058	229.8270	215.7250	192.4099	188.5860	197.9754	207.4900	237.0895	254.9446	285.2191	(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)
Aperture area of solar collector													3.0000 (H1)
Zero-loss collector efficiency													0.8000 (H2)
Collector linear heat loss coefficient													1.8000 (H3)
Collector 2nd order heat loss coefficient													0.0000 (H4)
Collector loop efficiency													0.9000 (H5)
Incidence angle modifier													1.0000 (H6)
Overshading factor													0.8000 (H8)
Overall heat loss coefficient of system													6.5000 (H10)
Heat loss coefficient of collector loop													3.9667 (H11)
Dedicated solar storage volume													75.0000 (H12)
Effective solar volume													75.0000 (H14)
Reference volume													225.0000 (H15)
Storage tank correction coefficient													1.3161 (H16)
Heat delivered to hot water													709.4623 (H24)
Heat delivered to space heating													0.0000 (H29)
Solar input													709.4623
Solar input	-0.0537	-18.6139	-62.3518	-88.5437	-111.5335	-112.3674	-108.8776	-97.6428	-68.0586	-36.7585	-4.6610	-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	288.4941	236.4397	206.7540	141.2833	104.1916	80.0425	79.7083	100.3326	139.4315	200.3310	250.2836	285.2191	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	119.1040	105.7257	111.9871	95.6749	88.9091	80.4974	79.7767	83.3337	88.8793	101.3416	107.1838	117.9973	(65)

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

Metabolic gains (Table 5), Watts	Jan 178.0135	Feb 178.0135	Mar 178.0135	Apr 178.0135	May 178.0135	Jun 178.0135	Jul 178.0135	Aug 178.0135	Sep 178.0135	Oct 178.0135	Nov 178.0135	Dec 178.0135	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	40.9387	36.3613	29.5710	22.3872	16.7347	14.1281	15.2659	19.8432	26.6335	33.8174	39.4699	42.0765	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	514.6862	520.0270	506.5683	477.9162	441.7482	407.7553	385.0460	379.7052	393.1639	421.8159	457.9840	491.9768	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	55.7682	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	-118.6757	(71)
Water heating gains (Table 5)													

