

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	029 - PRJ013014	Issued on Date	28/03/2024
Assessment Reference	029	Prop Type Ref	C
Property	20 Deeble Way, Netley Abbey, Southampton, SO31 5JP		

SAP Rating	85 B	DER	14.36	TER	17.29
Environmental	88 B	% DER<TER	16.93		
CO ₂ Emissions (t/year)	1.14	DFEE	44.27	TTEE	49.67
General Requirements Compliance	Pass	% DFEE<TFEE	10.88		

Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk	Assessor ID	4299-0004
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Client	
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CALCULATION OF HEAT DEMAND 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF HEAT DEMAND 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	47.7200 (1b)	x 2.3700 (2b)	= 113.0964 (1b) - (3b)
First floor	47.7200 (1c)	x 2.6200 (2c)	= 125.0264 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.1228 (5)

2. Ventilation rate

	main heating		secondary heating		other		total	m3 per hour				
Number of chimneys	0	+	0	+	0	=	0 * 40 =	0.0000 (6a)				
Number of open flues	0	+	0	+	0	=	0 * 20 =	0.0000 (6b)				
Number of intermittent fans							4 * 10 =	40.0000 (7a)				
Number of passive vents							0 * 10 =	0.0000 (7b)				
Number of flueless gas fires							0 * 40 =	0.0000 (7c)				
							Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =							40.0000 / (5) =		0.1680 (8)			
Pressure test							Yes		4.8100			
Measured/design AP50									0.4085 (18)			
Infiltration rate									1 (19)			
Number of sides sheltered												
Shelter factor							(20) = 1 - [0.075 x (19)] =		0.9250 (20)			
Infiltration rate adjusted to include shelter factor							(21) = (18) x (20) =		0.3778 (21)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.6000	4.5000	4.2000	4.2000	4.1000	4.1000	4.0000	4.0000	4.3000	4.3000	4.4000 (22)
Wind factor	1.2250	1.1500	1.1250	1.0500	1.0500	1.0250	1.0250	1.0000	1.0000	1.0750	1.0750	1.1000 (22a)
Adj infiltr rate	0.4629	0.4345	0.4251	0.3967	0.3967	0.3873	0.3873	0.3778	0.3778	0.4062	0.4062	0.4156 (22b)
Effective ac	0.6071	0.5944	0.5903	0.5787	0.5787	0.5750	0.5750	0.5714	0.5714	0.5825	0.5825	0.5864 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.5800	1.3258	15.3390		(27)
Floor - Ground			47.7150	0.1800	8.5887	75.6000	3607.2540 (28a)
W1 - Brick (Timber Frame)	97.6560	13.6650	83.9910	0.2100	17.6381	7.4000	621.5334 (29a)
Rf - Ins Joist	47.7150		47.7150	0.0800	3.8172	7.4000	353.0910 (30)
Total net area of external elements Aum(A, m ²)			193.0810				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.8910		(33)
Party Wall			46.7690	0.0000	0.0000	7.4000	346.0906 (32)
Stud			74.4133			7.4000	550.6581 (32c)
Internal Floor			47.7150			7.4000	353.0910 (32d)
Internal Ceiling			47.7150			7.4000	353.0910 (32e)
Heat capacity Cm = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 6184.8091 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.8031 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							16.8602 (36)
Total fabric heat loss							(33) + (36) = 64.7512 (37)

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

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(38)m	Jan 47.7078	Feb 46.7086	Mar 46.3896	Apr 45.4746	May 45.4746	Jun 45.1836	Jul 45.1836	Aug 44.8996	Sep 44.8996	Oct 45.7725	Nov 45.7725	Dec 46.0776	(38)
Heat transfer coeff	112.4590	111.4598	111.1408	110.2258	110.2258	109.9348	109.9348	109.6508	109.6508	110.5238	110.5238	110.8288	(39)
Average = Sum(39)m / 12 =												110.5466	(39)
HLP	Jan 1.1783	Feb 1.1679	Mar 1.1645	Apr 1.1549	May 1.1549	Jun 1.1519	Jul 1.1519	Aug 1.1489	Sep 1.1489	Oct 1.1580	Nov 1.1580	Dec 1.1612	(40)
HLP (average)												1.1583	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6931	(42)
Average daily hot water use (litres/day)												98.1614	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.9776	104.0511	100.1247	96.1982	92.2718	88.3453	88.3453	92.2718	96.1982	100.1247	104.0511	107.9776	(44)
Energy conte	160.1276	140.0487	144.5177	125.9940	120.8942	104.3225	96.6702	110.9304	112.2553	130.8227	142.8032	155.0751	(45)
Energy content (annual)											Total = Sum(45)m =	1544.4617	(45)
Distribution loss (46)m = 0.15 x (45)m	24.0191	21.0073	21.6777	18.8991	18.1341	15.6484	14.5005	16.6396	16.8383	19.6234	21.4205	23.2613	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.6708	0.6086	0.6503	0.5454	0.5020	0.4147	0.3843	0.4606	0.4859	0.5887	0.6206	0.6496	(61)
Total heat required for water heating calculated for each month	160.7984	140.6573	145.1680	126.5394	121.3962	104.7373	97.0545	111.3910	112.7412	131.4114	143.4239	155.7247	(62)
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	(63)
	Solar input (sum of months) = Sum(63)m =										0.0000	0.0000	(63)
Output from w/h	160.7984	140.6573	145.1680	126.5394	121.3962	104.7373	97.0545	111.3910	112.7412	131.4114	143.4239	155.7247	(64)
	Total per year (kWh/year) = Sum(64)m =										1551.0434	1551	(64)
RHI water heating demand													
Heat gains from water heating, kWh/month	53.4101	46.7183	48.2147	42.0294	40.3228	34.7909	32.2389	36.9995	37.4464	43.6457	47.6372	51.7249	(65)

