Full SAP Calculation Printout

Plot Reference	001	**Issued on Date**	20/01/2026
Assessment Reference	00001	**Plot Type Ref**	
Plot Address	Woodside Lodge, Picts Lane, Cowfold, West Sussex, RH13 8AT	**SAP Version**	10.2

SAP Rating	83 B	**DER**	3.20	**TER**	8.57
Environmental	96 A	**% DER < TER**			62.66
CO_2 Emissions (t/year)	0.8	**DFEE**	58.89	**TFEE**	58.96
Compliance Check	See BREL	**% DFEE < TFEE**			0.12
% DPER < TPER	33.11	**DPER**	33.03	**TPER**	49.38

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

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1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		272.3300	(1b)	x 3.2700	(2b) =	890.5191	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	272.3300						
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		890.5191	(5)

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2. Ventilation rate

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	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	5 * 10 =	50.0000 (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) =	50.0000 / (5) =	0.0561 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.0000 (17)
Infiltration rate		0.2561 (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) =	0.2561 (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	0.3266	0.3202	0.3138	0.2818	0.2754	0.2433	0.2433	0.2369	0.2561	0.2754	0.2882	0.3010	(22b)
Effective ac	0.5533	0.5513	0.5492	0.5397	0.5379	0.5296	0.5296	0.5281	0.5328	0.5379	0.5415	0.5453	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Glazed doors & windows			80.0400	1.3258	106.1136			(27)
Roof windows			10.2900	1.3258	13.6420			(27a)
PGD			1.7900	1.2000	2.1480			(26a)
Solid door			2.3100	1.2000	2.7720			(26)
Heatloss Floor 1			272.3300	0.1100	29.9563	75.0000	20424.7500	(28a)
External Wall 1	290.6800	84.1400	206.5400	0.1800	37.1772	110.0000	22719.4000	(29a)
External Roof 1	152.9900		152.9900	0.1000	15.2990	9.0000	1376.9100	(30)
External Roof 2	191.4000	10.2900	181.1100	0.1500	27.1665	9.0000	1629.9900	(30)
Total net area of external elements Aum(A, m2)			907.4000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		234.2747			(33)
Main dwelling								
Internal Wall 1			161.9800			9.0000	1457.8200	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 47608.8700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	174.8205 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	44.3500	0.0190	0.8427
E3 Sill	42.4000	0.0220	0.9328
E4 Jamb	71.9000	0.0170	1.2223

E5 Ground floor (normal)	101.0000	0.0670	6.7670	
E16 Corner (normal)	22.0000	0.0420	0.9240	
R1 Head of roof window	5.1400	0.2400	1.2336	
R2 Sill of roof window	5.1400	0.2400	1.2336	
R3 Jamb of roof window	21.8400	0.2400	5.2416	
E17 Corner (inverted - internal area greater than external area)	11.0000	-0.0850	-0.9350	
R4 Ridge (vaulted ceiling)	21.7500	0.1200	2.6100	
E10 Eaves (insulation at ceiling level)	32.4500	0.0570	1.8497	
E11 Eaves (insulation at rafter level)	43.5000	0.0180	0.7830	
E12 Gable (insulation at ceiling level)	14.1000	0.0430	0.6063	
E13 Gable (insulation at rafter level)	17.6000	0.0430	0.7568	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			24.0683	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	258.3430	(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	162.6077	161.9991	161.4026	158.6008	158.0766	155.6363	155.6363	155.1844	156.5763	158.0766	159.1371	160.2458	(38)
Heat transfer coeff	420.9507	420.3421	419.7456	416.9438	416.4196	413.9793	413.9793	413.5274	414.9193	416.4196	417.4801	418.5887	(39)
Average = Sum(39)m / 12 =												416.9413	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.5457	1.5435	1.5413	1.5310	1.5291	1.5201	1.5201	1.5185	1.5236	1.5291	1.5330	1.5371	(40)
HLP (average)												1.5310	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												3.0960	(42)
Hot water usage for mixer showers	76.1289	74.9849	73.3177	70.1280	67.7740	65.1489	63.6568	65.3113	67.1250	69.9435	73.2018	75.8373	(42a)
Hot water usage for baths	32.8612	32.3731	31.6859	30.4187	29.4698	28.4177	27.8494	28.5319	29.2749	30.4007	31.6940	32.7501	(42b)
Hot water usage for other uses	46.3357	44.6508	42.9658	41.2809	39.5960	37.9110	37.9110	39.5960	41.2809	42.9658	44.6508	46.3357	(42c)
Average daily hot water use (litres/day)												142.7792	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	155.3258	152.0088	147.9695	141.8276	136.8398	131.4777	129.4172	133.4391	137.6808	143.3101	149.5466	154.9230	(44)
Energy conte	245.9981	216.4585	227.4235	194.1549	184.2127	161.6671	156.5189	165.2255	169.7742	194.4705	213.0565	242.5720	(45)
Energy content (annual)										Total = Sum(45)m =		2371.5326	
Distribution loss (46)m = 0.15 x (45)m	36.8997	32.4688	34.1135	29.1232	27.6319	24.2501	23.4778	24.7838	25.4661	29.1706	31.9585	36.3858	(46)
Water storage loss (or HIU loss):													
Store volume												210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9720	(55)
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(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	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(64)
										Total per year (kWh/year) = Sum(64)m =		3000.2086	(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	124.5099	110.5542	118.3338	105.8941	103.9663	95.0919	94.7581	97.6530	97.7875	107.3770	112.1789	123.3707	(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	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	58.8556	52.2751	42.5129	32.1850	24.0587	20.3114	21.9471	28.5277	38.2898	48.6178	56.7441	60.4914	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	649.9284	656.6727	639.6774	603.4966	557.8248	514.8998	486.2232	479.4790	496.4742	532.6550	578.3268	621.2519	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	(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)	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	(71)
Water heating gains (Table 5)	167.3520	164.5152	159.0509	147.0751	139.7396	132.0721	127.3630	131.2540	135.8160	144.3239	155.8040	165.8209	(72)
Total internal gains	994.7270	992.0538	959.8321	901.3477	840.2140	785.8741	754.1242	757.8517	789.1710	844.1875	909.4659	966.1551	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	9.2800	10.6334	0.6300	0.7000	0.7700	30.1572	(74)
East	11.4300	19.6403	0.6300	0.7000	0.7700	68.6065	(76)
South	30.7700	46.7521	0.6300	0.7000	0.7700	439.6430	(78)
West	28.5600	19.6403	0.6300	0.7000	0.7700	171.4263	(80)
North	6.6800	15.2954	0.6300	0.7000	1.0000	40.5526	(82)

