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	121.4000	(1b)	x 2.4000	(2b) =	291.3600	(1b) - (3b)
First floor	121.4000	(1c)	x 2.5000	(2c) =	303.5000	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	242.8000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		594.8600	(5)

2. Ventilation rate

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

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.2000 (17)
Infiltration rate		0.1600 (18)
Number of sides sheltered		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1480 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.8000	5.5000	5.5000	5.0000	4.9000	4.3000	4.4000	4.2000	4.5000	5.1000	5.2000	5.7000	(22)
Wind factor	1.4500	1.3750	1.3750	1.2500	1.2250	1.0750	1.1000	1.0500	1.1250	1.2750	1.3000	1.4250	(22a)
Adj infilt rate	0.2146	0.2035	0.2035	0.1850	0.1813	0.1591	0.1628	0.1554	0.1665	0.1887	0.1924	0.2109	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation	0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	78.3000 (23c)

Effective ac	0.3231	0.3120	0.3120	0.2935	0.2898	0.2676	0.2713	0.2639	0.2750	0.2972	0.3009	0.3194	(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	
Window (Uw = 1.20)			39.2600	1.1450	44.9542			(27)
Door			2.4000	1.4000	3.3600			(26a)
NW Rooflight			3.6000	1.1450	4.1221			(27a)
SE Rooflight			9.1200	1.1450	10.4427			(27a)
Floor			121.4000	0.0900	10.9260			(28a)
Wall	175.7300	41.6600	134.0700	0.1700	22.7919			(29a)
Roof	172.6600	12.7200	159.9400	0.0800	12.7952			(30)
Total net area of external elements Aum(A, m2)			469.7900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		109.3922			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	19.9600	0.5800	11.5768
E3 Sill	5.2000	0.0160	0.0832
E4 Jamb	31.2000	0.0010	0.0312
E5 Ground floor (normal)	49.1000	0.0520	2.5532
E6 Intermediate floor within a dwelling	49.1000	0.0010	0.0491
E16 Corner (normal)	12.4000	0.0370	0.4588
R1 Head of roof window	7.4000	0.0610	0.4514
R2 Sill of roof window	4.2000	0.0600	0.2520
R3 Jamb of roof window	36.0000	0.0560	2.0160
E11 Eaves (insulation at rafter level)	35.6000	0.0480	1.7088
E13 Gable (insulation at rafter level)	19.4000	0.0370	0.7178

R4 Ridge (vaulted ceiling)									17.8000	0.1200	2.1360		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												22.0343	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	131.4265	(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	63.4258	61.2468	61.2468	57.6152	56.8888	52.5309	53.2572	51.8046	53.9835	58.3415	59.0678	62.6994	(38)
Heat transfer coeff	194.8522	192.6733	192.6733	189.0416	188.3153	183.9574	184.6837	183.2311	185.4100	189.7680	190.4943	194.1259	(39)
Average = Sum(39)m / 12 =												189.1022	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8025	0.7935	0.7935	0.7786	0.7756	0.7576	0.7606	0.7547	0.7636	0.7816	0.7846	0.7995	(40)
HLP (average)												0.7788	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												3.0576	(42)
Hot water usage for mixer showers	103.7923	102.2325	99.9595	95.6107	92.4014	88.8223	86.7880	89.0437	91.5164	95.3592	99.8015	103.3946	(42a)
Hot water usage for baths	32.5844	32.1004	31.4190	30.1625	29.2216	28.1784	27.6148	28.2915	29.0283	30.1447	31.4270	32.4742	(42b)
Hot water usage for other uses	45.9426	44.2719	42.6013	40.9307	39.2600	37.5894	37.5894	39.2600	40.9307	42.6013	44.2719	45.9426	(42c)
Average daily hot water use (litres/day)												167.6698	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	182.3192	178.6048	173.9798	166.7038	160.8830	154.5901	151.9922	156.5953	161.4754	168.1052	175.5004	181.8114	(44)
Energy conte	288.7490	254.3309	267.4005	228.2092	216.5794	190.0865	183.8215	193.8977	199.1154	228.1172	250.0326	284.6726	(45)
Energy content (annual)											Total = Sum(45)m =	2785.0124	
Distribution loss (46)m = 0.15 x (45)m	43.3124	38.1496	40.1101	34.2314	32.4869	28.5130	27.5732	29.0847	29.8673	34.2176	37.5049	42.7009	(46)
Water storage loss:													
Store volume												210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7500	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9450	(55)
Total storage loss	29.2950	26.4600	29.2950	28.3500	29.2950	28.3500	29.2950	29.2950	28.3500	29.2950	28.3500	29.2950	(56)
If cylinder contains dedicated solar storage	29.2950	26.4600	29.2950	28.3500	29.2950	28.3500	29.2950	29.2950	28.3500	29.2950	28.3500	29.2950	(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	341.3064	301.8021	319.9579	279.0712	269.1368	240.9485	236.3789	246.4551	249.9774	280.6746	300.8946	337.2300	(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	341.3064	301.8021	319.9579	279.0712	269.1368	240.9485	236.3789	246.4551	249.9774	280.6746	300.8946	337.2300	(64)
										Total per year (kWh/year) = Sum(64)m =		3403.8334	(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	138.0550	122.5420	130.9566	116.5692	114.0586	103.8934	103.1666	106.5169	106.8955	117.8949	123.8254	136.6996	(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	183.4542	183.4542	183.4542	183.4542	183.4542	183.4542	183.4542	183.4542	183.4542	183.4542	183.4542	183.4542	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	48.1791	42.7923	34.8010	26.3466	19.6944	16.6268	17.9659	23.3527	31.3440	39.7984	46.4506	49.5182	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	612.0873	618.4388	602.4331	568.3589	525.3462	484.9205	457.9135	451.5620	467.5677	501.6419	544.6545	585.0803	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	56.4030	56.4030	56.4030	56.4030	56.4030	56.4030	56.4030	56.4030	56.4030	56.4030	56.4030	56.4030	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-122.3028	-122.3028	-122.3028	-122.3028	-122.3028	-122.3028	-122.3028	-122.3028	-122.3028	-122.3028	-122.3028	-122.3028	(71)
Water heating gains (Table 5)	185.5578	182.3541	176.0169	161.9016	153.3045	144.2964	138.6647	143.1679	148.4659	158.4609	171.9798	183.7360	(72)
Total internal gains	966.3785	964.1396	933.8054	877.1615	818.8996	763.3980	732.0985	735.6370	764.9320	820.4556	883.6393	938.8889	(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	6.0700	15.4538	0.7200	0.7000	0.7700	32.7633	(75)
Southeast	30.3100	47.2368	0.7200	0.7000	0.7700	500.0694	(77)
Northwest	2.8800	15.4538	0.7200	0.7000	0.7700	15.5450	(81)
Southeast	9.1200	52.7967	0.7200	0.7000	1.0000	218.4112	(82)
Northwest	3.6000	22.4937	0.7200	0.7000	1.0000	36.7314	(82)

