

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	034 - PRJ013014	Issued on Date	09/10/2024
Assessment Reference	034	Prop Type Ref	A
Property	39 Deeble Way, Netley Abbey, Southampton, SO31 5JP		

SAP Rating	86 B	DER	13.27	TER	15.69
Environmental	87 B	% DER<TER	15.42		
CO ₂ Emissions (t/year)	1.66	DFEE	47.51	TFEE	54.63
General Requirements Compliance	Pass	% DFEE<TFEE	13.04		

Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk	Assessor ID	U903-0001
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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	75.5700 (1b)	x 2.3700 (2b)	= 179.1009 (1b) - (3b)
First floor	75.5700 (1c)	x 2.7000 (2c)	= 204.0390 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	151.1400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.1399 (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							6 * 10 =	60.0000	(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) =						60.0000 / (5) =	0.1566 (8)				
Pressure test							Yes					
Measured/design AP50							4.7800					
Infiltration rate							0.3956	(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) =	0.3956 (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	0.4846	0.4549	0.4451	0.4154	0.4154	0.4055	0.4055	0.3956	0.3956	0.4253	0.4253	0.4352 (22b)
Effective ac	0.6174	0.6035	0.5990	0.5863	0.5863	0.5822	0.5822	0.5782	0.5782	0.5904	0.5904	0.5947 (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			4.0700	1.2000	4.8840		(26)
Windows (Uw = 1.40)			27.7400	1.3258	36.7765		(27)
Fir - Ground			75.5700	0.1800	13.6026	75.6000	5713.0920 (28a)
Wl - Brick (Timber Frame)	159.2710	27.4700	131.8010	0.2100	27.6782	7.4000	975.3274 (29a)
Wl - Clad (Timber Frame)	26.0780	4.3440	21.7340	0.2100	4.5641	7.4000	160.8316 (29a)
Rf - Ins Joist	75.5700		75.5700	0.0800	6.0456	7.4000	559.2180 (30)
Total net area of external elements Aum, m ²			336.4850				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		93.5511		(33)
Stud			127.7288			7.4000	945.1930 (32c)
Internal Floor			75.5700			7.4000	559.2180 (32d)
Internal Ceiling			75.5700			7.4000	559.2180 (32e)
Heat capacity Cm = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 9472.0980 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							62.6710 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							24.6966 (36)
Total fabric heat loss							(33) + (36) = 118.2477 (37)

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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	78.0647	76.3024	75.7397	74.1258	74.1258	73.6126	73.6126	73.1117	73.1117	74.6514	74.6514	75.1894	(38)
Heat transfer coeff	196.3124	194.5501	193.9874	192.3735	192.3735	191.8602	191.8602	191.3594	191.3594	192.8991	192.8991	193.4370	(39)
Average = Sum(39)m / 12 =												192.9393	(39)
HLP	1.2989	1.2872	1.2835	1.2728	1.2728	1.2694	1.2694	1.2661	1.2661	1.2763	1.2763	1.2799	(40)
HLP (average)												1.2766	(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													2.9360	(42)
Average daily hot water use (litres/day)													103.9289	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	114.3218	110.1646	106.0075	101.8503	97.6932	93.5360	93.5360	97.6932	101.8503	106.0075	110.1646	114.3218	(44)	
Energy conte	169.5359	148.2772	153.0088	133.3967	127.9974	110.4520	102.3500	117.4481	118.8508	138.5092	151.1936	164.1865	(45)	
Energy content (annual)										Total = Sum(45)m =		1635.2061	(45)	
Distribution loss (46)m = 0.15 x (45)m	25.4304	22.2416	22.9513	20.0095	19.1996	16.5678	15.3525	17.6172	17.8276	20.7764	22.6790	24.6280	(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	0.6671	0.6081	0.6530	0.5915	0.5627	0.4649	0.4308	0.5163	0.5270	0.5911	0.6201	0.6461	(61)	
Total heat required for water heating calculated for each month	170.2030	148.8853	153.6618	133.9882	128.5601	110.9169	102.7808	117.9644	119.3778	139.1003	151.8137	164.8326	(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	(63)	
Output from w/h	170.2030	148.8853	153.6618	133.9882	128.5601	110.9169	102.7808	117.9644	119.3778	139.1003	151.8137	164.8326	(64)	
RHI water heating demand										Total per year (kWh/year) = Sum(64)m =		1642.0849	(64)	
Heat gains from water heating, kWh/month	56.5375	49.4542	51.0387	44.5023	42.6998	36.8415	34.1391	39.1806	39.6496	46.2021	50.4269	54.7535	(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	176.1572	176.1572	176.1572	176.1572	176.1572	176.1572	176.1572	176.1572	176.1572	176.1572	176.1572	176.1572	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	72.7264	64.5949	52.5321	39.7702	29.7287	25.0982	27.1195	35.2510	47.3138	60.0757	70.1172	74.7477	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	480.2386	485.2220	472.6640	445.9297	412.1823	380.4646	359.2752	354.2918	366.8497	393.5841	427.3315	459.0492	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.5517	55.5517	55.5517	55.5517	55.5517	55.5517	55.5517	55.5517	55.5517	55.5517	55.5517	55.5517	(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)	-117.4381	-117.4381	-117.4381	-117.4381	-117.4381	-117.4381	-117.4381	-117.4381	-117.4381	-117.4381	-117.4381	-117.4381	(71)	
Water heating gains (Table 5)	75.9912	73.5926	68.6004	61.8087	57.3922	51.1688	45.8859	52.6621	55.0690	62.0996	70.0374	73.5934	(72)	
Total internal gains	746.2269	740.6802	711.0672	664.7793	616.5739	574.0023	549.5513	559.4756	586.5032	633.0301	684.7568	724.6611	(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					11.5210	13.4684		0.7300	0.7200	0.7700		56.5191 (74)	
East					0.7190	25.1733		0.7300	0.7200	0.7700		6.5926 (76)	
South					15.5000	56.5862		0.7300	0.7200	0.7700		319.4706 (78)	