South				3.6100		47.0123		0.6300	0.7000		1.0000		67.3597 (82)
Solar gains	817.7453	1442.9250	2097.4377	2789.5050	3287.1094	3331.8278	3183.9601	2804.2697	2336.8361	1628.8802	988.8102	693.6493	(83)
Total gains	1812.4722	2434.9788	3057.2699	3690.8526	4127.3234	4117.7019	3938.0843	3562.1213	3126.0071	2473.0677	1898.2760	1659.8044	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	31.4162	31.4617	31.5064	31.7181	31.7581	31.9453	31.9453	31.9802	31.8729	31.7581	31.6774	31.5935	
alpha	3.0944	3.0974	3.1004	3.1145	3.1172	3.1297	3.1297	3.1320	3.1249	3.1172	3.1118	3.1062	
util living area	0.9888	0.9726	0.9374	0.8599	0.7325	0.5746	0.4393	0.4963	0.7233	0.9169	0.9790	0.9914	(86)
Living	19.0474	19.3434	19.7603	20.2370	20.5998	20.8009	20.8693	20.8541	20.6876	20.1687	19.5016	18.9914	
Non living	17.4028	17.7785	18.3003	18.8807	19.2862	19.4855	19.5349	19.5289	19.3935	18.8198	17.9888	17.3359	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	31	0	0	0	0	0	0	0	0	0	0	6	
16 / 9	0	28	31	0	0	0	0	0	0	0	15	25	
MIT	21.0000	20.0618	20.2979	20.2370	20.5998	20.8009	20.8693	20.8541	20.6876	20.1687	19.8265	20.0826	(87)
Th 2	19.6534	19.6550	19.6567	19.6643	19.6657	19.6724	19.6724	19.6737	19.6699	19.6657	19.6628	19.6598	(88)
util rest of house	0.9858	0.9657	0.9217	0.8252	0.6691	0.4776	0.3166	0.3684	0.6340	0.8881	0.9726	0.9891	(89)
MIT 2	19.6534	18.8268	19.0580	18.8807	19.2862	19.4855	19.5349	19.5289	19.3935	18.8198	18.4564	18.8326	(90)
Living area fraction										fLA = Living area / (4) =		0.4500	(91)
MIT	20.2593	19.3825	19.6159	19.4910	19.8773	20.0774	20.1353	20.1252	19.9758	19.4268	19.0729	19.3951	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2593	19.3825	19.6159	19.4910	19.8773	20.0774	20.1353	20.1252	19.9758	19.4268	19.0729	19.3951	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9873	0.9640	0.9211	0.8200	0.6801	0.5089	0.3609	0.4141	0.6568	0.8817	0.9689	0.9886	(94)
Useful gains	1789.3987	2347.4180	2816.1915	3026.6771	2807.1328	2095.4124	1421.3167	1475.1128	2053.2205	2180.5873	1839.3038	1640.8287	(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	6718.0836	6087.5982	5505.3432	4415.8662	3405.1676	2267.5352	1463.5423	1540.4607	2437.9921	3675.6462	4998.4384	6360.4810	(97)
Space heating kWh	3666.9416	2513.4011	2000.7289	1000.2162	444.9379	0.0000	0.0000	0.0000	0.0000	1112.3238	2274.5769	3511.4213	(98a)
Space heating requirement - total per year (kWh/year)												16524.5477	
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	3666.9416	2513.4011	2000.7289	1000.2162	444.9379	0.0000	0.0000	0.0000	0.0000	1112.3238	2274.5769	3511.4213	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												16524.5477	
Space heating per m2											(98c) / (4) =	60.6784	(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 %) 457.0317 (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	3666.9416	2513.4011	2000.7289	1000.2162	444.9379	0.0000	0.0000	0.0000	0.0000	1112.3238	2274.5769	3511.4213	(98)
Space heating efficiency (main heating system 1)	457.0317	457.0317	457.0317	457.0317	457.0317	0.0000	0.0000	0.0000	0.0000	457.0317	457.0317	457.0317	(210)
Space heating fuel (main heating system)	802.3386	549.9402	437.7659	218.8505	97.3538	0.0000	0.0000	0.0000	0.0000	243.3800	497.6847	768.3102	(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	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(64)
Efficiency of water heater												178.8847	(216)
(217)m	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	(217)
Fuel for water heating, kWh/month	167.3662	147.9644	156.9826	137.4220	132.8270	119.2607	117.3456	122.2128	123.7927	138.5612	147.9884	165.4509	(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	51.5160	41.3281	37.2113	27.2626	21.0584	17.2049	19.2102	24.9701	32.4338	42.5548	48.0656	52.9478	(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												3615.6240	(211)
Space heating fuel - main system 2												0.0000	(213)

Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	178.8847	
Water heating fuel used	1677.1744	(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)	415.7637	(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	5708.5620	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3615.6240	16.4900	596.2164	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1677.1744	16.4900	276.5661	(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	415.7637	16.4900	68.5594	(250)
Additional standing charges			0.0000	(251)
Total energy cost			941.3419	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.0679	(257)
SAP value		82.6890	
SAP rating (Section 12)		83	(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	3615.6240	0.1558	563.3808	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1677.1744	0.1410	236.4441	(264)
Space and water heating			799.8249	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	415.7637	0.1443	60.0075	(268)
Total CO2, kg/year			859.8324	(272)
CO2 emissions per m2			3.1600	(273)
EI value			96.3692	
EI rating			96	(274)
EI band			A	

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	272.3300	(1b)	x 3.2700	(2b) =	890.5191	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	272.3300					(4)
Dwelling volume					890.5191	(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	5 * 10 =	50.0000	(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) =	50.0000 / (5) =	0.0561	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)