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

Metabolic gains (Table 5), Watts	Jan 161.5868	Feb 161.5868	Mar 161.5868	Apr 161.5868	May 161.5868	Jun 161.5868	Jul 161.5868	Aug 161.5868	Sep 161.5868	Oct 161.5868	Nov 161.5868	Dec 161.5868	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.0062	54.1851	44.0663	33.3610	24.9378	21.0535	22.7491	29.5701	39.6889	50.3942	58.8175	62.7017	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	371.2510	375.1034	365.3954	344.7283	318.6397	294.1202	277.7396	273.8872	283.5951	304.2623	330.3508	354.8704	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	(71)
Water heating gains (Table 5)	71.7878	69.5213	64.8047	58.3741	54.1974	48.3207	43.3319	49.7305	52.0089	58.6636	66.1628	69.5227	(72)
Total internal gains	614.7590	609.5239	584.9805	547.1775	508.4889	474.2085	454.5346	463.9018	486.0070	524.0342	566.0452	597.8088	(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				
East				3.6130	25.1733	0.7300	0.7200	0.7700	33.1281 (76)				
South				0.7190	56.5862	0.7300	0.7200	0.7700	14.8193 (78)				
West				7.2440	25.1733	0.7300	0.7200	0.7700	66.4212 (80)				
Solar gains	114.3685	186.2398	303.4799	436.1292	498.0482	560.7068	516.7786	466.2876	368.2291	238.8239	141.2089	93.0706	(83)
Total gains	729.1275	795.7637	888.4604	983.3067	1006.5371	1034.9153	971.3131	930.1895	854.2360	762.8581	707.2541	690.8795	(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	15.2767	15.4136	15.4579	15.5862	15.5862	15.6275	15.6275	15.6679	15.6679	15.5442	15.5442	15.5014	
alpha	2.0184	2.0276	2.0305	2.0391	2.0391	2.0418	2.0418	2.0445	2.0445	2.0363	2.0363	2.0334	
util living area	0.8899	0.8687	0.8195	0.7354	0.6213	0.4577	0.3405	0.3435	0.5501	0.7445	0.8512	0.8968	(86)
MIT	18.4870	18.7161	19.2304	19.8667	20.4185	20.7936	20.9240	20.9254	20.6837	20.0687	19.2341	18.4837	(87)
Th 2	19.9374	19.9458	19.9485	19.9562	19.9562	19.9587	19.9587	19.9611	19.9611	19.9537	19.9537	19.9511	(88)
util rest of house	0.8773	0.8539	0.7987	0.7038	0.5715	0.3834	0.2437	0.2430	0.4768	0.7046	0.8313	0.8848	(89)
MIT 2	16.6668	16.9924	17.7166	18.5991	19.3349	19.7886	19.9187	19.9233	19.6785	18.8941	17.7381	16.6679	(90)

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CALCULATION OF HEAT DEMAND 09 Jan 2014

Living area fraction									fLA = Living area / (4) =	0.1539 (91)		
MIT	16.9470	17.2577	17.9496	18.7942	19.5017	19.9433	20.0735	20.0775	19.8333	19.0749	17.9684	16.9474 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.7970	17.1077	17.7996	18.6442	19.3517	19.7933	19.9235	19.9275	19.6833	18.9249	17.8184	16.7974 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8249	0.8000	0.7445	0.6564	0.5388	0.3707	0.2402	0.2395	0.4549	0.6568	0.7768	0.8337	(94)
Useful gains	601.4629	636.6184	661.4885	645.4198	542.3305	383.6046	233.3349	222.7942	388.5687	501.0502	549.4252	576.0031	(95)
Ext temp.	5.7000	6.1000	7.7000	10.1000	13.1000	15.9000	17.7000	17.8000	15.5000	12.3000	8.8000	5.8000	(96)
Heat loss rate W													
Month fracti	1247.9574	1226.9156	1122.4781	941.7881	689.1022	428.0040	244.4369	233.2865	458.6975	732.2108	996.7447	1218.8293	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating	480.9919	396.6797	342.9763	213.3852	109.1981	0.0000	0.0000	0.0000	0.0000	171.9835	322.0700	478.2627	(98)
RHI space heating demand												2515.5473	(98)
												2516	(98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF ENERGY RATINGS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	47.7200 (1b)	x 2.3700 (2b)	= 113.0964 (1b) - (3b)
First floor	47.7200 (1c)	x 2.6200 (2c)	= 125.0264 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.1228 (5)