Solar gains	382.5823	547.7329	755.3121	949.9729	1020.5962	1130.0669	1048.2670	984.5511	862.3812	658.1220	454.9613	323.1676	(83)
Total gains	1128.8093	1288.4131	1466.3793	1614.7523	1637.1701	1704.0692	1597.8183	1544.0266	1448.8844	1291.1521	1139.7181	1047.8286	(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	13.4028	13.5242	13.5635	13.6772	13.6772	13.7138	13.7138	13.7497	13.7497	13.6400	13.6400	13.6020		
alpha	1.8935	1.9016	1.9042	1.9118	1.9118	1.9143	1.9143	1.9166	1.9166	1.9093	1.9093	1.9068		
util living area	0.8960	0.8686	0.8174	0.7381	0.6319	0.4687	0.3526	0.3530	0.5488	0.7380	0.8530	0.9053	(86)	
MIT	18.1648	18.4538	19.0203	19.6966	20.3012	20.7407	20.8995	20.9028	20.6282	19.9571	19.0140	18.1409	(87)	
Th 2	19.8417	19.8509	19.8538	19.8622	19.8622	19.8649	19.8649	19.8675	19.8675	19.8594	19.8594	19.8566	(88)	
util rest of house	0.8834	0.8532	0.7955	0.7048	0.5791	0.3881	0.2451	0.2419	0.4704	0.6954	0.8322	0.8936	(89)	
MIT 2	16.1983	16.6042	17.3951	18.3269	19.1302	19.6582	19.8154	19.8216	19.5465	18.6987	17.4050	16.1704	(90)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Living area fraction									fLA = Living area / (4) =	0.1190 (91)		
MIT	16.4323	16.8244	17.5886	18.4900	19.2695	19.7871	19.9445	19.9502	19.6752	18.8484	17.5966	16.4049 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.2823	16.6744	17.4386	18.3400	19.1195	19.6371	19.7945	19.8002	19.5252	18.6984	17.4466	16.2549 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8264	0.7934	0.7348	0.6505	0.5392	0.3702	0.2378	0.2348	0.4435	0.6414	0.7715	0.8386	(94)
Useful gains	932.8683	1022.1729	1077.4497	1050.3650	882.7590	630.8991	380.0391	362.5476	642.5615	828.1369	879.2466	878.7058	(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	2077.4448	2057.2413	1889.1574	1585.1486	1158.0016	716.9982	401.8444	382.7662	770.2631	1234.2545	1667.9116	2022.3686	(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	851.5650	695.5659	603.9105	385.0442	204.7805	0.0000	0.0000	0.0000	0.0000	302.1515	567.8387	850.8851	(98)
RHI space heating demand												4461.7415	(98)
												4462	(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	75.5700 (1b)	x 2.3700 (2b)	= 179.1009 (1b) - (3b)
First floor	75.5700 (1c)	x 2.7000 (2c)	= 204.0390 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	151.1400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.1399 (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					6 * 10 = 60.0000 (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)					60.0000 / (5) = 0.1566 (8)
Pressure test					Yes
Measured/design AP50					4.7800
Infiltration rate					0.3956 (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) =	0.3956 (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	0.5044	0.4945	0.4846	0.4352	0.4253	0.3758	0.3758	0.3659	0.3956	0.4253	0.4451	0.4648 (22b)
Effective ac	0.6272	0.6223	0.6174	0.5947	0.5904	0.5706	0.5706	0.5670	0.5782	0.5904	0.5990	0.6080 (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			4.0700	1.2000	4.8840		(26)
Windows (Uw = 1.40)			27.7400	1.3258	36.7765		(27)
Flr - Ground			75.5700	0.1800	13.6026	75.6000	5713.0920 (28a)
Wl - Brick (Timber Frame)	159.2710	27.4700	131.8010	0.2100	27.6782	7.4000	975.3274 (29a)
Wl - Clad (Timber Frame)	26.0780	4.3440	21.7340	0.2100	4.5641	7.4000	160.8316 (29a)
Rf - Ins Joist	75.5700		75.5700	0.0800	6.0456	7.4000	559.2180 (30)
Total net area of external elements Aum(A, m ²)			336.4850				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		93.5511		(33)
Stud			127.7288			7.4000	945.1930 (32c)
Internal Floor			75.5700			7.4000	559.2180 (32d)
Internal Ceiling			75.5700			7.4000	559.2180 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9472.0980 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							62.6710 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							24.6966 (36)
Total fabric heat loss							(33) + (36) = 118.2477 (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	79.3014	78.6769	78.0647	75.1894	74.6514	72.1471	72.1471	71.6833	73.1117	74.6514	75.7397	76.8775 (38)
Heat transfer coeff	197.5491	196.9245	196.3124	193.4370	192.8991	190.3947	190.3947	189.9310	191.3594	192.8991	193.9874	195.1251 (39)
Average = Sum(39)m / 12 =												193.4345 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3071	1.3029	1.2989	1.2799	1.2763	1.2597	1.2597	1.2567	1.2661	1.2763	1.2835	1.2910 (40)
HLP (average)												1.2798 (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												2.9360 (42)
Average daily hot water use (litres/day)												103.9289 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	114.3218	110.1646	106.0075	101.8503	97.6932	93.5360	93.5360	97.6932	101.8503	106.0075	110.1646	114.3218 (44)
Energy conte	169.5359	148.2772	153.0088	133.3967	127.9974	110.4520	102.3500	117.4481	118.8508	138.5092	151.1936	164.1865 (45)
Energy content (annual)												Total = Sum(45)m = 1635.2061 (45)
Distribution loss (46)m = 0.15 x (45)m												