Infiltration rate	0.2561	(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) =	0.2561	(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	0.2690	0.2497	0.2497	0.2369	0.2369	0.2113	0.2177	0.1985	0.2049	0.2241	0.2177	0.2433	(22b)
Effective ac	0.5362	0.5312	0.5312	0.5281	0.5281	0.5223	0.5237	0.5197	0.5210	0.5251	0.5237	0.5296	(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								
Glazed doors & windows			80.0400	1.3258	106.1136			(27)
Roof windows			10.2900	1.3258	13.6420			(27a)
PGD			1.7900	1.2000	2.1480			(26a)
Solid door			2.3100	1.2000	2.7720			(26)
Heatloss Floor 1			272.3300	0.1100	29.9563	75.0000	20424.7500	(28a)
External Wall 1	290.6800	84.1400	206.5400	0.1800	37.1772	110.0000	22719.4000	(29a)
External Roof 1	152.9900		152.9900	0.1000	15.2990	9.0000	1376.9100	(30)
External Roof 2	191.4000	10.2900	181.1100	0.1500	27.1665	9.0000	1629.9900	(30)
Total net area of external elements Aum(A, m2)			907.4000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	234.2747			(33)
Main dwelling								
Internal Wall 1			161.9800			9.0000	1457.8200	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) =	47608.8700	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	174.8205	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	44.3500	0.0190	0.8427
E3 Sill	42.4000	0.0220	0.9328
E4 Jamb	71.9000	0.0170	1.2223
E5 Ground floor (normal)	101.0000	0.0670	6.7670
E16 Corner (normal)	22.0000	0.0420	0.9240
R1 Head of roof window	5.1400	0.2400	1.2336
R2 Sill of roof window	5.1400	0.2400	1.2336
R3 Jamb of roof window	21.8400	0.2400	5.2416
E17 Corner (inverted - internal area greater than external area)	11.0000	-0.0850	-0.9350
R4 Ridge (vaulted ceiling)	21.7500	0.1200	2.6100
E10 Eaves (insulation at ceiling level)	32.4500	0.0570	1.8497
E11 Eaves (insulation at rafter level)	43.5000	0.0180	0.7830
E12 Gable (insulation at ceiling level)	14.1000	0.0430	0.6063
E13 Gable (insulation at rafter level)	17.6000	0.0430	0.7568

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	24.0683	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	258.3430	(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	157.5645	156.1003	156.1003	155.1844	155.1844	153.4973	153.9010	152.7261	153.1057	154.3168	153.9010	155.6363	(38)
Heat transfer coeff	415.9074	414.4433	414.4433	413.5274	413.5274	411.8403	412.2440	411.0690	411.4486	412.6597	412.2440	413.9793	(39)
Average = Sum(39)m / 12 =												413.1112	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.5272	1.5218	1.5218	1.5185	1.5185	1.5123	1.5138	1.5095	1.5108	1.5153	1.5138	1.5201	(40)
HLP (average)												1.5170	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	3.0960	(42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	76.1289	74.9849	73.3177	70.1280	67.7740	65.1489	63.6568	65.3113	67.1250	69.9435	73.2018	75.8373	(42a)
Hot water usage for baths	32.8612	32.3731	31.6859	30.4187	29.4698	28.4177	27.8494	28.5319	29.2749	30.4007	31.6940	32.7501	(42b)
Hot water usage for other uses	46.3357	44.6508	42.9658	41.2809	39.5960	37.9110	37.9110	39.5960	41.2809	42.9658	44.6508	46.3357	(42c)
Average daily hot water use (litres/day)												142.7792	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	155.3258	152.0088	147.9695	141.8276	136.8398	131.4777	129.4172	133.4391	137.6808	143.3101	149.5466	154.9230	(44)
Energy conte	245.9981	216.4585	227.4235	194.1549	184.2127	161.6671	156.5189	165.2255	169.7742	194.4705	213.0565	242.5720	(45)
Energy content (annual)										Total = Sum(45)m =		2371.5326	
Distribution loss (46)m = 0.15 x (45)m	36.8997	32.4688	34.1135	29.1232	27.6319	24.2501	23.4778	24.7838	25.4661	29.1706	31.9585	36.3858	(46)

Water storage loss (or HIU loss):		
Store volume	210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):	1.8000	(48)
Temperature factor from Table 2b	0.5400	(49)
Enter (49) or (54) in (55)	0.9720	(55)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(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	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(64)
										Total per year (kWh/year) = Sum(64)m =		3000.2086	(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													
	124.5099	110.5542	118.3338	105.8941	103.9663	95.0919	94.7581	97.6530	97.7875	107.3770	112.1789	123.3707	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	58.8556	52.2751	42.5129	32.1850	24.0587	20.3114	21.9471	28.5277	38.2898	48.6178	56.7441	60.4914	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	649.9284	656.6727	639.6774	603.4966	557.8248	514.8998	486.2232	479.4790	496.4742	532.6550	578.3268	621.2519	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	(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)													
	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	(71)
Water heating gains (Table 5)													
	167.3520	164.5152	159.0509	147.0751	139.7396	132.0721	127.3630	131.2540	135.8160	144.3239	155.8040	165.8209	(72)
Total internal gains													
	994.7270	992.0538	959.8321	901.3477	840.2140	785.8741	754.1242	757.8517	789.1710	844.1875	909.4659	966.1551	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	9.2800	12.6907	0.6300	0.7000	0.7700	35.9920	(74)
East	11.4300	23.7106	0.6300	0.7000	0.7700	82.8249	(76)
South	30.7700	53.4173	0.6300	0.7000	0.7700	502.3207	(78)
West	28.5600	23.7106	0.6300	0.7000	0.7700	206.9536	(80)
North	6.6800	18.0222	0.6300	0.7000	1.0000	47.7821	(82)
South	3.6100	55.1161	0.6300	0.7000	1.0000	78.9709	(82)

