

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	016 - PRJ013014	Issued on Date	02/05/2024
Assessment Reference	016	Prop Type Ref	3B
Property	9 Deeble way, Netley Abbey, Southampton, SO31 5JP		

SAP Rating	85 B	DER	14.34	TER	17.13
Environmental	88 B	% DER<TER	16.29		
CO ₂ Emissions (t/year)	1.13	DFEE	46.00	TTEE	49.99
General Requirements Compliance	Pass	% DFEE<TFEE	7.99		

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	46.9500 (1b)	x 2.3700 (2b)	= 111.2715 (1b) - (3b)
First floor	46.9500 (1c)	x 2.6200 (2c)	= 123.0090 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 234.2805 (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							3 * 10 =	30.0000 (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) =						30.0000 / (5) =	0.1281 (8)				
Pressure test							Yes					
Measured/design AP50							4.8100					
Infiltration rate							0.3686	(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) =	0.3409 (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	0.4176	0.3920	0.3835	0.3580	0.3580	0.3494	0.3494	0.3409	0.3409	0.3665	0.3665	0.3750 (22b)
Effective ac	0.5872	0.5769	0.5735	0.5641	0.5641	0.5611	0.5611	0.5581	0.5581	0.5672	0.5672	0.5703 (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)			17.1600	1.3258	22.7500		(27)
Fir - Ground			46.9500	0.1800	8.4510	75.6000	3549.4200 (28a)
Wl - Brick (Timber Frame)	96.8930	19.2470	77.6460	0.2100	16.3057	7.4000	574.5804 (29a)
Rf - Ins Joist	46.9540		46.9540	0.0800	3.7563	7.4000	347.4596 (30)
Total net area of external elements Aum(A, m ²)			190.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.7710		(33)
Party Wall			46.2060	0.0000	0.0000	7.4000	341.9244 (32)
Stud			67.7630			7.4000	501.4465 (32c)
Internal Floor			46.9540			7.4000	347.4596 (32d)
Internal Ceiling			46.9540			7.4000	347.4596 (32e)
Heat capacity Cm = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 6009.7501 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.0016 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							19.1121 (36)
Total fabric heat loss							(33) + (36) = 72.8831 (37)

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

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CALCULATION OF HEAT DEMAND 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.3980	44.5978	44.3423	43.6094	43.6094	43.3763	43.3763	43.1489	43.1489	43.8481	43.8481	44.0924	(38)
Heat transfer coeff	118.2811	117.4809	117.2253	116.4925	116.4925	116.2594	116.2594	116.0320	116.0320	116.7312	116.7312	116.9754	(39)
Average = Sum(39)m / 12 =												116.7494	(39)
HLP	1.2596	1.2511	1.2484	1.2406	1.2406	1.2381	1.2381	1.2357	1.2357	1.2431	1.2431	1.2457	(40)
HLP (average)												1.2433	(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												2.6754	(42)
Average daily hot water use (litres/day)												97.7415	(43)
Daily hot water use	107.5156	103.6060	99.6963	95.7866	91.8770	87.9673	87.9673	91.8770	95.7866	99.6963	103.6060	107.5156	(44)
Energy conte	159.4425	139.4495	143.8994	125.4549	120.3770	103.8762	96.2566	110.4558	111.7750	130.2630	142.1923	154.4116	(45)
Energy content (annual)										Total = Sum(45)m =		1537.8538	(45)
Distribution loss (46)m = 0.15 x (45)m	23.9164	20.9174	21.5849	18.8182	18.0566	15.5814	14.4385	16.5684	16.7663	19.5395	21.3288	23.1617	(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	0.6085	0.6456	0.5408	0.4977	0.4112	0.3810	0.4567	0.4818	0.5844	0.6205	0.6497	(61)
Total heat required for water heating calculated for each month	160.1134	140.0580	144.5449	125.9957	120.8747	104.2874	96.6376	110.9125	112.2568	130.8474	142.8128	155.0613	(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	160.1134	140.0580	144.5449	125.9957	120.8747	104.2874	96.6376	110.9125	112.2568	130.8474	142.8128	155.0613	(64)
RHI water heating demand										Total per year (kWh/year) = Sum(64)m =		1544.4025	(64)