2. Ventilation rate

										main	secondary	other	total	m3 per hour			
										heating	heating						
Number of chimneys										0	+	0	+	0	=	0 * 40 =	0.0000 (6a)
Number of open flues										0	+	0	+	0	=	0 * 20 =	0.0000 (6b)
Number of intermittent fans																4 * 10 =	40.0000 (7a)
Number of passive vents																0 * 10 =	0.0000 (7b)
Number of flueless gas fires																0 * 40 =	0.0000 (7c)
										Air changes per hour							
Infiltration due to chimneys, flues and fans										= (6a)+(6b)+(7a)+(7b)+(7c) =					40.0000	/ (5) =	0.1680 (8)
Pressure test										Yes							
Measured/design AP50										4.8100							
Infiltration rate										0.4085 (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) =					0.3778 (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	0.4818	0.4723	0.4629	0.4156	0.4062	0.3590	0.3590	0.3495	0.3778	0.4062	0.4251	0.4440 (22b)					
Effective ac	0.6160	0.6115	0.6071	0.5864	0.5825	0.5644	0.5644	0.5611	0.5714	0.5825	0.5903	0.5986 (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					
Solid Door			2.0900	1.2000	2.5080		(26)					
Windows (Uw = 1.40)			11.5800	1.3258	15.3390		(27)					
Flr - Ground			47.7150	0.1800	8.5887	75.6000	3607.2540 (28a)					
Wl - Brick (Timber Frame)	97.6560	13.6650	83.9910	0.2100	17.6381	7.4000	621.5334 (29a)					
Rf - Ins Joist	47.7150		47.7150	0.0800	3.8172	7.4000	353.0910 (30)					
Total net area of external elements Aum(A, m2)			193.0810				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.8910		(33)					
Party Wall			46.7690	0.0000	0.0000	7.4000	346.0906 (32)					
Stud			74.4133			7.4000	550.6581 (32c)					
Internal Floor			47.7150			7.4000	353.0910 (32d)					
Internal Ceiling			47.7150			7.4000	353.0910 (32e)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6184.8091 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							64.8031 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							16.8602 (36)					
Total fabric heat loss						(33) + (36) =	64.7512 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	48.4089	48.0548	47.7078	46.0776	45.7725	44.3527	44.3527	44.0897	44.8996	45.7725	46.3896	47.0346 (38)
Heat transfer coeff	113.1602	112.8061	112.4590	110.8288	110.5238	109.1039	109.1039	108.8410	109.6508	110.5238	111.1408	111.7859 (39)
Average = Sum(39)m / 12 =												110.8273 (39)
HLP	Jan 1.1857	Feb 1.1820	Mar 1.1783	Apr 1.1612	May 1.1580	Jun 1.1432	Jul 1.1432	Aug 1.1404	Sep 1.1489	Oct 1.1580	Nov 1.1645	Dec 1.1713 (40)
HLP (average)												1.1612 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6931 (42)
Average daily hot water use (litres/day)												98.1614 (43)
Daily hot water use	Jan 107.9776	Feb 104.0511	Mar 100.1247	Apr 96.1982	May 92.2718	Jun 88.3453	Jul 88.3453	Aug 92.2718	Sep 96.1982	Oct 100.1247	Nov 104.0511	Dec 107.9776 (44)
Energy conte	160.1276	140.0487	144.5177	125.9940	120.8942	104.3225	96.6702	110.9304	112.2553	130.8227	142.8032	155.0751 (45)
Energy content (annual)										Total = Sum(45)m =		1544.4617 (45)
Distribution loss (46)m = 0.15 x (45)m												

Water storage loss:	24.0191	21.0073	21.6777	18.8991	18.1341	15.6484	14.5005	16.6396	16.8383	19.6234	21.4205	23.2613 (46)
Total storage loss												
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
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 (57)
Total heat required for water heating calculated for each month	0.6708	0.6086	0.6503	0.5454	0.5020	0.4147	0.3843	0.4606	0.4859	0.5887	0.6206	0.6496 (61)
WWHRS	160.7984	140.6573	145.1680	126.5394	121.3962	104.7373	97.0545	111.3910	112.7412	131.4114	143.4239	155.7247 (62)
Total of WWHRS savings	-52.8094	-46.4657	-47.4242	-39.0182	-36.2287	-29.8865	-25.2932	-30.6245	-31.5182	-38.9634	-45.1348	-51.0429 eq. (G10)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-474.4098
Output from w/h								Solar input (sum of months) = Sum(63)m =				
	107.9890	94.1916	97.7438	87.5212	85.1676	74.8508	71.7613	80.7666	81.2231	92.4480	98.2890	104.6817 (64)
Heat gains from water heating, kWh/month								Total per year (kWh/year) = Sum(64)m =				
	53.4101	46.7183	48.2147	42.0294	40.3228	34.7909	32.2389	36.9995	37.4464	43.6457	47.6372	51.7249 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.0062	54.1851	44.0663	33.3610	24.9378	21.0535	22.7491	29.5701	39.6889	50.3942	58.8175	62.7017 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	371.2510	375.1034	365.3954	344.7283	318.6397	294.1202	277.7396	273.8872	283.5951	304.2623	330.3508	354.8704 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245 (71)
Water heating gains (Table 5)	71.7878	69.5213	64.8047	58.3741	54.1974	48.3207	43.3319	49.7305	52.0089	58.6636	66.1628	69.5227 (72)
Total internal gains	614.7590	609.5239	584.9805	547.1775	508.4889	474.2085	454.5346	463.9018	486.0070	524.0342	566.0452	597.8088 (73)

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
East	3.6130	19.6403	0.7300	0.7200	0.7700	25.8466 (76)
South	0.7190	46.7521	0.7300	0.7200	0.7700	12.2439 (78)
West	7.2440	19.6403	0.7300	0.7200	0.7700	51.8220 (80)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8498	0.8221	0.7760	0.7019	0.6031	0.4745	0.3498	0.3824	0.5588	0.7263	0.8183	0.8590 (94)
Useful gains	598.8004	642.4575	667.9029	660.4868	594.5345	455.9937	321.3774	331.0786	449.1388	527.2530	554.2914	577.4943 (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	1351.3045	1323.8408	1218.4906	1035.7308	810.2238	546.0928	353.9559	371.4917	581.5378	862.0777	1121.2672	1338.8489 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	559.8631	457.8896	409.6373	270.1757	160.4729	0.0000	0.0000	0.0000	0.0000	249.1096	408.2226	566.4478 (98)
Space heating												3081.8186 (98)
Space heating per m2												32.2906 (99)
										(98) / (4) =		