Solar gains	954.8443	1475.7281	2141.7304	2951.5090	3400.8450	3750.3298	3503.6718	3109.5562	2551.6965	1767.6811	1138.0032	782.9685	(83)
Total gains	1949.5713	2467.7819	3101.5625	3852.8566	4241.0589	4536.2039	4257.7960	3867.4078	3340.8675	2611.8686	2047.4691	1749.1236	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	31.7972	31.9095	31.9095	31.9802	31.9802	32.1112	32.0798	32.1714	32.1418	32.0474	32.0798	31.9453	
alpha	3.1198	3.1273	3.1273	3.1320	3.1320	3.1407	3.1387	3.1448	3.1428	3.1365	3.1387	3.1297	
util living area													
	0.9851	0.9700	0.9302	0.8363	0.6925	0.4978	0.3750	0.3989	0.6687	0.8925	0.9710	0.9889	(86)
Living	19.1901	19.4240	19.8493	20.3266	20.6666	20.8409	20.8834	20.8807	20.7452	20.2918	19.6569	19.1310	
Non living	17.5939	17.8917	18.4211	18.9910	19.3606	19.5199	19.5461	19.5489	19.4521	18.9729	18.1946	17.5227	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	31	0	0	0	0	0	0	0	0	0	0	4	
16 / 9	0	28	31	0	0	0	0	0	0	0	14	27	
MIT	21.0000	20.1074	20.3483	20.3266	20.6666	20.8409	20.8834	20.8807	20.7452	20.2918	19.9286	20.0780	(87)
Th 2	19.6671	19.6712	19.6712	19.6737	19.6737	19.6783	19.6772	19.6804	19.6794	19.6760	19.6772	19.6724	(88)
util rest of house													
	0.9811	0.9624	0.9125	0.7970	0.6224	0.3998	0.2564	0.2709	0.5713	0.8555	0.9621	0.9860	(89)
MIT 2	19.6671	18.8857	19.1194	18.9910	19.3606	19.5199	19.5461	19.5489	19.4521	18.9729	18.5811	18.8460	(90)
Living area fraction										fLA = Living area / (4) =		0.4500	(91)
MIT	20.2669	19.4355	19.6724	19.5920	19.9483	20.1143	20.1478	20.1482	20.0340	19.5664	19.1875	19.4004	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2669	19.4355	19.6724	19.5920	19.9483	20.1143	20.1478	20.1482	20.0340	19.5664	19.1875	19.4004	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9831	0.9608	0.9126	0.7943	0.6381	0.4335	0.2997	0.3176	0.5998	0.8518	0.9578	0.9852	(94)
Useful gains	1916.5482	2371.1087	2830.3572	3060.2448	2706.0288	1966.2785	1275.8552	1228.3156	2003.8371	2224.7482	1961.1621	1723.3218	(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													
	6432.7945	5899.7914	5293.4211	4256.0207	3162.7716	2065.0894	1297.6765	1253.0185	2276.9520	3452.4652	4735.6351	6044.2561	(97)
Space heating kWh													
	3360.0872	2371.2747	1832.5196	860.9587	339.8166	0.0000	0.0000	0.0000	0.0000	913.4215	1997.6206	3214.7751	(98a)
Space heating requirement - total per year (kWh/year)												14890.4740	
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													
	3360.0872	2371.2747	1832.5196	860.9587	339.8166	0.0000	0.0000	0.0000	0.0000	913.4215	1997.6206	3214.7751	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												14890.4740	
Space heating per m2											(98c) / (4) =	54.6781	(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 %)	458.1619	(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												

	3360.0872	2371.2747	1832.5196	860.9587	339.8166	0.0000	0.0000	0.0000	0.0000	913.4215	1997.6206	3214.7751 (98)
Space heating efficiency (main heating system 1)												
	458.1619	458.1619	458.1619	458.1619	458.1619	0.0000	0.0000	0.0000	0.0000	458.1619	458.1619	458.1619 (210)
Space heating fuel (main heating system)												
	733.3843	517.5626	399.9721	187.9158	74.1696	0.0000	0.0000	0.0000	0.0000	199.3665	436.0076	701.6680 (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												
	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664 (64)
Efficiency of water heater												178.8527 (216)
(217)m	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527 (217)
Fuel for water heating, kWh/month												
	167.3962	147.9909	157.0107	137.4466	132.8507	119.2820	117.3666	122.2346	123.8149	138.5861	148.0149	165.4806 (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	51.5160	41.3281	37.2113	27.2626	21.0584	17.2049	19.2102	24.9701	32.4338	42.5548	48.0656	52.9478 (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	3250.0465 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	178.8527
Water heating fuel used	1677.4748 (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)	415.7637 (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	5343.2849 (238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3250.0465	28.4300	923.9882	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1677.4748	28.4300	476.9061	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	415.7637	28.4300	118.2016	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1519.0959	(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	3250.0465	0.1562	507.5326	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1677.4748	0.1410	236.4864	(264)
Space and water heating			744.0190	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	415.7637	0.1443	60.0075	(268)
Total CO2, kg/year			804.0266	(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	3250.0465	1.5781	5128.9390	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1677.4748	1.5213	2551.9223	(278)
Space and water heating			7680.8613	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	415.7637	1.5338	637.7122	(282)
Total Primary energy kWh/year			8318.5735	(286)

SAP 10 EPC IMPROVEMENTS

00001

Current energy efficiency rating: B 83
Current environmental impact rating: A 96

N Solar water heating		SAP increase too small
U Solar photovoltaic panels		Recommended
V2 Wind turbine		Recommended

Recommended measures:	SAP change	Cost change	CO2 change
U Solar photovoltaic panels	+ 3.2	-£ 314	-148 kg (18.4%)
V2 Wind turbine	+ 7.6	-£ 712	-347 kg (52.9%)

Measures omitted - SAP change or cost saving too small:

N Solar water heating	+ 0.9	-£ 101	-44 kg (5.5%)

	Typical annual savings		Energy efficiency	Environmental impact
Recommended measures				
Solar photovoltaic panels	£314	0.54 kg/m²	B 86	A 97
Wind turbine	£712	1.27 kg/m²	A 93	A 98
Total Savings	£1026	1.82 kg/m²		

Potential energy efficiency rating: A 93
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 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	£1519	£1519	£0
Space heating	£924	£924	£0
Water heating	£477	£477	£0
Lighting	£118	£118	£0
Generated (PV)	-£0	-£314	£314
Generated (wind)	-£0	-£712	£712
Total cost of fuels	£1519	£493	£1026
Total cost of uses	£1519	£493	£1026
Delivered energy	20 kWh/m²	6 kWh/m²	13 kWh/m²
Carbon dioxide emissions	0.8 tonnes	0.3 tonnes	0.5 tonnes
CO2 emissions per m²	3 kg/m²	1 kg/m²	2 kg/m²
Primary energy	31 kWh/m²	11 kWh/m²	20 kWh/m²

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	272.3300	(1b)	x 3.2700	(2b) =	890.5191	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	272.3300					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	890.5191	(5)