Heat gains from water heating, kWh/month	53.1824	46.5191	48.0079	41.8490	40.1498	34.6416	32.1006	36.8407	37.2856	43.4586	47.4341	51.5043	(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	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.6537	49.4311	40.2001	30.4341	22.7498	19.2064	20.7531	26.9757	36.2068	45.9728	53.6570	57.2005	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	367.2726	371.0838	361.4798	341.0341	315.2252	290.9683	274.7633	270.9522	280.5561	301.0018	326.8108	351.0676	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	(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)	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	(71)
Water heating gains (Table 5)	71.4817	69.2248	64.5268	58.1236	53.9648	48.1134	43.1459	49.5171	51.7856	58.4120	65.8806	69.2262	(72)
Total internal gains	604.6446	599.9763	576.4433	539.8284	502.1763	468.5247	448.8990	457.6816	478.7851	515.6232	556.5851	587.7309	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c				Access factor Table 6d			Gains W
Northeast				5.8820	14.6130	0.7300	0.7200				0.7700			31.3079 (75)
Southeast				6.1670	45.0642	0.7300	0.7200				0.7700			101.2264 (77)
Southwest				5.1080	45.0642	0.7300	0.7200				0.7700			83.8438 (79)
Solar gains	216.3782	322.8510	474.8735	637.2035	711.2184	798.0315	736.2292	672.5318	557.3424	397.1408	260.2625			180.8072 (83)
Total gains	821.0228	922.8273	1051.3168	1177.0318	1213.3947	1266.5562	1185.1281	1130.2134	1036.1275	912.7640	816.8475			768.5381 (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	14.1136	14.2098	14.2407	14.3303	14.3303	14.3591	14.3591	14.3872	14.3872	14.3010	14.3010	14.2712	
alpha	1.9409	1.9473	1.9494	1.9554	1.9554	1.9573	1.9573	1.9591	1.9591	1.9534	1.9534	1.9514	
util living area	0.8694	0.8398	0.7802	0.6864	0.5673	0.4051	0.2988	0.3026	0.4957	0.6960	0.8215	0.8794	(86)
MIT	18.4674	18.7371	19.2838	19.9235	20.4595	20.8137	20.9310	20.9317	20.7091	20.1147	19.2466	18.4369	(87)
Th 2	19.8726	19.8793	19.8815	19.8877	19.8877	19.8896	19.8896	19.8915	19.8915	19.8856	19.8856	19.8836	(88)
util rest of house	0.8545	0.8221	0.7558	0.6511	0.5148	0.3320	0.2064	0.2064	0.4209	0.6513	0.7980	0.8653	(89)
MIT 2	16.6202	16.9973	17.7564	18.6283	19.3283	19.7433	19.8561	19.8596	19.6435	18.9068	17.7251	16.5830	(90)

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CALCULATION OF HEAT DEMAND 09 Jan 2014

Living area fraction									fLA = Living area / (4) =		0.1949 (91)	
MIT	16.9802	17.3364	18.0541	18.8807	19.5487	19.9519	20.0655	20.0685	19.8511	19.1422	18.0216	16.9443 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.8302	17.1864	17.9041	18.7307	19.3987	19.8019	19.9155	19.9185	19.7011	18.9922	17.8716	16.7943 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7995	0.7664	0.7026	0.6084	0.4892	0.3258	0.2087	0.2088	0.4068	0.6089	0.7428	0.8114	(94)
Useful gains	656.3780	707.2305	738.6783	716.1125	593.5843	412.6421	247.3003	236.0277	421.4560	555.7500	606.7847	623.5768	(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	1316.4903	1302.4360	1196.1736	1005.4143	733.7559	453.6357	257.5775	245.8195	487.4672	781.1862	1058.9414	1286.0595	(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	491.1236	399.9781	340.3765	208.2973	104.2877	0.0000	0.0000	0.0000	0.0000	167.7245	325.5529	492.8871	(98)
RHI space heating demand												2530.2276	(98)
												2530	(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	46.9500 (1b)	x 2.3700 (2b)	= 111.2715 (1b) - (3b)
First floor	46.9500 (1c)	x 2.6200 (2c)	= 123.0090 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 234.2805 (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					3 * 10 = 30.0000 (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)					30.0000 / (5) = 0.1281 (8)
Pressure test					Yes
Measured/design AP50					4.8100