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													6039.9412 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	993.1761	798.1053	715.6790	482.0407	294.7327	0.0000	0.0000	0.0000	0.0000	435.7968	721.1321	1007.3642	(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)	1101.0821	884.8175	793.4357	534.4132	326.7546	0.0000	0.0000	0.0000	0.0000	483.1450	799.4812	1116.8118	(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	113.2883	98.8056	102.5500	91.9491	89.5332	78.7268	75.5466	84.9870	85.4341	97.1291	103.1819	109.8188	(64)
Efficiency of water heater (217)m	88.5621	88.4402	88.2032	87.6634	86.5572	76.4000	76.4000	76.4000	76.4000	87.3252	88.2057	88.6264	(216)
Fuel for water heating, kWh/month	127.9196	111.7202	116.2656	104.8888	103.4382	103.0455	98.8830	111.2395	111.8247	111.2269	116.9788	123.9121	(217)
Water heating fuel used												1341.3430	(219)
Annual totals kWh/year													
Space heating fuel - main system												6039.9412	(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)												513.7484	(232)
Total delivered energy for all uses												7970.0325	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	6039.9412	3.4800	210.1900 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1341.3430	3.4800	46.6787 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	513.7484	13.1900	67.7634 (250)
Additional standing charges			120.0000 (251)
Total energy cost			454.5246 (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] = 0.9733 (257)
SAP value	86.4227
SAP rating (Section 12)	86 (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	6039.9412	0.2160	1304.6273 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1341.3430	0.2160	289.7301 (264)
Space and water heating			1594.3574 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	513.7484	0.5190	266.6354 (268)
Total kg/year			1899.9178 (272)
CO2 emissions per m2			12.5700 (273)
EI value			87.0200
EI rating			87 (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	$3.48 / 0.8410 = 4.138$, stars = 5
Water heating environmental impact	$0.216 / 0.8410 = 0.2568$, 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	75.5700 (1b)	x 2.3700 (2b)	= 179.1009 (1b) - (3b)
First floor	75.5700 (1c)	x 2.7000 (2c)	= 204.0390 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	151.1400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.1399 (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					6 * 10 = 60.0000 (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)					60.0000 / (5) = 0.1566 (8)
Pressure test					Yes
Measured/design AP50					4.7800
Infiltration rate					0.3956 (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) =	0.3956 (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	0.4846	0.4549	0.4451	0.4154	0.4154	0.4055	0.4055	0.3956	0.3956	0.4253	0.4253	0.4352 (22b)
Effective ac	0.6174	0.6035	0.5990	0.5863	0.5863	0.5822	0.5822	0.5782	0.5782	0.5904	0.5904	0.5947 (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			4.0700	1.2000	4.8840		(26)
Windows (Uw = 1.40)			27.7400	1.3258	36.7765		(27)
Flr - Ground			75.5700	0.1800	13.6026	75.6000	5713.0920 (28a)
Wl - Brick (Timber Frame)	159.2710	27.4700	131.8010	0.2100	27.6782	7.4000	975.3274 (29a)
Wl - Clad (Timber Frame)	26.0780	4.3440	21.7340	0.2100	4.5641	7.4000	160.8316 (29a)
Rf - Ins Joist	75.5700		75.5700	0.0800	6.0456	7.4000	559.2180 (30)
Total net area of external elements Aum(A, m ²)			336.4850				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		93.5511		(33)
Stud			127.7288			7.4000	945.1930 (32c)
Internal Floor			75.5700			7.4000	559.2180 (32d)
Internal Ceiling			75.5700			7.4000	559.2180 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9472.0980 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							62.6710 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							24.6966 (36)
Total fabric heat loss							(33) + (36) = 118.2477 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	78.0647	76.3024	75.7397	74.1258	74.1258	73.6126	73.6126	73.1117	73.1117	74.6514	74.6514	75.1894 (38)
Heat transfer coeff	196.3124	194.5501	193.9874	192.3735	192.3735	191.8602	191.8602	191.3594	191.3594	192.8991	192.8991	193.4370 (39)
Average = Sum(39)m / 12 =												192.9393 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2989	1.2872	1.2835	1.2728	1.2728	1.2694	1.2694	1.2661	1.2661	1.2763	1.2763	1.2799 (40)
HLP (average)												1.2766 (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												2.9360 (42)
Average daily hot water use (litres/day)												103.9289 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	114.3218	110.1646	106.0075	101.8503	97.6932	93.5360	93.5360	97.6932	101.8503	106.0075	110.1646	114.3218 (44)
Energy conte	169.5359	148.2772	153.0088	133.3967	127.9974	110.4520	102.3500	117.4481	118.8508	138.5092	151.1936	164.1865 (45)
Energy content (annual)												Total = Sum(45)m = 1635.2061 (45)
Distribution loss (46)m = 0.15 x (45)m												