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

8c. Space cooling requirement

Not applicable

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 %)												90.2000	(206)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement												3416.6504	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	559.8631	457.8896	409.6373	270.1757	160.4729	0.0000	0.0000	0.0000	0.0000	249.1096	408.2226	566.4478	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	620.6908	507.6382	454.1433	299.5296	177.9079	0.0000	0.0000	0.0000	0.0000	276.1748	452.5749	627.9910	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	107.9890	94.1916	97.7438	87.5212	85.1676	74.8508	71.7613	80.7666	81.2231	92.4480	98.2890	104.6817	(64)
Efficiency of water heater	87.6403	87.5034	87.1669	86.3822	84.8840	76.4000	76.4000	76.4000	76.4000	85.9957	87.1455	87.7283	(216)
(217)m	87.6403	87.5034	87.1669	86.3822	84.8840	76.4000	76.4000	76.4000	76.4000	85.9957	87.1455	87.7283	(217)
Fuel for water heating, kWh/month	123.2184	107.6434	112.1341	101.3185	100.3341	97.9723	93.9284	105.7154	106.3129	107.5031	112.7873	119.3249	(219)
Water heating fuel used	123.2184	107.6434	112.1341	101.3185	100.3341	97.9723	93.9284	105.7154	106.3129	107.5031	112.7873	119.3249	(219)
Annual totals kWh/year												1288.1927	(219)
Space heating fuel - main system												3416.6504	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
central heating pump												30.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												75.0000	(231)
Electricity for lighting (calculated in Appendix L)												430.9551	(232)
Total delivered energy for all uses												5210.7981	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3416.6504	3.4800	118.8994 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1288.1927	3.4800	44.8291 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	430.9551	13.1900	56.8430 (250)
Additional standing charges			120.0000 (251)
Total energy cost			350.4640 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.4200 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 1.0481 (257)
SAP value	85.3790
SAP rating (Section 12)	85 (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	3416.6504	0.2160	737.9965 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1288.1927	0.2160	278.2496 (264)
Space and water heating			1016.2461 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	430.9551	0.5190	223.6657 (268)
Total kg/year			1278.8368 (272)
CO2 emissions per m2			13.4000 (273)
EI value			87.7981
EI rating			88 (274)
EI band			B

Calculation of stars for heating and DHW

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9020 = 3.858$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9020 = 0.2395$, stars = 4
Water heating energy efficiency	$3.48 / 0.8334 = 4.176$, stars = 5
Water heating environmental impact	$0.216 / 0.8334 = 0.2592$, stars = 5

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	47.7200 (1b)	x 2.3700 (2b)	= 113.0964 (1b) - (3b)
First floor	47.7200 (1c)	x 2.6200 (2c)	= 125.0264 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.1228 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					4 * 10 = 40.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					40.0000 / (5) = 0.1680 (8)
Pressure test					Yes
Measured/design AP50					4.8100
Infiltration rate					0.4085 (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) =	0.3778 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.6000	4.5000	4.2000	4.2000	4.1000	4.1000	4.0000	4.0000	4.3000	4.3000	4.4000 (22)
Wind factor	1.2250	1.1500	1.1250	1.0500	1.0500	1.0250	1.0250	1.0000	1.0000	1.0750	1.0750	1.1000 (22a)
Adj infilt rate	0.4629	0.4345	0.4251	0.3967	0.3967	0.3873	0.3873	0.3778	0.3778	0.4062	0.4062	0.4156 (22b)
Effective ac	0.6071	0.5944	0.5903	0.5787	0.5787	0.5750	0.5750	0.5714	0.5714	0.5825	0.5825	0.5864 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.5800	1.3258	15.3390		(27)
Flr - Ground			47.7150	0.1800	8.5887	75.6000	3607.2540 (28a)
Wl - Brick (Timber Frame)	97.6560	13.6650	83.9910	0.2100	17.6381	7.4000	621.5334 (29a)
Rf - Ins Joist	47.7150		47.7150	0.0800	3.8172	7.4000	353.0910 (30)
Total net area of external elements Aum(A, m ²)			193.0810				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.8910		(33)
Party Wall			46.7690	0.0000	0.0000	7.4000	346.0906 (32)
Stud			74.4133			7.4000	550.6581 (32c)
Internal Floor			47.7150			7.4000	353.0910 (32d)
Internal Ceiling			47.7150			7.4000	353.0910 (32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss

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	47.7078	46.7086	46.3896	45.4746	45.4746	45.1836	45.1836	44.8996	44.8996	45.7725	45.7725	46.0776 (38)
Heat transfer coeff	112.4590	111.4598	111.1408	110.2258	110.2258	109.9348	109.9348	109.6508	109.6508	110.5238	110.5238	110.8288 (39)
Average = Sum(39)m / 12 =												110.5466 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1783	1.1679	1.1645	1.1549	1.1549	1.1519	1.1519	1.1489	1.1489	1.1580	1.1580	1.1612 (40)
HLP (average)												1.1583 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6931 (42)
Average daily hot water use (litres/day)												98.1614 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	107.9776	104.0511	100.1247	96.1982	92.2718	88.3453	88.3453	92.2718	96.1982	100.1247	104.0511	107.9776 (44)
Energy content (annual)	160.1276	140.0487	144.5177	125.9940	120.8942	104.3225	96.6702	110.9304	112.2553	130.8227	142.8032	155.0751 (45)
Distribution loss (46)m = 0.15 x (45)m												1544.4617 (45)

[illegible]

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.0062	54.1851	44.0663	33.3610	24.9378	21.0535	22.7491	29.5701	39.6889	50.3942	58.8175	62.7017 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	371.2510	375.1034	365.3954	344.7283	318.6397	294.1202	277.7396	273.8872	283.5951	304.2623	330.3508	354.8704 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245 (71)
Water heating gains (Table 5)	71.7878	69.5213	64.8047	58.3741	54.1974	48.3207	43.3319	49.7305	52.0089	58.6636	66.1628	69.5227 (72)
Total internal gains	614.7590	609.5239	584.9805	547.1775	508.4889	474.2085	454.5346	463.9018	486.0070	524.0342	566.0452	597.8088 (73)