Infiltration rate					0.3686 (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) =	0.3409 (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	0.4347	0.4261	0.4176	0.3750	0.3665	0.3239	0.3239	0.3153	0.3409	0.3665	0.3835	0.4006 (22b)
Effective ac	0.5945	0.5908	0.5872	0.5703	0.5672	0.5524	0.5524	0.5497	0.5581	0.5672	0.5735	0.5802 (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)			17.1600	1.3258	22.7500		(27)
Flr - Ground			46.9500	0.1800	8.4510	75.6000	3549.4200 (28a)
Wl - Brick (Timber Frame)	96.8930	19.2470	77.6460	0.2100	16.3057	7.4000	574.5804 (29a)
Rf - Ins Joist	46.9540		46.9540	0.0800	3.7563	7.4000	347.4596 (30)
Total net area of external elements Aum(A, m ²)			190.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.7710		(33)
Party Wall			46.2060	0.0000	0.0000	7.4000	341.9244 (32)
Stud			67.7630			7.4000	501.4465 (32c)
Internal Floor			46.9540			7.4000	347.4596 (32d)
Internal Ceiling			46.9540			7.4000	347.4596 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 6009.7501 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 64.0016 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 19.1121 (36)
Total fabric heat loss (33) + (36) = 72.8831 (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	45.9596	45.6760	45.3980	44.0924	43.8481	42.7109	42.7109	42.5003	43.1489	43.8481	44.3423	44.8589 (38)
Heat transfer coeff	118.8427	118.5591	118.2811	116.9754	116.7312	115.5940	115.5940	115.3834	116.0320	116.7312	117.2253	117.7420 (39)
Average = Sum(39)m / 12 =												116.9743 (39)
HLP	Jan 1.2656	Feb 1.2626	Mar 1.2596	Apr 1.2457	May 1.2431	Jun 1.2310	Jul 1.2310	Aug 1.2288	Sep 1.2357	Oct 1.2431	Nov 1.2484	Dec 1.2539 (40)
HLP (average)												1.2457 (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												2.6754 (42)
Average daily hot water use (litres/day)												97.7415 (43)
Daily hot water use	Jan 107.5156	Feb 103.6060	Mar 99.6963	Apr 95.7866	May 91.8770	Jun 87.9673	Jul 87.9673	Aug 91.8770	Sep 95.7866	Oct 99.6963	Nov 103.6060	Dec 107.5156 (44)
Energy conte	159.4425	139.4495	143.8994	125.4549	120.3770	103.8762	96.2566	110.4558	111.7750	130.2630	142.1923	154.4116 (45)
Energy content (annual)												Total = Sum(45)m = 1537.8538 (45)
Distribution loss (46)m = 0.15 x (45)m												

Water storage loss:	23.9164	20.9174	21.5849	18.8182	18.0566	15.5814	14.4385	16.5684	16.7663	19.5395	21.3288	23.1617 (46)	
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	0.6085	0.6456	0.5408	0.4977	0.4112	0.3810	0.4567	0.4818	0.5844	0.6205	0.6497 (61)	
Total heat required for water heating calculated for each month													
	160.1134	140.0580	144.5449	125.9957	120.8747	104.2874	96.6376	110.9125	112.2568	130.8474	142.8128	155.0613 (62)	
WWHRS	-52.5105	-46.2025	-47.1557	-38.7982	-36.0249	-29.7187	-25.1519	-30.4531	-31.3416	-38.7444	-44.8802	-50.7538 eq. (G10)	
Total of WWHRS savings												-471.7356	
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	107.6029	93.8555	97.3893	87.1975	84.8498	74.5687	71.4857	80.4594	80.9153	92.1030	97.9325	104.3075 (64)	
								Total per year (kWh/year) = Sum(64)m =					1072.6669 (64)
Heat gains from water heating, kWh/month													
	53.1824	46.5191	48.0079	41.8490	40.1498	34.6416	32.1006	36.8407	37.2856	43.4586	47.4341	51.5043 (65)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8294	0.7900	0.7361	0.6562	0.5530	0.4265	0.3096	0.3412	0.5091	0.6832	0.7909	0.8410 (94)
Useful gains	646.8340	716.1545	748.8225	736.1101	656.2070	495.7130	344.2818	355.5418	492.8489	587.6897	607.4363	619.6645 (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	1419.8666	1402.3258	1295.8883	1105.0473	864.0103	581.2494	374.9277	393.9367	619.9324	919.4602	1186.2902	1407.1538 (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	575.1362	461.1071	407.0170	265.6348	154.6057	0.0000	0.0000	0.0000	0.0000	246.8373	416.7748	585.8920 (98)