	25.4304	22.2416	22.9513	20.0095	19.1996	16.5678	15.3525	17.6172	17.8276	20.7764	22.6790	24.6280 (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	0.6671	0.6081	0.6530	0.5915	0.5627	0.4649	0.4308	0.5163	0.5270	0.5911	0.6201	0.6461 (61)
Total heat required for water heating calculated for each month	170.2030	148.8553	153.6618	133.9882	128.5601	110.9169	102.7808	117.9644	119.3778	139.1003	151.8137	164.8326 (62)
WWHRS	-56.9147	-50.0797	-51.1117	-42.0391	-39.0269	-32.1901	-27.2342	-32.9775	-33.9437	-41.9712	-48.6318	-55.0138 eq. (G10)
Total of WWHRS savings												-511.1344
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)
Output from w/h								Solar input	(sum of months) = Sum(63)m =			0.0000 (63)
	113.2883	98.8056	102.5500	91.9491	89.5332	78.7268	75.5466	84.9870	85.4341	97.1291	103.1819	109.8188 (64)
								Total per year (kWh/year) = Sum(64)m =				1130.9505 (64)
Heat gains from water heating, kWh/month	56.5375	49.4542	51.0387	44.5023	42.6998	36.8415	34.1391	39.1806	39.6496	46.2021	50.4269	54.7535 (65)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8264	0.7934	0.7348	0.6505	0.5392	0.3702	0.2378	0.2348	0.4435	0.6414	0.7715	0.8386 (94)
Useful gains	932.8683	1022.1729	1077.4497	1050.3650	882.7590	630.8991	380.0391	362.5476	642.5615	828.1369	879.2466	878.7058 (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												
	2077.4448	2057.2413	1889.1574	1585.1486	1158.0016	716.9982	401.8444	382.7662	770.2631	1234.2545	1667.9116	2022.3686 (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												
	851.5650	695.5659	603.9105	385.0442	204.7805	0.0000	0.0000	0.0000	0.0000	302.1515	567.8387	850.8851 (98)
Space heating												4461.7415 (98)
Space heating per m2												29.5206 (99)
										(98) / (4) =		