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2. Ventilation rate

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		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	5 * 10 =	50.0000	(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) =	50.0000 / (5) =	0.0561	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.2561	(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) =	0.2561	(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	0.3266	0.3202	0.3138	0.2818	0.2754	0.2433	0.2433	0.2369	0.2561	0.2754	0.2882	0.3010	(22b)
Effective ac	0.5533	0.5513	0.5492	0.5397	0.5379	0.5296	0.5296	0.5281	0.5328	0.5379	0.5415	0.5453	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
Glazed doors & windows			80.0400	1.3258	106.1136			(27)
Roof windows			10.2900	1.3258	13.6420			(27a)
PGD			1.7900	1.2000	2.1480			(26a)
Solid door			2.3100	1.2000	2.7720			(26)
Heatloss Floor 1			272.3300	0.1100	29.9563	75.0000	20424.7500	(28a)
External Wall 1	290.6800	84.1400	206.5400	0.1800	37.1772	110.0000	22719.4000	(29a)
External Roof 1	152.9900		152.9900	0.1000	15.2990	9.0000	1376.9100	(30)
External Roof 2	191.4000	10.2900	181.1100	0.1500	27.1665	9.0000	1629.9900	(30)
Total net area of external elements Aum(A, m2)			907.4000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	234.2747			(33)
Main dwelling								
Internal Wall 1			161.9800			9.0000	1457.8200	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 47608.8700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 174.8205 (35)
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	44.3500	0.0190	0.8427
E3 Sill	42.4000	0.0220	0.9328
E4 Jamb	71.9000	0.0170	1.2223
E5 Ground floor (normal)	101.0000	0.0670	6.7670
E16 Corner (normal)	22.0000	0.0420	0.9240
R1 Head of roof window	5.1400	0.2400	1.2336
R2 Sill of roof window	5.1400	0.2400	1.2336
R3 Jamb of roof window	21.8400	0.2400	5.2416
E17 Corner (inverted - internal area greater than external area)	11.0000	-0.0850	-0.9350
R4 Ridge (vaulted ceiling)	21.7500	0.1200	2.6100
E10 Eaves (insulation at ceiling level)	32.4500	0.0570	1.8497
E11 Eaves (insulation at rafter level)	43.5000	0.0180	0.7830
E12 Gable (insulation at ceiling level)	14.1000	0.0430	0.6063
E13 Gable (insulation at rafter level)	17.6000	0.0430	0.7568

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 24.0683 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 258.3430 (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	162.6077	161.9991	161.4026	158.6008	158.0766	155.6363	155.6363	155.1844	156.5763	158.0766	159.1371	160.2458	(38)
Heat transfer coeff	420.9507	420.3421	419.7456	416.9438	416.4196	413.9793	413.9793	413.5274	414.9193	416.4196	417.4801	418.5887	(39)
Average = Sum(39)m / 12 =												416.9413	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.5457	1.5435	1.5413	1.5310	1.5291	1.5201	1.5201	1.5185	1.5236	1.5291	1.5330	1.5371	(40)
HLP (average)												1.5310	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 3.0960 (42)
Hot water usage for mixer showers

76.1289	74.9849	73.3177	70.1280	67.7740	65.1489	63.6568	65.3113	67.1250	69.9435	73.2018	75.8373	(42a)

Hot water usage for baths

32.8612	32.3731	31.6859	30.4187	29.4698	28.4177	27.8494	28.5319	29.2749	30.4007	31.6940	32.7501	(42b)

Hot water usage for other uses

46.3357	44.6508	42.9658	41.2809	39.5960	37.9110	37.9110	39.5960	41.2809	42.9658	44.6508	46.3357	(42c)

Average daily hot water use (litres/day) 142.7792 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	155.3258	152.0088	147.9695	141.8276	136.8398	131.4777	129.4172	133.4391	137.6808	143.3101	149.5466	154.9230	(44)
Energy conte	245.9981	216.4585	227.4235	194.1549	184.2127	161.6671	156.5189	165.2255	169.7742	194.4705	213.0565	242.5720	(45)
Energy content (annual)										Total = Sum(45)m =		2371.5326	
Distribution loss (46)m = 0.15 x (45)m													
	36.8997	32.4688	34.1135	29.1232	27.6319	24.2501	23.4778	24.7838	25.4661	29.1706	31.9585	36.3858	(46)
Water storage loss (or HIU loss):													
Store volume												210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9720	(55)
Total storage loss													
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)
If cylinder contains dedicated solar storage													
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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													
	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(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													
	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(64)
										Total per year (kWh/year) = Sum(64)m =		3000.2086	(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													
	124.5099	110.5542	118.3338	105.8941	103.9663	95.0919	94.7581	97.6530	97.7875	107.3770	112.1789	123.3707	(65)

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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	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

58.8556	52.2751	42.5129	32.1850	24.0587	20.3114	21.9471	28.5277	38.2898	48.6178	56.7441	60.4914	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

649.9284	656.6727	639.6774	603.4966	557.8248	514.8998	486.2232	479.4790	496.4742	532.6550	578.3268	621.2519	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	(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)

-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	(71)

Water heating gains (Table 5)

167.3520	164.5152	159.0509	147.0751	139.7396	132.0721	127.3630	131.2540	135.8160	144.3239	155.8040	165.8209	(72)

Total internal gains

994.7270	992.0538	959.8321	901.3477	840.2140	785.8741	754.1242	757.8517	789.1710	844.1875	909.4659	966.1551	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	9.2800	10.6334	0.6300	0.7000	0.7700	30.1572	(74)
East	11.4300	19.6403	0.6300	0.7000	0.7700	68.6065	(76)
South	30.7700	46.7521	0.6300	0.7000	0.7700	439.6430	(78)
West	28.5600	19.6403	0.6300	0.7000	0.7700	171.4263	(80)
North	6.6800	15.2954	0.6300	0.7000	1.0000	40.5526	(82)
South	3.6100	47.0123	0.6300	0.7000	1.0000	67.3597	(82)