Space heating												3113.0050 (98)
Space heating per m2												33.1523 (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													3451.2250	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	575.1362	461.1071	407.0170	265.6348	154.6057	0.0000	0.0000	0.0000	0.0000	246.8373	416.7748	585.8920	(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)	637.6233	511.2052	451.2384	294.4954	171.4032	0.0000	0.0000	0.0000	0.0000	273.6555	462.0564	649.5477	(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	107.6029	93.8555	97.3893	87.1975	84.8498	74.5687	71.4857	80.4594	80.9153	92.1030	97.9325	104.3075	(64)	
Efficiency of water heater (217)m	87.7033	87.5263	87.1603	86.3456	84.7741	76.4000	76.4000	76.4000	76.4000	85.9798	87.2030	87.8032	(216)	
Fuel for water heating, kWh/month	122.6897	107.2312	111.7358	100.9867	100.0894	97.6030	93.5677	105.3133	105.9100	107.1217	112.3041	118.7969	(219)	
Water heating fuel used												1283.3494	(219)	
Annual totals kWh/year														
Space heating fuel - main system													3451.2250	(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)													393.1448	(232)
Total delivered energy for all uses													5202.7192	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3451.2250	3.4800	120.1026 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1283.3494	3.4800	44.6606 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	393.1448	13.1900	51.8558 (250)
Additional standing charges			120.0000 (251)
Total energy cost			346.5115 (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] =	1.0478 (257)
SAP value		85.3837
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	3451.2250	0.2160	745.4646 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1283.3494	0.2160	277.2035 (264)
Space and water heating			1022.6681 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	393.1448	0.5190	204.0422 (268)
Total kg/year			1265.6352 (272)
CO2 emissions per m2			13.4800 (273)
EI value			87.7901
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	46.9500 (1b)	x 2.3700 (2b)	= 111.2715 (1b) - (3b)
First floor	46.9500 (1c)	x 2.6200 (2c)	= 123.0090 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 234.2805 (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					3 * 10 = 30.0000 (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) =					30.0000 / (5) = 0.1281 (8)
Pressure test					Yes
Measured/design AP50					4.8100
Infiltration rate					0.3686 (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) =	0.3409 (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	0.4176	0.3920	0.3835	0.3580	0.3580	0.3494	0.3494	0.3409	0.3409	0.3665	0.3665	0.3750 (22b)
Effective ac	0.5872	0.5769	0.5735	0.5641	0.5641	0.5611	0.5611	0.5581	0.5581	0.5672	0.5672	0.5703 (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)			17.1600	1.3258	22.7500		(27)
Flr - Ground			46.9500	0.1800	8.4510	75.6000	3549.4200 (28a)
Wl - Brick (Timber Frame)	96.8930	19.2470	77.6460	0.2100	16.3057	7.4000	574.5804 (29a)
Rf - Ins Joist	46.9540		46.9540	0.0800	3.7563	7.4000	347.4596 (30)
Total net area of external elements Aum(A, m ²)			190.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.7710		(33)
Party Wall			46.2060	0.0000	0.0000	7.4000	341.9244 (32)
Stud			67.7630			7.4000	501.4465 (32c)
Internal Floor			46.9540			7.4000	347.4596 (32d)
Internal Ceiling			46.9540			7.4000	347.4596 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 6009.7501 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 64.0016 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 19.1121 (36)
Total fabric heat loss (33) + (36) = 72.8831 (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	45.3980	44.5978	44.3423	43.6094	43.6094	43.3763	43.3763	43.1489	43.1489	43.8481	43.8481	44.0924 (38)
Heat transfer coeff	118.2811	117.4809	117.2253	116.4925	116.4925	116.2594	116.2594	116.0320	116.0320	116.7312	116.7312	116.9754 (39)