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													4946.4983 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	851.5650	695.5659	603.9105	385.0442	204.7805	0.0000	0.0000	0.0000	0.0000	302.1515	567.8387	850.8851	(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)	944.0853	771.1374	669.5238	426.8783	227.0294	0.0000	0.0000	0.0000	0.0000	334.9795	629.5330	943.3316	(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	113.2883	98.8056	102.5500	91.9491	89.5332	78.7268	75.5466	84.9870	85.4341	97.1291	103.1819	109.8188	(64)
Efficiency of water heater (217)m	88.3267	88.2180	87.8954	87.1650	85.5018	76.4000	76.4000	76.4000	76.4000	86.4035	87.7624	88.3752	(217)
Fuel for water heating, kWh/month	128.2605	112.0016	116.6728	105.4886	104.7150	103.0455	98.8830	111.2395	111.8247	112.4135	117.5696	124.2642	(219)
Water heating fuel used												1346.3786	(219)
Annual totals kWh/year													
Space heating fuel - main system												4946.4983	(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)												513.7484	(232)
Total delivered energy for all uses												6881.6253	(238)

10a. Fuel costs - using BEDF prices (542)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4946.4983	7.6100	376.4285 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1346.3786	7.6100	102.4594 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	513.7484	31.0800	159.6730 (250)
Additional standing charges			105.0000 (251)
Total energy cost			766.8709 (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	4946.4983	0.2160	1068.4436 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1346.3786	0.2160	290.8178 (264)
Space and water heating			1359.2614 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	513.7484	0.5190	266.6354 (268)
Total kg/year			1664.8218 (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	4946.4983	1.2200	6034.7280 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1346.3786	1.2200	1642.5819 (264)
Space and water heating			7677.3098 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	513.7484	3.0700	1577.2075 (268)
Primary energy kWh/year			9484.7673 (272)
Primary energy kWh/m2/year			62.7548 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating:
Current environmental impact rating:

B 86
B 87

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	+ 6.8	-£ 605	-1010 kg (60.7%)
Measures omitted - SAP change or cost saving too small:			
N Solar water heating	+ 0.6	-£ 47	-153 kg (9.2%)

Recommended measures	Typical annual savings		Energy efficiency	Environmental impact
Solar photovoltaic panels	£605	6.68 kg/m ²	A 93	A 93
Total Savings	£605	6.68 kg/m ²		
Potential energy efficiency rating:			A 93	
Potential environmental impact rating:				A 93