Solar gains	817.7453	1442.9250	2097.4377	2789.5050	3287.1094	3331.8278	3183.9601	2804.2697	2336.8361	1628.8802	988.8102	693.6493	(83)
Total gains	1812.4722	2434.9788	3057.2699	3690.8526	4127.3234	4117.7019	3938.0843	3562.1213	3126.0071	2473.0677	1898.2760	1659.8044	(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	31.4162	31.4617	31.5064	31.7181	31.7581	31.9453	31.9453	31.9802	31.8729	31.7581	31.6774	31.5935	
alpha	3.0944	3.0974	3.1004	3.1145	3.1172	3.1297	3.1297	3.1320	3.1249	3.1172	3.1118	3.1062	
util living area													
	0.9888	0.9726	0.9374	0.8599	0.7325	0.5746	0.4393	0.4963	0.7233	0.9169	0.9790	0.9914	(86)
Living	19.0474	19.3434	19.7603	20.2370	20.5998	20.8009	20.8693	20.8541	20.6876	20.1687	19.5016	18.9914	
Non living	17.4028	17.7785	18.3003	18.8807	19.2862	19.4855	19.5349	19.5289	19.3935	18.8198	17.9888	17.3359	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	31	0	0	0	0	0	0	0	0	0	0	6	
16 / 9	0	28	31	0	0	0	0	0	0	0	15	25	
MIT	21.0000	20.0618	20.2979	20.2370	20.5998	20.8009	20.8693	20.8541	20.6876	20.1687	19.8265	20.0826	(87)
Th 2	19.6534	19.6550	19.6567	19.6643	19.6657	19.6724	19.6724	19.6737	19.6699	19.6657	19.6628	19.6598	(88)
util rest of house													
	0.9858	0.9657	0.9217	0.8252	0.6691	0.4776	0.3166	0.3684	0.6340	0.8881	0.9726	0.9891	(89)
MIT 2	19.6534	18.8268	19.0580	18.8807	19.2862	19.4855	19.5349	19.5289	19.3935	18.8198	18.4564	18.8326	(90)
Living area fraction										fLA = Living area / (4) =		0.4500	(91)
MIT	20.2593	19.3825	19.6159	19.4910	19.8773	20.0774	20.1353	20.1252	19.9758	19.4268	19.0729	19.3951	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2593	19.3825	19.6159	19.4910	19.8773	20.0774	20.1353	20.1252	19.9758	19.4268	19.0729	19.3951	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9873	0.9640	0.9211	0.8200	0.6801	0.5089	0.3609	0.4141	0.6568	0.8817	0.9689	0.9886	(94)
Useful gains	1789.3987	2347.4180	2816.1915	3026.6771	2807.1328	2095.4124	1421.3167	1475.1128	2053.2205	2180.5873	1839.3038	1640.8287	(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													
	6718.0836	6087.5982	5505.3432	4415.8662	3405.1676	2267.5352	1463.5423	1540.4607	2437.9921	3675.6462	4998.4384	6360.4810	(97)
Space heating kWh													
	3666.9416	2513.4011	2000.7289	1000.2162	444.9379	0.0000	0.0000	0.0000	0.0000	1112.3238	2274.5769	3511.4213	(98a)
Space heating requirement - total per year (kWh/year)												16524.5477	
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													
	3666.9416	2513.4011	2000.7289	1000.2162	444.9379	0.0000	0.0000	0.0000	0.0000	1112.3238	2274.5769	3511.4213	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												16524.5477	
Space heating per m2											(98c) / (4) =	60.6784	(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 %)	457.0317	(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													
	3666.9416	2513.4011	2000.7289	1000.2162	444.9379	0.0000	0.0000	0.0000	0.0000	1112.3238	2274.5769	3511.4213	(98)
Space heating efficiency (main heating system 1)													
	457.0317	457.0317	457.0317	457.0317	457.0317	0.0000	0.0000	0.0000	0.0000	457.0317	457.0317	457.0317	(210)
Space heating fuel (main heating system)													
	802.3386	549.9402	437.7659	218.8505	97.3538	0.0000	0.0000	0.0000	0.0000	243.3800	497.6847	768.3102	(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													
	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(64)
Efficiency of water heater												178.8847	(216)
(217)m	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	178.8847	(217)
Fuel for water heating, kWh/month													
	167.3662	147.9644	156.9826	137.4220	132.8270	119.2607	117.3456	122.2128	123.7927	138.5612	147.9884	165.4509	(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	51.5160	41.3281	37.2113	27.2626	21.0584	17.2049	19.2102	24.9701	32.4338	42.5548	48.0656	52.9478	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-41.8626	-64.2187	-99.6252	-117.7376	-129.9507	-117.8768	-116.2163	-106.5939	-90.3143	-74.6816	-47.2900	-35.4708	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	-212.5732	-192.0016	-212.5732	-205.7160	-212.5732	-205.7160	-212.5732	-212.5732	-205.7160	-212.5732	-205.7160	-212.5732	(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	3615.6240	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	178.8847	
Water heating fuel used	1677.1744	(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)	415.7637	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1041.8384	(233)
Wind generation	-3575.5408	(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	2163.8451	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3615.6240	16.4900	596.2164	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1677.1744	16.4900	276.5661	(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	415.7637	16.4900	68.5594	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1041.8384	16.4900	-171.7992	
PV Unit electricity exported	0.0000	5.5900	0.0000	
Total			-171.7992	(252)
Wind Turbine electricity used in dwelling	-2502.8785	16.4900	-412.7247	
Wind Turbine electricity exported	0.0000	5.5900	0.0000	
Total			-412.7247	(252)
Total energy cost			356.8181	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.4048	(257)
SAP value		93.4382	
SAP rating (Section 12)		93	(258)
SAP band		A	