Average = Sum(39)m / 12 =												116.7494 (39)
HLP	1.2596	1.2511	1.2484	1.2406	1.2406	1.2381	1.2381	1.2357	1.2357	1.2431	1.2431	1.2457 (40)
HLP (average)												1.2433 (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												2.6754 (42)
Average daily hot water use (litres/day)												97.7415 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	107.5156	103.6060	99.6963	95.7866	91.8770	87.9673	87.9673	91.8770	95.7866	99.6963	103.6060	107.5156 (44)
Energy conte	159.4425	139.4495	143.8994	125.4549	120.3770	103.8762	96.2566	110.4558	111.7750	130.2630	142.1923	154.4116 (45)
Energy content (annual)												Total = Sum(45)m = 1537.8538 (45)
Distribution loss (46)m = 0.15 x (45)m												

Water storage loss:	23.9164	20.9174	21.5849	18.8182	18.0566	15.5814	14.4385	16.5684	16.7663	19.5395	21.3288	23.1617 (46)
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	0.6085	0.6456	0.5408	0.4977	0.4112	0.3810	0.4567	0.4818	0.5844	0.6205	0.6497 (61)
Total heat required for water heating calculated for each month												
	160.1134	140.0580	144.5449	125.9957	120.8747	104.2874	96.6376	110.9125	112.2568	130.8474	142.8128	155.0613 (62)
WWHRS	-52.5105	-46.2025	-47.1557	-38.7982	-36.0249	-29.7187	-25.1519	-30.4531	-31.3416	-38.7444	-44.8802	-50.7538 eq. (G10)
Total of WWHRS savings												-471.7356
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	107.6029	93.8555	97.3893	87.1975	84.8498	74.5687	71.4857	80.4594	80.9153	92.1030	97.9325	104.3075 (64)
								Total per year (kWh/year) =	Sum(64)m =			1072.6669 (64)
Heat gains from water heating, kWh/month												
	53.1824	46.5191	48.0079	41.8490	40.1498	34.6416	32.1006	36.8407	37.2856	43.4586	47.4341	51.5043 (65)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7995	0.7664	0.7026	0.6084	0.4892	0.3258	0.2087	0.2088	0.4068	0.6089	0.7428	0.8114 (94)
Useful gains	656.3780	707.2305	738.6783	716.1125	593.5843	412.6421	247.3003	236.0277	421.4560	555.7500	606.7847	623.5768 (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												
	1316.4903	1302.4360	1196.1736	1005.4143	733.7559	453.6357	257.5775	245.8195	487.4672	781.1862	1058.9414	1286.0595 (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												
	491.1236	399.9781	340.3765	208.2973	104.2877	0.0000	0.0000	0.0000	0.0000	167.7245	325.5529	492.8871 (98)
Space heating												2530.2276 (98)
Space heating per m2												26.9460 (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													2805.1304	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	491.1236	399.9781	340.3765	208.2973	104.2877	0.0000	0.0000	0.0000	0.0000	167.7245	325.5529	492.8871	(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)	544.4829	443.4347	377.3575	230.9282	115.6183	0.0000	0.0000	0.0000	0.0000	185.9474	360.9233	546.4380	(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	107.6029	93.8555	97.3893	87.1975	84.8498	74.5687	71.4857	80.4594	80.9153	92.1030	97.9325	104.3075	(64)	
Efficiency of water heater (217)m	87.3640	87.2063	86.7154	85.6355	83.4388	76.4000	76.4000	76.4000	76.4000	84.7722	86.5833	87.4413	(217)	
Fuel for water heating, kWh/month	123.1662	107.6247	112.3091	101.8240	101.6911	97.6030	93.5677	105.3133	105.9100	108.6477	113.1079	119.2885	(219)	
Water heating fuel used												1290.0532	(219)	
Annual totals kWh/year														
Space heating fuel - main system													2805.1304	(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)													393.1448	(232)
Total delivered energy for all uses													4563.3283	(238)

10a. Fuel costs - using BEDF prices (540)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2805.1304	7.6100	213.4704 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1290.0532	7.6100	98.1730 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	393.1448	31.0800	122.1894 (250)