Fuel prices for cost data on this page from database revision number 542 TEST (30 Apr 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	£183	£183	£0
Mains gas	£584	£584	£0
Space heating	£505	£505	£0
Water heating	£102	£102	£0
Lighting	£160	£160	£0
Generated (PV)	-£0	-£605	£605
Total cost of fuels	£767	£162	£605
Total cost of uses	£767	£162	£605
Delivered energy	46 kWh/m ²	33 kWh/m ²	13 kWh/m ²
Carbon dioxide emissions	1.7 tonnes	0.7 tonnes	1.0 tonnes
CO2 emissions per m ²	11 kg/m ²	4 kg/m ²	7 kg/m ²
Primary energy	63 kWh/m ²	23 kWh/m ²	40 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	75.5700 (1b)	x 2.3700 (2b)	= 179.1009 (1b) - (3b)
First floor	75.5700 (1c)	x 2.7000 (2c)	= 204.0390 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	151.1400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.1399 (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					6 * 10 = 60.0000 (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)					60.0000 / (5) = 0.1566 (8)
Pressure test					Yes
Measured/design AP50					4.7800
Infiltration rate					0.3956 (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) =	0.3956 (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	0.5044	0.4945	0.4846	0.4352	0.4253	0.3758	0.3758	0.3659	0.3956	0.4253	0.4451	0.4648 (22b)
Effective ac	0.6272	0.6223	0.6174	0.5947	0.5904	0.5706	0.5706	0.5670	0.5782	0.5904	0.5990	0.6080 (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			4.0700	1.2000	4.8840		(26)
Windows (Uw = 1.40)			27.7400	1.3258	36.7765		(27)
Flr - Ground			75.5700	0.1800	13.6026	75.6000	5713.0920 (28a)
Wl - Brick (Timber Frame)	159.2710	27.4700	131.8010	0.2100	27.6782	7.4000	975.3274 (29a)
Wl - Clad (Timber Frame)	26.0780	4.3440	21.7340	0.2100	4.5641	7.4000	160.8316 (29a)
Rf - Ins Joist	75.5700		75.5700	0.0800	6.0456	7.4000	559.2180 (30)
Total net area of external elements Aum(A, m ²)			336.4850				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		93.5511		(33)
Stud			127.7288			7.4000	945.1930 (32c)
Internal Floor			75.5700			7.4000	559.2180 (32d)
Internal Ceiling			75.5700			7.4000	559.2180 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9472.0980 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							62.6710 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							24.6966 (36)
Total fabric heat loss							(33) + (36) = 118.2477 (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	79.3014	78.6769	78.0647	75.1894	74.6514	72.1471	72.1471	71.6833	73.1117	74.6514	75.7397	76.8775 (38)
Heat transfer coeff	197.5491	196.9245	196.3124	193.4370	192.8991	190.3947	190.3947	189.9310	191.3594	192.8991	193.9874	195.1251 (39)
Average = Sum(39)m / 12 =												193.4345 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3071	1.3029	1.2989	1.2799	1.2763	1.2597	1.2597	1.2567	1.2661	1.2763	1.2835	1.2910 (40)
HLP (average)												1.2798 (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	2.9360 (42)
Average daily hot water use (litres/day)	103.9289 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	114.3218	110.1646	106.0075	101.8503	97.6932	93.5360	93.5360	97.6932	101.8503	106.0075	110.1646	114.3218 (44)
Energy conte	169.5359	148.2772	153.0088	133.3967	127.9974	110.4520	102.3500	117.4481	118.8508	138.5092	151.1936	164.1865 (45)
Energy content (annual)												Total = Sum(45)m = 1635.2061 (45)
Distribution loss (46)m = 0.15 x (45)m												