[Jan	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
East	3.6130	25.1733	0.7300	0.7200	0.7700	33.1281 (76)
South	0.7190	56.5862	0.7300	0.7200	0.7700	14.8193 (78)
West	7.2440	25.1733	0.7300	0.7200	0.7700	66.4212 (80)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8249	0.8000	0.7445	0.6564	0.5388	0.3707	0.2402	0.2395	0.4549	0.6568	0.7768	0.8337 (94)
Useful gains	601.4629	636.6184	661.4885	645.4198	542.3305	383.6046	233.3349	222.7942	388.5687	501.0502	549.4252	576.0031 (95)
Ext temp.	5.7000	6.1000	7.7000	10.1000	13.1000	15.9000	17.7000	17.8000	15.5000	12.3000	8.8000	5.8000 (96)
Heat loss rate W												
	1247.9574	1226.9156	1122.4781	941.7881	689.1022	428.0040	244.4369	233.2865	458.6975	732.2108	996.7447	1218.8293 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh												
	480.9919	396.6797	342.9763	213.3852	109.1981	0.0000	0.0000	0.0000	0.0000	171.9835	322.0700	478.2627 (98)
Space heating												
Space heating per m2												2515.5473 (98)
										(98) / (4) =		26.3574 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

8c. Space cooling requirement

Not applicable

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 %)	90.2000 (206)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	2788.8550 (211)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	480.9919	396.6797	342.9763	213.3852	109.1981	0.0000	0.0000	0.0000	0.0000	171.9835	322.0700	478.2627 (98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000 (210)
Space heating fuel (main heating system)	533.2504	439.7779	380.2398	236.5689	121.0622	0.0000	0.0000	0.0000	0.0000	190.6690	357.0621	530.2247 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	107.9890	94.1916	97.7438	87.5212	85.1676	74.8508	71.7613	80.7666	81.2231	92.4480	98.2890	104.6817 (64)
Efficiency of water heater (217)m	87.3085	87.1784	86.7258	85.6977	83.5845	76.4000	76.4000	76.4000	76.4000	84.8423	86.5448	87.3662 (217)
Fuel for water heating, kWh/month	123.6866	108.0447	112.7045	102.1279	101.8940	97.9723	93.9284	105.7154	106.3129	108.9646	113.5701	119.8195 (219)
Water heating fuel used	1294.7408 (219)											
Annual totals kWh/year												
Space heating fuel - main system	2788.8550 (211)											
Space heating fuel - secondary	0.0000 (215)											
Electricity for pumps and fans:												
central heating pump	30.0000 (230c)											
main heating flue fan	45.0000 (230e)											
Total electricity for the above, kWh/year	75.0000 (231)											
Electricity for lighting (calculated in Appendix L)	430.9551 (232)											
Total delivered energy for all uses	4589.5509 (238)											

10a. Fuel costs - using BEDF prices (538)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2788.8550	7.6100	212.2319 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1294.7408	7.6100	98.5298 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	430.9551	31.0800	133.9408 (250)
Additional standing charges			105.0000 (251)
Total energy cost			573.0125 (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	2788.8550	0.2160	602.3927 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1294.7408	0.2160	279.6640 (264)
Space and water heating			882.0567 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	430.9551	0.5190	223.6657 (268)
Total kg/year			1144.6474 (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	2788.8550	1.2200	3402.4032 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1294.7408	1.2200	1579.5837 (264)
Space and water heating			4981.9869 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	430.9551	3.0700	1323.0321 (268)
Primary energy kWh/year			6535.2690 (272)
Primary energy kWh/m2/year			68.4752 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating:
Current environmental impact rating:

B 85
B 88

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

(For testing purposes):

A	Not considered
B	Not considered
C	Not considered
D	Not considered
E Low energy lighting	Already installed
F	Not considered
G	Not considered
H	Not considered
I	Not considered
J	Not considered
K	Not considered
M	Not considered
N Solar water heating	SAP increase too small
O	Not considered
P	Not considered
R	Not considered
S	Not considered
T	Not considered
U Solar photovoltaic panels	Recommended
A2	Not considered
A3	Not considered
T2	Not considered
W	Not considered
X	Not considered
Y	Not considered
J2	Not considered
Q2	Not considered
Z1	Not considered
Z2	Not considered
Z3	Not considered
Z4	Not considered
Z5	Not considered
V2 Wind turbine	Not applicable
L2	Not considered
Q3	Not considered
O3	Not considered

Recommended measures:	SAP change	Cost change	CO2 change
U Solar photovoltaic panels	+ 9.5	-£ 605	-1010 kg (88.3%)
Measures omitted - SAP change or cost saving too small:			
N Solar water heating	+ 0.9	-£ 46	-148 kg (12.9%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar photovoltaic panels	£605 10.58 kg/m ²	A 95	A 96
Total Savings	£605 10.58 kg/m ²		
Potential energy efficiency rating:		A 95	
Potential environmental impact rating:			A 96