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	3615.6240	0.1558	563.3808	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1677.1744	0.1410	236.4441	(264)
Space and water heating			799.8249	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	415.7637	0.1443	60.0075	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1041.8384	0.1338	-139.4125	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-139.4125	(269)
Wind Turbine electricity used in dwelling	-2502.8785	0.1387	-347.1801	
Wind Turbine electricity exported	0.0000	0.0000	0.0000	
Total			-347.1801	(269)
Total CO2, kg/year			373.2398	(272)
CO2 emissions per m2			1.3700	(273)
EI value			98.4239	
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)	
Main dwelling						
Ground floor	272.3300	(1b)	x 3.2700	(2b) =	890.5191	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	272.3300					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	890.5191	(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	5 * 10 =	50.0000 (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) =	50.0000 / (5) =	0.0561 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.0000 (17)
Infiltration rate		0.2561 (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) =	0.2561 (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	0.2690	0.2497	0.2497	0.2369	0.2369	0.2113	0.2177	0.1985	0.2049	0.2241	0.2177	0.2433	(22b)
Effective ac	0.5362	0.5312	0.5312	0.5281	0.5281	0.5223	0.5237	0.5197	0.5210	0.5251	0.5237	0.5296	(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								
Glazed doors & windows			80.0400	1.3258	106.1136			(27)
Roof windows			10.2900	1.3258	13.6420			(27a)
PGD			1.7900	1.2000	2.1480			(26a)
Solid door			2.3100	1.2000	2.7720			(26)
Heatloss Floor 1			272.3300	0.1100	29.9563	75.0000	20424.7500	(28a)
External Wall 1	290.6800	84.1400	206.5400	0.1800	37.1772	110.0000	22719.4000	(29a)
External Roof 1	152.9900		152.9900	0.1000	15.2990	9.0000	1376.9100	(30)
External Roof 2	191.4000	10.2900	181.1100	0.1500	27.1665	9.0000	1629.9900	(30)
Total net area of external elements Aum(A, m2)			907.4000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		234.2747			(33)
Main dwelling								
Internal Wall 1			161.9800			9.0000	1457.8200	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	47608.8700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		174.8205 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	44.3500	0.0190	0.8427
E3 Sill	42.4000	0.0220	0.9328
E4 Jamb	71.9000	0.0170	1.2223
E5 Ground floor (normal)	101.0000	0.0670	6.7670
E16 Corner (normal)	22.0000	0.0420	0.9240
R1 Head of roof window	5.1400	0.2400	1.2336
R2 Sill of roof window	5.1400	0.2400	1.2336
R3 Jamb of roof window	21.8400	0.2400	5.2416
E17 Corner (inverted - internal area greater than external area)	11.0000	-0.0850	-0.9350
R4 Ridge (vaulted ceiling)	21.7500	0.1200	2.6100
E10 Eaves (insulation at ceiling level)	32.4500	0.0570	1.8497
E11 Eaves (insulation at rafter level)	43.5000	0.0180	0.7830
E12 Gable (insulation at ceiling level)	14.1000	0.0430	0.6063
E13 Gable (insulation at rafter level)	17.6000	0.0430	0.7568

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		24.0683 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	258.3430 (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	157.5645	156.1003	156.1003	155.1844	155.1844	153.4973	153.9010	152.7261	153.1057	154.3168	153.9010	155.6363	(38)
Heat transfer coeff	415.9074	414.4433	414.4433	413.5274	413.5274	411.8403	412.2440	411.0690	411.4486	412.6597	412.2440	413.9793	(39)
Average = Sum(39)m / 12 =												413.1112	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.5272	1.5218	1.5218	1.5185	1.5185	1.5123	1.5138	1.5095	1.5108	1.5153	1.5138	1.5201	(40)
HLP (average)												1.5170	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												3.0960	(42)
Hot water usage for mixer showers													
	76.1289	74.9849	73.3177	70.1280	67.7740	65.1489	63.6568	65.3113	67.1250	69.9435	73.2018	75.8373	(42a)
Hot water usage for baths													
	32.8612	32.3731	31.6859	30.4187	29.4698	28.4177	27.8494	28.5319	29.2749	30.4007	31.6940	32.7501	(42b)
Hot water usage for other uses													
	46.3357	44.6508	42.9658	41.2809	39.5960	37.9110	37.9110	39.5960	41.2809	42.9658	44.6508	46.3357	(42c)
Average daily hot water use (litres/day)												142.7792	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	155.3258	152.0088	147.9695	141.8276	136.8398	131.4777	129.4172	133.4391	137.6808	143.3101	149.5466	154.9230	(44)
Energy conte	245.9981	216.4585	227.4235	194.1549	184.2127	161.6671	156.5189	165.2255	169.7742	194.4705	213.0565	242.5720	(45)
Energy content (annual)											Total = Sum(45)m =	2371.5326	
Distribution loss (46)m = 0.15 x (45)m													
	36.8997	32.4688	34.1135	29.1232	27.6319	24.2501	23.4778	24.7838	25.4661	29.1706	31.9585	36.3858	(46)
Water storage loss (or HIU loss):													
Store volume												210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9720	(55)
Total storage loss													
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)
If cylinder contains dedicated solar storage													
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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													
	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(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													
	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(64)
										Total per year (kWh/year) = Sum(64)m =		3000.2086	(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													
	124.5099	110.5542	118.3338	105.8941	103.9663	95.0919	94.7581	97.6530	97.7875	107.3770	112.1789	123.3707	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	185.7575	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	58.8556	52.2751	42.5129	32.1850	24.0587	20.3114	21.9471	28.5277	38.2898	48.6178	56.7441	60.4914	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	649.9284	656.6727	639.6774	603.4966	557.8248	514.8998	486.2232	479.4790	496.4742	532.6550	578.3268	621.2519	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	56.6717	(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)													
	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	-123.8384	(71)
Water heating gains (Table 5)													
	167.3520	164.5152	159.0509	147.0751	139.7396	132.0721	127.3630	131.2540	135.8160	144.3239	155.8040	165.8209	(72)
Total internal gains													
	994.7270	992.0538	959.8321	901.3477	840.2140	785.8741	754.1242	757.8517	789.1710	844.1875	909.4659	966.1551	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	9.2800	12.6907	0.6300	0.7000	0.7700	35.9920	(74)
East	11.4300	23.7106	0.6300	0.7000	0.7700	82.8249	(76)
South	30.7700	53.4173	0.6300	0.7000	0.7700	502.3207	(78)
West	28.5600	23.7106	0.6300	0.7000	0.7700	206.9536	(80)
North	6.6800	18.0222	0.6300	0.7000	1.0000	47.7821	(82)
South	3.6100	55.1161	0.6300	0.7000	1.0000	78.9709	(82)