	25.4304	22.2416	22.9513	20.0095	19.1996	16.5678	15.3525	17.6172	17.8276	20.7764	22.6790	24.6280 (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	0.6671	0.6081	0.6530	0.5915	0.5627	0.4649	0.4308	0.5163	0.5270	0.5911	0.6201	0.6461 (61)
Total heat required for water heating calculated for each month	170.2030	148.8853	153.6618	133.9882	128.5601	110.9169	102.7808	117.9644	119.3778	139.1003	151.8137	164.8326 (62)
WWHRS	-56.9147	-50.0797	-51.1117	-42.0391	-39.0269	-32.1901	-27.2342	-32.9775	-33.9437	-41.9712	-48.6318	-55.0138 eq.(G10)
Total of WWHRS savings												-511.1344
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)
Output from w/h								Solar input	(sum of months) =	Sum(63)m =		0.0000 (63)
	113.2883	98.8056	102.5500	91.9491	89.5332	78.7268	75.5466	84.9870	85.4341	97.1291	103.1819	109.8188 (64)
								Total per year (kWh/year) =	Sum(64)m =			1130.9505 (64)
Heat gains from water heating, kWh/month	56.5375	49.4542	51.0387	44.5023	42.6998	36.8415	34.1391	39.1806	39.6496	46.2021	50.4269	54.7535 (65)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8551	0.8146	0.7652	0.6948	0.6007	0.4759	0.3504	0.3806	0.5467	0.7132	0.8180	0.8666 (94)
Useful gains	906.3947	1033.1020	1089.0263	1072.7826	966.0089	744.4041	526.1063	542.3543	740.9322	864.8925	866.3277	861.5049 (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	2241.3088	2220.7587	2050.9604	1742.2837	1362.1549	916.2875	589.6982	619.7169	978.5535	1450.6410	1867.9000	2215.4891 (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	993.1761	798.1053	715.6790	482.0407	294.7327	0.0000	0.0000	0.0000	0.0000	435.7968	721.1321	1007.3642 (98)
Space heating												5448.0269 (98)
Space heating per m2												36.0462 (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													6039.9412 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	993.1761	798.1053	715.6790	482.0407	294.7327	0.0000	0.0000	0.0000	0.0000	435.7968	721.1321	1007.3642	(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)	1101.0821	884.8175	793.4357	534.4132	326.7546	0.0000	0.0000	0.0000	0.0000	483.1450	799.4812	1116.8118	(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	113.2883	98.8056	102.5500	91.9491	89.5332	78.7268	75.5466	84.9870	85.4341	97.1291	103.1819	109.8188	(64)
Efficiency of water heater (217)m	88.5621	88.4402	88.2032	87.6634	86.5572	76.4000	76.4000	76.4000	76.4000	87.3252	88.2057	88.6264	(216)
Fuel for water heating, kWh/month	127.9196	111.7202	116.2656	104.8888	103.4382	103.0455	98.8830	111.2395	111.8247	111.2269	116.9788	123.9121	(219)
Water heating fuel used												1341.3430	(219)
Annual totals kWh/year													
Space heating fuel - main system												6039.9412	(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)													513.7484 (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												6242.7931	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	6039.9412	3.4800	210.1900 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1341.3430	3.4800	46.6787 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	513.7484	13.1900	67.7634 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-1727.2394	13.1900	-227.8229 (252)
Total energy cost			226.7017 (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] =	0.4854 (257)
SAP value		93.2281
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	6039.9412	0.2160	1304.6273 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1341.3430	0.2160	289.7301 (264)
Space and water heating			1594.3574 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	513.7484	0.5190	266.6354 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			1003.4805 (272)
CO2 emissions per m2			6.6400 (273)
EI value			93.1444
EI rating			93 (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	75.5700 (1b)	x 2.3700 (2b)	= 179.1009 (1b) - (3b)
First floor	75.5700 (1c)	x 2.7000 (2c)	= 204.0390 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	151.1400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.1399 (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					6 * 10 = 60.0000 (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) =					60.0000 / (5) = 0.1566 (8)
Pressure test					Yes
Measured/design AP50					4.7800
Infiltration rate					0.3956 (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) =	0.3956 (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	0.4846	0.4549	0.4451	0.4154	0.4154	0.4055	0.4055	0.3956	0.3956	0.4253	0.4253	0.4352 (22b)
Effective ac	0.6174	0.6035	0.5990	0.5863	0.5863	0.5822	0.5822	0.5782	0.5782	0.5904	0.5904	0.5947 (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			4.0700	1.2000	4.8840		(26)
Windows (Uw = 1.40)			27.7400	1.3258	36.7765		(27)
Flr - Ground			75.5700	0.1800	13.6026	75.6000	5713.0920 (28a)
Wl - Brick (Timber Frame)	159.2710	27.4700	131.8010	0.2100	27.6782	7.4000	975.3274 (29a)
Wl - Clad (Timber Frame)	26.0780	4.3440	21.7340	0.2100	4.5641	7.4000	160.8316 (29a)
Rf - Ins Joist	75.5700		75.5700	0.0800	6.0456	7.4000	559.2180 (30)
Total net area of external elements Aum(A, m ²)			336.4850				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		93.5511		(33)
Stud			127.7288			7.4000	945.1930 (32c)
Internal Floor			75.5700			7.4000	559.2180 (32d)
Internal Ceiling			75.5700			7.4000	559.2180 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9472.0980 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							62.6710 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							24.6966 (36)
Total fabric heat loss							(33) + (36) = 118.2477 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	78.0647	76.3024	75.7397	74.1258	74.1258	73.6126	73.6126	73.1117	73.1117	74.6514	74.6514	75.1894 (38)
Heat transfer coeff	196.3124	194.5501	193.9874	192.3735	192.3735	191.8602	191.8602	191.3594	191.3594	192.8991	192.8991	193.4370 (39)
Average = Sum(39)m / 12 =												192.9393 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2989	1.2872	1.2835	1.2728	1.2728	1.2694	1.2694	1.2661	1.2661	1.2763	1.2763	1.2799 (40)
HLP (average)												1.2766 (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												2.9360 (42)
Average daily hot water use (litres/day)												103.9289 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	114.3218	110.1646	106.0075	101.8503	97.6932	93.5360	93.5360	97.6932	101.8503	106.0075	110.1646	114.3218 (44)
Energy conte	169.5359	148.2772	153.0088	133.3967	127.9974	110.4520	102.3500	117.4481	118.8508	138.5092	151.1936	164.1865 (45)
Energy content (annual)												Total = Sum(45)m = 1635.2061 (45)
Distribution loss (46)m = 0.15 x (45)m												