Fuel prices for cost data on this page from database revision number 538 TEST (29 Feb 2024)
Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£157	£157	£0
Mains gas	£416	£416	£0
Space heating	£341	£341	£0
Water heating	£99	£99	£0
Lighting	£134	£134	£0
Generated (PV)	-£0	-£605	£605
Total cost of fuels	£573	-£32	£605
Total cost of uses	£574	-£31	£605
Delivered energy	48 kWh/m ²	28 kWh/m ²	20 kWh/m ²
Carbon dioxide emissions	1.1 tonnes	0.1 tonnes	1.0 tonnes
CO2 emissions per m ²	12 kg/m ²	1 kg/m ²	11 kg/m ²
Primary energy	68 kWh/m ²	6 kWh/m ²	63 kWh/m ²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	47.7200 (1b)	x 2.3700 (2b)	= 113.0964 (1b) - (3b)
First floor	47.7200 (1c)	x 2.6200 (2c)	= 125.0264 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.1228 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					4 * 10 = 40.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					40.0000 / (5) = 0.1680 (8)
Pressure test					Yes
Measured/design AP50					4.8100
Infiltration rate					0.4085 (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) =	0.3778 (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	0.4818	0.4723	0.4629	0.4156	0.4062	0.3590	0.3590	0.3495	0.3778	0.4062	0.4251	0.4440 (22b)
Effective ac	0.6160	0.6115	0.6071	0.5864	0.5825	0.5644	0.5644	0.5611	0.5714	0.5825	0.5903	0.5986 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.5800	1.3258	15.3390		(27)
Flr - Ground			47.7150	0.1800	8.5887	75.6000	3607.2540 (28a)
Wl - Brick (Timber Frame)	97.6560	13.6650	83.9910	0.2100	17.6381	7.4000	621.5334 (29a)
Rf - Ins Joist	47.7150		47.7150	0.0800	3.8172	7.4000	353.0910 (30)
Total net area of external elements Aum(A, m ²)			193.0810				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.8910		(33)
Party Wall			46.7690	0.0000	0.0000	7.4000	346.0906 (32)
Stud			74.4133			7.4000	550.6581 (32c)
Internal Floor			47.7150			7.4000	353.0910 (32d)
Internal Ceiling			47.7150			7.4000	353.0910 (32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss

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	48.4089	48.0548	47.7078	46.0776	45.7725	44.3527	44.3527	44.0897	44.8996	45.7725	46.3896	47.0346 (38)
Heat transfer coeff	113.1602	112.8061	112.4590	110.8288	110.5238	109.1039	109.1039	108.8410	109.6508	110.5238	111.1408	111.7859 (39)
Average = Sum(39)m / 12 =												110.8273 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1857	1.1820	1.1783	1.1612	1.1580	1.1432	1.1432	1.1404	1.1489	1.1580	1.1645	1.1713 (40)
HLP (average)												1.1612 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6931 (42)
Average daily hot water use (litres/day)												98.1614 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	107.9776	104.0511	100.1247	96.1982	92.2718	88.3453	88.3453	92.2718	96.1982	100.1247	104.0511	107.9776 (44)
Energy content (annual)	160.1276	140.0487	144.5177	125.9940	120.8942	104.3225	96.6702	110.9304	112.2553	130.8227	142.8032	155.0751 (45)
Distribution loss (46)m = 0.15 x (45)m												1544.4617 (45)

	24.0191	21.0073	21.6777	18.8991	18.1341	15.6484	14.5005	16.6396	16.8383	19.6234	21.4205	23.2613 (46)	
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Combi loss	0.6708	0.6086	0.6503	0.5454	0.5020	0.4147	0.3843	0.4606	0.4859	0.5887	0.6206	0.6496 (61)	
Total heat required for water heating calculated for each month	160.7984	140.6573	145.1680	126.5394	121.3962	104.7373	97.0545	111.3910	112.7412	131.4114	143.4239	155.7247 (62)	
WWHRS	-52.8094	-46.4657	-47.4242	-39.0182	-36.2287	-29.8865	-25.2932	-30.6245	-31.5182	-38.9634	-45.1348	-51.0429 eq. (G10)	
Total of WWHRS savings												-474.4098	
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 (63)	
								Solar input (sum of months) = Sum(63)m =					0.0000 (63)
Output from w/h	107.9890	94.1916	97.7438	87.5212	85.1676	74.8508	71.7613	80.7666	81.2231	92.4480	98.2890	104.6817 (64)	
								Total per year (kWh/year) = Sum(64)m =					1076.6336 (64)
Heat gains from water heating, kWh/month	53.4101	46.7183	48.2147	42.0294	40.3228	34.7909	32.2389	36.9995	37.4464	43.6457	47.6372	51.7249 (65)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8498	0.8221	0.7760	0.7019	0.6031	0.4745	0.3498	0.3824	0.5588	0.7263	0.8183	0.8590 (94)
Useful gains	598.8004	642.4575	667.9029	660.4868	594.5345	455.9937	321.3774	331.0786	449.1388	527.2530	554.2914	577.4943 (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	1351.3045	1323.8408	1218.4906	1035.7308	810.2238	546.0928	353.9559	371.4917	581.5378	862.0777	1121.2672	1338.8489 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	559.8631	457.8896	409.6373	270.1757	160.4729	0.0000	0.0000	0.0000	0.0000	249.1096	408.2226	566.4478 (98)
Space heating												3081.8186 (98)
Space heating per m2												32.2906 (99)
										(98) / (4) =		