Solar gains	954.8443	1475.7281	2141.7304	2951.5090	3400.8450	3750.3298	3503.6718	3109.5562	2551.6965	1767.6811	1138.0032	782.9685	(83)
Total gains	1949.5713	2467.7819	3101.5625	3852.8566	4241.0589	4536.2039	4257.7960	3867.4078	3340.8675	2611.8686	2047.4691	1749.1236	(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	31.7972	31.9095	31.9095	31.9802	31.9802	32.1112	32.0798	32.1714	32.1418	32.0474	32.0798	31.9453	
alpha	3.1198	3.1273	3.1273	3.1320	3.1320	3.1407	3.1387	3.1448	3.1428	3.1365	3.1387	3.1297	
util living area													
	0.9851	0.9700	0.9302	0.8363	0.6925	0.4978	0.3750	0.3989	0.6687	0.8925	0.9710	0.9889	(86)
Living	19.1901	19.4240	19.8493	20.3266	20.6666	20.8409	20.8834	20.8807	20.7452	20.2918	19.6569	19.1310	
Non living	17.5939	17.8917	18.4211	18.9910	19.3606	19.5199	19.5461	19.5489	19.4521	18.9729	18.1946	17.5227	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	31	0	0	0	0	0	0	0	0	0	0	4	
16 / 9	0	28	31	0	0	0	0	0	0	0	14	27	
MIT	21.0000	20.1074	20.3483	20.3266	20.6666	20.8409	20.8834	20.8807	20.7452	20.2918	19.9286	20.0780	(87)

Th 2	19.6671	19.6712	19.6712	19.6737	19.6737	19.6783	19.6772	19.6804	19.6794	19.6760	19.6772	19.6724	(88)
util rest of house	0.9811	0.9624	0.9125	0.7970	0.6224	0.3998	0.2564	0.2709	0.5713	0.8555	0.9621	0.9860	(89)
MIT 2	19.6671	18.8857	19.1194	18.9910	19.3606	19.5199	19.5461	19.5489	19.4521	18.9729	18.5811	18.8460	(90)
Living area fraction									fLA = Living area / (4) =			0.4500	(91)
MIT	20.2669	19.4355	19.6724	19.5920	19.9483	20.1143	20.1478	20.1482	20.0340	19.5664	19.1875	19.4004	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2669	19.4355	19.6724	19.5920	19.9483	20.1143	20.1478	20.1482	20.0340	19.5664	19.1875	19.4004	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9831	0.9608	0.9126	0.7943	0.6381	0.4335	0.2997	0.3176	0.5998	0.8518	0.9578	0.9852	(94)
Useful gains	1916.5482	2371.1087	2830.3572	3060.2448	2706.0288	1966.2785	1275.8552	1228.3156	2003.8371	2224.7482	1961.1621	1723.3218	(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	6432.7945	5899.7914	5293.4211	4256.0207	3162.7716	2065.0894	1297.6765	1253.0185	2276.9520	3452.4652	4735.6351	6044.2561	(97)
Space heating kWh	3360.0872	2371.2747	1832.5196	860.9587	339.8166	0.0000	0.0000	0.0000	0.0000	913.4215	1997.6206	3214.7751	(98a)
Space heating requirement - total per year (kWh/year)												14890.4740	
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	3360.0872	2371.2747	1832.5196	860.9587	339.8166	0.0000	0.0000	0.0000	0.0000	913.4215	1997.6206	3214.7751	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												14890.4740	
Space heating per m2											(98c) / (4) =	54.6781	(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 %)												458.1619	(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	3360.0872	2371.2747	1832.5196	860.9587	339.8166	0.0000	0.0000	0.0000	0.0000	913.4215	1997.6206	3214.7751	(98)
Space heating efficiency (main heating system 1)	458.1619	458.1619	458.1619	458.1619	458.1619	0.0000	0.0000	0.0000	0.0000	458.1619	458.1619	458.1619	(210)
Space heating fuel (main heating system)	733.3843	517.5626	399.9721	187.9158	74.1696	0.0000	0.0000	0.0000	0.0000	199.3665	436.0076	701.6680	(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	299.3925	264.6857	280.8179	245.8269	237.6071	213.3391	209.9133	218.6199	221.4462	247.8649	264.7285	295.9664	(64)
Efficiency of water heater												178.8527	(216)
(217)m	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	178.8527	(217)
Fuel for water heating, kWh/month	167.3962	147.9909	157.0107	137.4466	132.8507	119.2820	117.3666	122.2346	123.8149	138.5861	148.0149	165.4806	(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	51.5160	41.3281	37.2113	27.2626	21.0584	17.2049	19.2102	24.9701	32.4338	42.5548	48.0656	52.9478	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-48.5785	-66.0209	-101.5786	-122.1432	-131.7785	-127.2323	-123.6885	-114.5218	-96.7511	-79.8194	-53.8082	-39.9756	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	-212.5732	-192.0016	-212.5732	-205.7160	-212.5732	-205.7160	-212.5732	-212.5732	-205.7160	-212.5732	-205.7160	-212.5732	(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	3250.0465	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	178.8527	
Water heating fuel used	1677.4748	(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)	415.7637	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1105.8966	(233)
Wind generation	-3575.5408	(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	1734.5098	(238)

10a. Fuel costs - using BEDF prices (589)

	Fuel	Fuel price	Fuel cost

	kWh/year	p/kWh	£/year	
Space heating - main system 1	3250.0465	28.4300	923.9882	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1677.4748	28.4300	476.9061	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	415.7637	28.4300	118.2016	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1105.8966	28.4300	-314.4064	
PV Unit electricity exported	0.0000	5.8100	0.0000	
Total			-314.4064	(252)
Wind Turbine electricity used in dwelling	-2502.8785	28.4300	-711.5684	
Wind Turbine electricity exported	0.0000	5.8100	0.0000	
Total			-711.5684	(252)
Total energy cost			493.1211	(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	3250.0465	0.1562	507.5326	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1677.4748	0.1410	236.4864	(264)
Space and water heating			744.0190	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	415.7637	0.1443	60.0075	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1105.8966	0.1338	-148.0083	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-148.0083	(269)
Wind Turbine electricity used in dwelling	-2502.8785	0.1387	-347.1801	
Wind Turbine electricity exported	0.0000	0.0000	0.0000	
Total			-347.1801	(269)
Total CO2, kg/year			308.8382	(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	3250.0465	1.5781	5128.9390	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1677.4748	1.5213	2551.9223	(278)
Space and water heating			7680.8613	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	415.7637	1.5338	637.7122	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1105.8966	1.4946	-1652.8596	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-1652.8596	(283)
Wind Turbine electricity used in dwelling	-2502.8785	1.5128	-3786.3546	
Wind Turbine electricity exported	0.0000	0.0000	0.0000	
Total			-3786.3546	(283)
Total Primary energy kWh/year			2879.3593	(286)