	25.4304	22.2416	22.9513	20.0095	19.1996	16.5678	15.3525	17.6172	17.8276	20.7764	22.6790	24.6280 (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	0.6671	0.6081	0.6530	0.5915	0.5627	0.4649	0.4308	0.5163	0.5270	0.5911	0.6201	0.6461 (61)
Total heat required for water heating calculated for each month	170.2030	148.8553	153.6618	133.9882	128.5601	110.9169	102.7808	117.9644	119.3778	139.1003	151.8137	164.8326 (62)
WWHRS	-56.9147	-50.0797	-51.1117	-42.0391	-39.0269	-32.1901	-27.2342	-32.9775	-33.9437	-41.9712	-48.6318	-55.0138 eq. (G10)
Total of WWHRS savings												-511.1344
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)
Output from w/h								Solar input (sum of months) = Sum(63)m =				0.0000 (63)
	113.2883	98.8056	102.5500	91.9491	89.5332	78.7268	75.5466	84.9870	85.4341	97.1291	103.1819	109.8188 (64)
								Total per year (kWh/year) = Sum(64)m =				1130.9505 (64)
Heat gains from water heating, kWh/month	56.5375	49.4542	51.0387	44.5023	42.6998	36.8415	34.1391	39.1806	39.6496	46.2021	50.4269	54.7535 (65)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8264	0.7934	0.7348	0.6505	0.5392	0.3702	0.2378	0.2348	0.4435	0.6414	0.7715	0.8386 (94)
Useful gains	932.8683	1022.1729	1077.4497	1050.3650	882.7590	630.8991	380.0391	362.5476	642.5615	828.1369	879.2466	878.7058 (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	2077.4448	2057.2413	1889.1574	1585.1486	1158.0016	716.9982	401.8444	382.7662	770.2631	1234.2545	1667.9116	2022.3686 (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	851.5650	695.5659	603.9105	385.0442	204.7805	0.0000	0.0000	0.0000	0.0000	302.1515	567.8387	850.8851 (98)
Space heating												4461.7415 (98)
Space heating per m2												29.5206 (99)
										(98) / (4) =		

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													4946.4983 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	851.5650	695.5659	603.9105	385.0442	204.7805	0.0000	0.0000	0.0000	0.0000	302.1515	567.8387	850.8851	(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)	944.0853	771.1374	669.5238	426.8783	227.0294	0.0000	0.0000	0.0000	0.0000	334.9795	629.5330	943.3316	(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	113.2883	98.8056	102.5500	91.9491	89.5332	78.7268	75.5466	84.9870	85.4341	97.1291	103.1819	109.8188	(64)
Efficiency of water heater (217)m	88.3267	88.2180	87.8954	87.1650	85.5018	76.4000	76.4000	76.4000	76.4000	86.4035	87.7624	76.4000	(216)
Fuel for water heating, kWh/month	128.2605	112.0016	116.6728	105.4886	104.7150	103.0455	98.8830	111.2395	111.8247	112.4135	117.5696	124.2642	(219)
Water heating fuel used												1346.3786	(219)
Annual totals kWh/year													
Space heating fuel - main system												4946.4983	(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)												513.7484	(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												4935.1793	(238)

10a. Fuel costs - using BEDF prices (542)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4946.4983	7.6100	376.4285 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1346.3786	7.6100	102.4594 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	513.7484	31.0800	159.6730 (250)
Additional standing charges			105.0000 (251)
Energy saving/generation technologies			
PV Unit	-1946.4459	31.0800	-604.9554 (252)
Total energy cost			161.9155 (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	4946.4983	0.2160	1068.4436 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1346.3786	0.2160	290.8178 (264)
Space and water heating			1359.2614 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	513.7484	0.5190	266.6354 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	0.5190	-1010.2054 (269)
Total kg/year			654.6164 (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	4946.4983	1.2200	6034.7280 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1346.3786	1.2200	1642.5819 (264)
Space and water heating			7677.3098 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	513.7484	3.0700	1577.2075 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	3.0700	-5975.5890 (269)
Primary energy kWh/year			3509.1783 (272)
Primary energy kWh/m2/year			23.2181 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	034 - PRJ013014		Issued on Date	09/10/2024	
Assessment Reference	034	Prop Type Ref	A		
Property	39 Deeble Way, Netley Abbey, Southampton, SO31 5JP				
SAP Rating	86 B	DER	13.27	TER	15.69
Environmental	87 B	% DER<TER	15.42		
CO ₂ Emissions (t/year)	1.66	DFEE	47.51	TFEE	54.63
General Requirements Compliance	Pass	% DFEE<TFEE	13.04		
Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk			Assessor ID	U903-0001
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)	15.69	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.27	kgCO ₂ /m ²	Pass
	-2.42 (-15.4%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	54.63	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	47.51	kWh/m ² /yr	
	-7.1 (-13.0%)	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
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	4.78 (measured in this dwelling)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

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
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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

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 North

11.52 m², No overhang

Windows facing East

0.72 m², No overhang

Windows facing South

15.50 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

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

4.78 (measured in this dwelling)

Maximum

10.0

Pass

10 Key features

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.