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

8c. Space cooling requirement

Not applicable

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 %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3416.6504 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	559.8631	457.8896	409.6373	270.1757	160.4729	0.0000	0.0000	0.0000	0.0000	249.1096	408.2226	566.4478	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	620.6908	507.6382	454.1433	299.5296	177.9079	0.0000	0.0000	0.0000	0.0000	276.1748	452.5749	627.9910	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	107.9890	94.1916	97.7438	87.5212	85.1676	74.8508	71.7613	80.7666	81.2231	92.4480	98.2890	104.6817	(64)
Efficiency of water heater (217)m	87.6403	87.5034	87.1669	86.3822	84.8840	76.4000	76.4000	76.4000	76.4000	85.9957	87.1455	87.7283	(216)
Fuel for water heating, kWh/month	123.2184	107.6434	112.1341	101.3185	100.3341	97.9723	93.9284	105.7154	106.3129	107.5031	112.7873	119.3249	(219)
Water heating fuel used												1288.1927	(219)
Annual totals kWh/year													
Space heating fuel - main system													3416.6504 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													430.9551 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 2.50 * 1080 * 0.80) =										-1727.2394			-1727.2394 (233)
Total delivered energy for all uses													3483.5587 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3416.6504	3.4800	118.8994 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1288.1927	3.4800	44.8291 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	430.9551	13.1900	56.8430 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-1727.2394	13.1900	-227.8229 (252)
Total energy cost			122.6411 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.3668 (257)
SAP value		94.8835
SAP rating (Section 12)		95 (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	3416.6504	0.2160	737.9965 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1288.1927	0.2160	278.2496 (264)
Space and water heating			1016.2461 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	430.9551	0.5190	223.6657 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			382.3995 (272)
CO2 emissions per m2			4.0100 (273)
EI value			96.3514
EI rating			96 (274)
EI band			A

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	47.7200 (1b)	x 2.3700 (2b)	= 113.0964 (1b) - (3b)
First floor	47.7200 (1c)	x 2.6200 (2c)	= 125.0264 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.1228 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					4 * 10 = 40.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				40.0000 / (5) = 0.1680 (8)
Pressure test					Yes
Measured/design AP50					4.8100
Infiltration rate					0.4085 (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) =				0.3778 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.6000	4.5000	4.2000	4.2000	4.1000	4.1000	4.0000	4.0000	4.3000	4.3000	4.4000 (22)
Wind factor	1.2250	1.1500	1.1250	1.0500	1.0500	1.0250	1.0250	1.0000	1.0000	1.0750	1.0750	1.1000 (22a)
Adj infilt rate	0.4629	0.4345	0.4251	0.3967	0.3967	0.3873	0.3873	0.3778	0.3778	0.4062	0.4062	0.4156 (22b)
Effective ac	0.6071	0.5944	0.5903	0.5787	0.5787	0.5750	0.5750	0.5714	0.5714	0.5825	0.5825	0.5864 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.5800	1.3258	15.3390		(27)
Flr - Ground			47.7150	0.1800	8.5887	75.6000	3607.2540 (28a)
Wl - Brick (Timber Frame)	97.6560	13.6650	83.9910	0.2100	17.6381	7.4000	621.5334 (29a)
Rf - Ins Joist	47.7150		47.7150	0.0800	3.8172	7.4000	353.0910 (30)
Total net area of external elements Aum(A, m ²)			193.0810				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.8910		(33)
Party Wall			46.7690	0.0000	0.0000	7.4000	346.0906 (32)
Stud			74.4133			7.4000	550.6581 (32c)
Internal Floor			47.7150			7.4000	353.0910 (32d)
Internal Ceiling			47.7150			7.4000	353.0910 (32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		6184.8091 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.8031 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							16.8602 (36)
Total fabric heat loss					(33) + (36) =		64.7512 (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	47.7078	46.7086	46.3896	45.4746	45.4746	45.1836	45.1836	44.8996	44.8996	45.7725	45.7725	46.0776 (38)
Heat transfer coeff	112.4590	111.4598	111.1408	110.2258	110.2258	109.9348	109.9348	109.6508	109.6508	110.5238	110.5238	110.8288 (39)
Average = Sum(39)m / 12 =												110.5466 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1783	1.1679	1.1645	1.1549	1.1549	1.1519	1.1519	1.1489	1.1489	1.1580	1.1580	1.1612 (40)
HLP (average)												1.1583 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6931 (42)
Average daily hot water use (litres/day)												98.1614 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	107.9776	104.0511	100.1247	96.1982	92.2718	88.3453	88.3453	92.2718	96.1982	100.1247	104.0511	107.9776 (44)
Energy conte	160.1276	140.0487	144.5177	125.9940	120.8942	104.3225	96.6702	110.9304	112.2553	130.8227	142.8032	155.0751 (45)
Energy content (annual)												Total = Sum(45)m = 1544.4617 (45)
Distribution loss (46)m = 0.15 x (45)m												

	24.0191	21.0073	21.6777	18.8991	18.1341	15.6484	14.5005	16.6396	16.8383	19.6234	21.4205	23.2613 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6708	0.6086	0.6503	0.5454	0.5020	0.4147	0.3843	0.4606	0.4859	0.5887	0.6206	0.6496 (61)
Total heat required for water heating calculated for each month												
WWHRS	160.7984	140.6573	145.1680	126.5394	121.3962	104.7373	97.0545	111.3910	112.7412	131.4114	143.4239	155.7247 (62)
Total of WWHRS savings	-52.8094	-46.4657	-47.4242	-39.0182	-36.2287	-29.8865	-25.2932	-30.6245	-31.5182	-38.9634	-45.1348	-51.0429 eq. (G10)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-474.4098
Output from w/h								Solar input	(sum of months) =	Sum(63)m =		0.0000 (63)
	107.9890	94.1916	97.7438	87.5212	85.1676	74.8508	71.7613	80.7666	81.2231	92.4480	98.2890	104.6817 (64)
								Total per year (kWh/year) =	Sum(64)m =			1076.6336 (64)
Heat gains from water heating, kWh/month												
	53.4101	46.7183	48.2147	42.0294	40.3228	34.7909	32.2389	36.9995	37.4464	43.6457	47.6372	51.7249 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868	161.5868 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	61.0062	54.1851	44.0663	33.3610	24.9378	21.0535	22.7491	29.5701	39.6889	50.3942	58.8175	62.7017 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	371.2510	375.1034	365.3954	344.7283	318.6397	294.1202	277.7396	273.8872	283.5951	304.2623	330.3508	354.8704 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518	53.8518 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245	-107.7245 (71)
Water heating gains (Table 5)	71.7878	69.5213	64.8047	58.3741	54.1974	48.3207	43.3319	49.7305	52.0089	58.6636	66.1628	69.5227 (72)
Total internal gains	614.7590	609.5239	584.9805	547.1775	508.4889	474.2085	454.5346	463.9018	486.0070	524.0342	566.0452	597.8088 (73)