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Total internal gains	160.0861	157.3300	150.5203	132.8818	119.5015	111.8020	107.2267	112.0076	123.4435	136.2119	148.8664	158.5985 (72)
	830.8170	828.8244	801.7657	748.2913	693.0905	648.7915	622.6447	626.6621	658.3471	706.9513	761.4264	807.7579 (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			
Northeast				5.8200	13.7578	0.6400	0.7000	0.7700	24.8590 (75)			
Southeast				7.5300	42.5203	0.6400	0.7000	0.7700	99.4037 (77)			
Southwest				11.1100	42.5203	0.6400	0.7000	0.7700	146.6634 (79)			
Northwest				12.6300	13.7578	0.6400	0.7000	0.7700	53.9465 (81)			
Northeast				0.6700	20.0123	0.7200	0.7000	1.0000	6.0820 (82)			
Southeast				2.0000	47.2983	0.7200	0.7000	1.0000	42.9090 (82)			
Solar gains	373.8635	587.4905	878.2271	1253.0964	1479.9651	1648.5913	1533.5666	1335.0519	1061.1395	710.9844	447.5354	305.3400 (83)
Total gains	1204.6805	1416.3149	1679.9927	2001.3877	2173.0556	2297.3828	2156.2113	1961.7140	1719.4866	1417.9357	1208.9619	1113.0978 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	28.9914	29.1276	29.1276	29.2134	29.2134	29.3728	29.3345	29.4463	29.4101	29.2952	29.3345	29.1710
util living area	2.9328	2.9418	2.9418	2.9476	2.9476	2.9582	2.9556	2.9631	2.9607	2.9530	2.9556	2.9447
	0.9628	0.9421	0.8930	0.7917	0.6464	0.4622	0.3472	0.3687	0.6203	0.8435	0.9400	0.9692 (86)
Living	19.2835	19.4959	19.8953	20.3437	20.6675	20.8343	20.8765	20.8742	20.7459	20.3317	19.7403	19.2309
Non living	17.9730	18.2425	18.7389	19.2797	19.6449	19.8136	19.8460	19.8487	19.7402	19.2836	18.5594	17.9109
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.1219	19.4959	19.8953	20.3437	20.6675	20.8343	20.8765	20.8742	20.7459	20.3317	19.7403	19.4783 (87)
Th 2	19.9774	19.9817	19.9817	19.9844	19.9844	19.9894	19.9882	19.9916	19.9905	19.9870	19.9882	19.9831 (88)
util rest of house	0.9565	0.9328	0.8758	0.7597	0.5945	0.3928	0.2638	0.2789	0.5496	0.8104	0.9283	0.9639 (89)
MIT 2	19.1783	18.2425	18.7389	19.2797	19.6449	19.8136	19.8460	19.8487	19.7402	19.2836	18.5594	18.2843 (90)
Living area fraction	FLA = Living area / (4) =											0.1328 (91)
MIT	19.3036	18.4089	18.8924	19.4210	19.7807	19.9491	19.9828	19.9849	19.8737	19.4227	18.7161	18.4428 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3036	18.4089	18.8924	19.4210	19.7807	19.9491	19.9828	19.9849	19.8737	19.4227	18.7161	18.4428 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9516	0.9141	0.8534	0.7396	0.5833	0.3899	0.2633	0.2783	0.5407	0.7883	0.9092	0.9534 (94)
Ext temp.	1146.4119	1294.5994	1433.6531	1480.2240	1267.4543	895.7996	567.8271	545.8623	929.7207	1117.8161	1099.1455	1061.2731 (95)
Heat loss rate W	4.8000	5.2000	6.9000	9.3000	12.3000	15.1000	17.0000	17.1000	14.5000	11.2000	7.7000	4.8000 (96)
Space heating kWh	2836.0320	2570.7932	2334.0277	1964.0136	1451.6584	935.8734	576.4289	555.3926	1035.8135	1591.1926	2128.8958	2651.2918 (97)
Space heating requirement - total per year (kWh/year)	1257.0774	857.6022	669.8787	348.3285	137.0479	0.0000	0.0000	0.0000	0.0000	352.1921	741.4202	1182.9739 (98a)
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1257.0774	857.6022	669.8787	348.3285	137.0479	0.0000	0.0000	0.0000	0.0000	352.1921	741.4202	1182.9739 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5546.5209
Space heating per m2												(98c) / (4) = 32.0164 (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 %)												345.3111 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	1257.0774	857.6022	669.8787	348.3285	137.0479	0.0000	0.0000	0.0000	0.0000	352.1921	741.4202	1182.9739 (98)
Space heating fuel (main heating system)	345.3111	345.3111	345.3111	345.3111	345.3111	0.0000	0.0000	0.0000	0.0000	345.3111	345.3111	345.3111 (210)
Space heating efficiency (main heating system 2)	364.0420	248.3564	193.9928	100.8738	39.6882	0.0000	0.0000	0.0000	0.0000	101.9927	214.7108	342.5821 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	288.4941	236.4397	206.7540	141.2833	104.1916	80.0425	79.7083	100.3326	139.4315	200.3310	250.2836	285.2191 (64)
Efficiency of water heater (217)m	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877	190.7877 (216)
Fuel for water heating, kWh/month	151.2121	123.9282	108.3686	74.0526	54.6113	41.9537	41.7785	52.5886	73.0820	105.0020	131.1844	149.4955 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945 (231)
Lighting	35.8334	28.7469	25.8834	18.9633	14.6478	11.9673	13.3622	17.3687	22.5602	29.6002	33.4333	36.8293 (232)

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Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-46.3264	-61.9642	-93.4409	-110.2785	-116.4517	-110.7773	-107.9409	-101.6000	-88.6233	-74.4659	-51.0013	-38.2590	(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												1606.2390	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												190.7877	
Water heating fuel used												1107.2576	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												289.1958	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1001.1293	(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												2081.5631	(238)

10a. Fuel costs - using BEDF prices (561)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1606.2390	26.0600	418.5859	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1107.2576	26.0600	288.5513	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Pump for solar water heating	80.0000	26.0600	20.8480	(249)
Energy for lighting	289.1958	26.0600	75.3644	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1001.1293	26.0600	-260.8943	
PV Unit electricity exported	0.0000	5.8100	0.0000	
Total			-260.8943	(252)
Total energy cost			542.4553	(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	1606.2390	0.1560	250.5538	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1107.2576	0.1461	161.7894	(264)
Space and water heating			412.3432	(265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970	(267)
Energy for lighting	289.1958	0.1443	41.7399	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1001.1293	0.1343	-134.4341	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-134.4341	(269)
Total CO2, kg/year			330.7460	(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	1606.2390	1.5775	2533.7794	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1107.2576	1.5405	1705.7545	(278)
Space and water heating			4239.5340	(279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240	(281)
Energy for lighting	289.1958	1.5338	443.5781	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1001.1293	1.4963	-1497.9557	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-1497.9557	(283)
Total Primary energy kWh/year			3306.1804	(286)