Solar gains	803.5203	1187.3394	1706.5560	2344.1459	2604.1752	2839.7188	2430.0840	2333.6712	1975.3021	1352.8227	916.6790	701.6404	(83)
Total gains	1769.8988	2151.4790	2640.3614	3221.3073	3423.0747	3603.1168	3162.1825	3069.3082	2740.2341	2173.2782	1800.3183	1640.5293	(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	86.5328	87.5114	87.5114	89.1926	89.5366	91.6577	91.2972	92.0210	90.9396	88.8512	88.5124	86.8566	
alpha	6.7689	6.8341	6.8341	6.9462	6.9691	7.1105	7.0865	7.1347	7.0626	6.9234	6.9008	6.7904	
util living area													
	0.9891	0.9657	0.8815	0.6945	0.5252	0.3572	0.3095	0.3163	0.4790	0.7965	0.9645	0.9920	(86)
MIT	20.4984	20.6463	20.8235	20.9307	20.9518	20.9561	20.9561	20.9563	20.9546	20.9094	20.7060	20.4793	(87)
Th 2	20.2511	20.2589	20.2589	20.2719	20.2745	20.2902	20.2876	20.2928	20.2850	20.2693	20.2667	20.2537	(88)
util rest of house													
	0.9858	0.9565	0.8575	0.6585	0.4865	0.3211	0.2679	0.2742	0.4314	0.7530	0.9530	0.9894	(89)
MIT 2	19.6710	19.8611	20.0686	20.1929	20.2146	20.2340	20.2312	20.2368	20.2276	20.1732	19.9436	19.6494	(90)
Living area fraction										fLA = Living area / (4) =		0.1277	(91)
MIT	19.7766	19.9613	20.1649	20.2871	20.3088	20.3262	20.3238	20.3287	20.3205	20.2672	20.0409	19.7553	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7766	19.9613	20.1649	20.2871	20.3088	20.3262	20.3238	20.3287	20.3205	20.2672	20.0409	19.7553	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9831	0.9522	0.8542	0.6593	0.4884	0.3229	0.2700	0.2763	0.4337	0.7529	0.9488	0.9872	(94)
Useful gains	1739.9309	2048.6188	2255.3682	2123.7248	1671.6961	1163.4875	853.8791	848.0594	1188.5496	1636.2515	1708.1119	1619.4564	(95)
Ext temp.	5.4000	5.7000	7.0000	8.8000	11.4000	14.0000	15.7000	15.7000	13.9000	11.2000	8.2000	5.7000	(96)
Heat loss rate W	2801.3182	2747.7764	2536.5319	2171.5367	1677.6560	1163.7425	853.9374	848.1229	1190.4178	1720.6648	2255.6296	2728.5064	(97)
Space heating kWh	789.6721	469.8339	209.1858	34.4246	4.4342	0.0000	0.0000	0.0000	0.0000	62.8035	394.2127	825.1332	(98a)
Space heating requirement - total per year (kWh/year)												2789.7000	
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	789.6721	469.8339	209.1858	34.4246	4.4342	0.0000	0.0000	0.0000	0.0000	62.8035	394.2127	825.1332	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2789.7000	
Space heating per m2											(98c) / (4) =	11.4897	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												249.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	789.6721	469.8339	209.1858	34.4246	4.4342	0.0000	0.0000	0.0000	0.0000	62.8035	394.2127	825.1332	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	315.9952	188.0088	83.7078	13.7753	1.7744	0.0000	0.0000	0.0000	0.0000	25.1315	157.7482	330.1854	(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	341.3064	301.8021	319.9579	279.0712	269.1368	240.9485	236.3789	246.4551	249.9774	280.6746	300.8946	337.2300	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	194.9209	172.3598	182.7286	159.3782	153.7046	137.6062	134.9965	140.7511	142.7626	160.2939	171.8416	192.5928	(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	48.3236	43.6471	48.3236	46.7648	48.3236	46.7648	48.3236	48.3236	46.7648	48.3236	46.7648	48.3236	(231)
Lighting	42.1709	33.8311	30.4611	22.3171	17.2384	14.0839	15.7254	20.4405	26.5502	34.8353	39.3464	43.3430	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-107.1999	-144.6274	-226.3905	-278.6734	-302.8241	-299.6340	-277.4465	-269.6229	-231.5789	-174.6328	-116.8512	-92.7625	(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												1116.3265	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1943.9369	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7840)													
mechanical ventilation fans (SFP = 0.7840)												568.9717	(230a)
Total electricity for the above, kWh/year												568.9717	(231)
Electricity for lighting (calculated in Appendix L)												340.3433	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2522.2440	(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	1447.3343	(238)