Additional standing charges			105.0000 (251)
Total energy cost			562.1429 (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	2805.1304	0.2160	605.9082 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1290.0532	0.2160	278.6515 (264)
Space and water heating			884.5596 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	393.1448	0.5190	204.0422 (268)
Total kg/year			1127.5268 (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	2805.1304	1.2200	3422.2591 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1290.0532	1.2200	1573.8649 (264)
Space and water heating			4996.1239 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	393.1448	3.0700	1206.9545 (268)
Primary energy kWh/year			6433.3285 (272)
Primary energy kWh/m2/year			68.5126 (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	+ 9.6	-£ 605	-1010 kg (89.6%)
Measures omitted - SAP change or cost saving too small:			
N Solar water heating	+ 0.9	-£ 46	-148 kg (13.1%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar photovoltaic panels	£605 10.76 kg/m ²	A 95	A 96
Total Savings	£605 10.76 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 540 TEST (28 Mar 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	£145	£145	£0
Mains gas	£417	£417	£0
Space heating	£342	£342	£0
Water heating	£98	£98	£0
Lighting	£122	£122	£0
Generated (PV)	-£0	-£605	£605
Total cost of fuels	£562	-£43	£605
Total cost of uses	£562	-£43	£605
Delivered energy	49 kWh/m ²	28 kWh/m ²	21 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	69 kWh/m ²	5 kWh/m ²	64 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	46.9500 (1b)	x 2.3700 (2b)	= 111.2715 (1b) - (3b)
First floor	46.9500 (1c)	x 2.6200 (2c)	= 123.0090 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 234.2805 (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					3 * 10 = 30.0000 (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)					30.0000 / (5) = 0.1281 (8)
Pressure test					Yes
Measured/design AP50					4.8100
Infiltration rate					0.3686 (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) =	0.3409 (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	0.4347	0.4261	0.4176	0.3750	0.3665	0.3239	0.3239	0.3153	0.3409	0.3665	0.3835	0.4006 (22b)
Effective ac	0.5945	0.5908	0.5872	0.5703	0.5672	0.5524	0.5524	0.5497	0.5581	0.5672	0.5735	0.5802 (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)			17.1600	1.3258	22.7500		(27)
Flr - Ground			46.9500	0.1800	8.4510	75.6000	3549.4200 (28a)
Wl - Brick (Timber Frame)	96.8930	19.2470	77.6460	0.2100	16.3057	7.4000	574.5804 (29a)
Rf - Ins Joist	46.9540		46.9540	0.0800	3.7563	7.4000	347.4596 (30)
Total net area of external elements Aum(A, m ²)			190.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.7710		(33)
Party Wall			46.2060	0.0000	0.0000	7.4000	341.9244 (32)
Stud			67.7630			7.4000	501.4465 (32c)
Internal Floor			46.9540			7.4000	347.4596 (32d)
Internal Ceiling			46.9540			7.4000	347.4596 (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
(28)...(30) + (32) + (32a)...(32e) = 6009.7501 (34)
64.0016 (35)
19.1121 (36)
(33) + (36) = 72.8831 (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	45.9596	45.6760	45.3980	44.0924	43.8481	42.7109	42.7109	42.5003	43.1489	43.8481	44.3423	44.8589 (38)
Heat transfer coeff	118.8427	118.5591	118.2811	116.9754	116.7312	115.5940	115.5940	115.3834	116.0320	116.7312	117.2253	117.7420 (39)
Average = Sum(39)m / 12 =												116.9743 (39)
HLP	1.2656	1.2626	1.2596	1.2457	1.2431	1.2310	1.2310	1.2288	1.2357	1.2431	1.2484	1.2539 (40)
HLP (average)												1.2457 (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												2.6754 (42)
Average daily hot water use (litres/day)												97.7415 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	107.5156	103.6060	99.6963	95.7866	91.8770	87.9673	87.9673	91.8770	95.7866	99.6963	103.6060	107.5156 (44)