[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

East	3.6130	25.1733	0.7300	0.7200	0.7700	33.1281 (76)
South	0.7190	56.5862	0.7300	0.7200	0.7700	14.8193 (78)
West	7.2440	25.1733	0.7300	0.7200	0.7700	66.4212 (80)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8249	0.8000	0.7445	0.6564	0.5388	0.3707	0.2402	0.2395	0.4549	0.6568	0.7768	0.8337 (94)
Useful gains	601.4629	636.6184	661.4885	645.4198	542.3305	383.6046	233.3349	222.7942	388.5687	501.0502	549.4252	576.0031 (95)
Ext temp.	5.7000	6.1000	7.7000	10.1000	13.1000	15.9000	17.7000	17.8000	15.5000	12.3000	8.8000	5.8000 (96)
Heat loss rate W	1247.9574	1226.9156	1122.4781	941.7881	689.1022	428.0040	244.4369	233.2865	458.6975	732.2108	996.7447	1218.8293 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	480.9919	396.6797	342.9763	213.3852	109.1981	0.0000	0.0000	0.0000	0.0000	171.9835	322.0700	478.2627 (98)
Space heating												2515.5473 (98)
Space heating per m2											(98) / (4) =	26.3574 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

8c. Space cooling requirement

Not applicable

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 %)													90.2000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													2788.8550	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	480.9919	396.6797	342.9763	213.3852	109.1981	0.0000	0.0000	0.0000	0.0000	171.9835	322.0700	478.2627	(98)	
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)	
Space heating fuel (main heating system)	533.2504	439.7779	380.2398	236.5689	121.0622	0.0000	0.0000	0.0000	0.0000	190.6690	357.0621	530.2247	(211)	
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating requirement	107.9890	94.1916	97.7438	87.5212	85.1676	74.8508	71.7613	80.7666	81.2231	92.4480	98.2890	104.6817	(64)	
Efficiency of water heater (217)m	87.3085	87.1784	86.7258	85.6977	83.5845	76.4000	76.4000	76.4000	76.4000	84.8423	86.5448	87.3662	(216)	
Fuel for water heating, kWh/month	123.6866	108.0447	112.7045	102.1279	101.8940	97.9723	93.9284	105.7154	106.3129	108.9646	113.5701	119.8195	(219)	
Water heating fuel used												1294.7408	(219)	
Annual totals kWh/year														
Space heating fuel - main system													2788.8550	(211)
Space heating fuel - secondary													0.0000	(215)
Electricity for pumps and fans:														
central heating pump													30.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													75.0000	(231)
Electricity for lighting (calculated in Appendix L)													430.9551	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV Unit 0 (0.80 * 2.50 * 1217 * 0.80) =										-1946.4459			-1946.4459	(233)
Total delivered energy for all uses													2643.1050	(238)

10a. Fuel costs - using BEDF prices (538)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2788.8550	7.6100	212.2319 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1294.7408	7.6100	98.5298 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	430.9551	31.0800	133.9408 (250)
Additional standing charges			105.0000 (251)
Energy saving/generation technologies			
PV Unit	-1946.4459	31.0800	-604.9554 (252)
Total energy cost			-31.9429 (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	2788.8550	0.2160	602.3927 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1294.7408	0.2160	279.6640 (264)
Space and water heating			882.0567 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	430.9551	0.5190	223.6657 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	0.5190	-1010.2054 (269)
Total kg/year			134.4419 (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	2788.8550	1.2200	3402.4032 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1294.7408	1.2200	1579.5837 (264)
Space and water heating			4981.9869 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	430.9551	3.0700	1323.0321 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	3.0700	-5975.5890 (269)
Primary energy kWh/year			559.6800 (272)
Primary energy kWh/m2/year			5.8642 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	029 - PRJ013014			Issued on Date	28/03/2024
Assessment Reference	029	Prop Type Ref	C		
Property	20 Deeble Way, Netley Abbey, Southampton, SO31 5JP				
SAP Rating	85 B	DER	14.36	TER	17.29
Environmental	88 B	% DER<TER	16.93		
CO ₂ Emissions (t/year)	1.14	DFEE	44.27	TFEE	49.67
General Requirements Compliance	Pass	% DFEE<TFEE	10.88		
Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk			Assessor ID	4299-0004
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Built)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.29	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.36	kgCO ₂ /m ²	Pass
	-2.93 (-16.9%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	49.67	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.27	kWh/m ² /yr	
	-5.4 (-10.9%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.21 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.18 (max. 0.25)	0.18 (max. 0.70)	Pass
Roof	0.08 (max. 0.20)	0.08 (max. 0.35)	Pass
Openings	1.37 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.81 (measured in this dwelling)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoFIT sustain 835 VUW 356/6-3 (H-GB)
Combi boiler
Efficiency: 89.3% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing East

3.61 m², No overhang

Windows facing South

0.72 m², No overhang

Windows facing West

7.24 m², No overhang

Air change rate

4.68 ach

Blinds/curtains

Dark-coloured curtain or roller blind, closed 100% of daylight hours

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00 W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

4.81 (measured in this dwelling)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00 W/m²K

Roof U-value

0.08 W/m²K

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.