10a. Fuel costs - using BEDF prices (531)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1 (high-rate cost)	669.7959	29.3660	248.5613	(240)
Space heating - main system 1 (low-rate cost)	446.5306	0.1775	79.2592	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (electric off-peak tariff)				
High-rate fraction			0.7000	(243)
Low-rate fraction			0.3000	(244)
High-rate cost	1360.7558	37.1100	504.9765	(245)
Low-rate cost	583.1811	17.7500	103.5146	(246)
Energy for instantaneous electric shower(s)	0.0000	33.2380	0.0000	(247a)
Pumps, fans and electric keep-hot (0.80*37.11 + 0.20*17.75)	568.9717	33.2380	164.8812	(249)
Energy for lighting (0.80*37.11 + 0.20*17.75)	340.3433	33.2380	113.1233	(250)
Additional standing charges			92.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-2522.2440	33.2380	-838.3435	
PV Unit electricity exported	0.0000	5.5900	0.0000	
Total			-838.3435	(252)
Total energy cost			467.9726	(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 (high-rate cost)	669.7959	0.1642	109.9930	(261)
Space heating - main system 1 (low-rate cost)	446.5306	0.1516	67.6953	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating - high rate cost	1360.7558	0.1458	198.3793	(264)
Water heating - low rate cost	583.1811	0.1345	78.4550	(264)
Space and water heating			454.5226	(265)
Pumps, fans and electric keep-hot	568.9717	0.1412	78.9304	(267)
Energy for lighting	340.3433	0.1468	49.9765	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-2522.2440	0.1359	-342.8631	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-342.8631	(269)
Total CO2, kg/year			240.5664	(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 (high-rate cost)	669.7959	0.9668	1079.2345	(275)
Space heating - main system 1 (low-rate cost)	446.5306	1.5577	695.5807	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating - high rate cost	1360.7558	1.5430	2099.6712	(278)
Water heating - low rate cost	583.1811	1.4917	869.9087	(278)
Space and water heating			4744.3952	(279)
Pumps, fans and electric keep-hot	568.9717	1.5239	860.6712	(281)
Energy for lighting	340.3433	1.5451	525.8552	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-2522.2440	1.5044	-3794.5186	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-3794.5186	(283)
Total Primary energy kWh/year			2336.4029	(286)

SAP 10 EPC IMPROVEMENTS

23-S936

Current energy efficiency rating: A 93
Current environmental impact rating: A 99

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

Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 1.0	-£ 100	-42 kg (17.3%)

	Typical annual savings		Energy efficiency	Environmental impact
Recommended measures				
Solar water heating	£100	0.17 kg/m²	A 94	A 99
Total Savings	£100	0.17 kg/m²		

Potential energy efficiency rating: A 94
Potential environmental impact rating: A 99

Fuel prices for cost data on this page from database revision number 531 TEST (31 Oct 2023)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

Current	Potential	Saving

Full SAP Calculation Printout

Electricity	£1306	£1190	£116
Space heating	£585	£611	-£27
Water heating	£608	£466	£143
Lighting	£113	£113	£0
Generated (PV)	-£838	-£822	-£16
Total cost of fuels	£468	£368	£100
Total cost of uses	£468	£368	£100
Delivered energy	6 kWh/m²	5 kWh/m²	1 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	1 kg/m²	1 kg/m²	0 kg/m²
Primary energy	10 kWh/m²	8 kWh/m²	2 kWh/m²