Energy conte	159.4425	139.4495	143.8994	125.4549	120.3770	103.8762	96.2566	110.4558	111.7750	130.2630	142.1923	154.4116 (45)
Energy content (annual)												Total = Sum(45)m = 1537.8538 (45)
Distribution loss (46)m = 0.15 x (45)m												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

	23.9164	20.9174	21.5849	18.8182	18.0566	15.5814	14.4385	16.5684	16.7663	19.5395	21.3288	23.1617 (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	0.6085	0.6456	0.5408	0.4977	0.4112	0.3810	0.4567	0.4818	0.5844	0.6205	0.6497 (61)
Total heat required for water heating calculated for each month	160.1134	140.0580	144.5449	125.9957	120.8747	104.2874	96.6376	110.9125	112.2568	130.8474	142.8128	155.0613 (62)
WWHRS	-52.5105	-46.2025	-47.1557	-38.7982	-36.0249	-29.7187	-25.1519	-30.4531	-31.3416	-38.7444	-44.8802	-50.7538 eq. (G10)
Total of WWHRS savings												-471.7356
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	107.6029	93.8555	97.3893	87.1975	84.8498	74.5687	71.4857	80.4594	80.9153	92.1030	97.9325	104.3075 (64)
Heat gains from water heating, kWh/month	53.1824	46.5191	48.0079	41.8490	40.1498	34.6416	32.1006	36.8407	37.2856	43.4586	47.4341	51.5043 (65)
												1072.6669 (64)

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	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258	160.5258 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.6537	49.4311	40.2001	30.4341	22.7498	19.2064	20.7531	26.9757	36.2068	45.9728	53.6570	57.2005 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	367.2726	371.0838	361.4798	341.0341	315.2252	290.9683	274.7633	270.9522	280.5561	301.0018	326.8108	351.0676 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280	53.7280 (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)	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172	-107.0172 (71)
Water heating gains (Table 5)	71.4817	69.2248	64.5268	58.1236	53.9648	48.1134	43.1459	49.5171	51.7856	58.4120	65.8806	69.2262 (72)
Total internal gains	604.6446	599.9763	576.4433	539.8284	502.1763	468.5247	448.8990	457.6816	478.7851	515.6232	556.5851	587.7309 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W		
Northeast				5.8820	11.2829	0.7300	0.7200	0.7700		24.1733 (75)		
Southeast				6.1670	36.7938	0.7300	0.7200	0.7700		82.6490 (77)		
Southwest				5.1080	36.7938	0.7300	0.7200	0.7700		68.4565 (79)		
Solar gains	175.2788	306.5940	440.8228	581.9489	684.4606	693.8634	662.9855	584.3130	489.3504	344.6021	211.4058	149.0559 (83)
Total gains	779.9234	906.5703	1017.2661	1121.7773	1186.6369	1162.3881	1111.8845	1041.9946	968.1355	860.2253	767.9908	736.7868 (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	14.0469	14.0805	14.1136	14.2712	14.3010	14.4417	14.4417	14.4681	14.3872	14.3010	14.2407	14.1782
alpha	1.9365	1.9387	1.9409	1.9514	1.9534	1.9628	1.9628	1.9645	1.9591	1.9534	1.9494	1.9452
util living area	0.8937	0.8604	0.8119	0.7346	0.6316	0.5073	0.3981	0.4326	0.5976	0.7671	0.8631	0.9028 (86)
MIT	18.0322	18.3948	18.9451	19.6248	20.2175	20.6485	20.8456	20.8125	20.4814	19.7099	18.7550	17.9581 (87)
Th 2	19.8679	19.8702	19.8726	19.8836	19.8856	19.8953	19.8953	19.8970	19.8915	19.8856	19.8815	19.8771 (88)
util rest of house	0.8821	0.8455	0.7916	0.7049	0.5879	0.4433	0.3139	0.3481	0.5369	0.7344	0.8461	0.8921 (89)
MIT 2	16.0017	16.5109	17.2818	18.2238	19.0179	19.5677	19.7872	19.7588	19.3777	18.3645	17.0344	15.9001 (90)
Living area fraction									fLA = Living area / (4) =			0.1949 (91)
MIT	16.3974	16.8781	17.6060	18.4968	19.2517	19.7784	19.9935	19.9642	19.5928	18.6267	17.3697	16.3012 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.2474	16.7281	17.4560	18.3468	19.1017	19.6284	19.8435	19.8142	19.4428	18.4767	17.2197	16.1512 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	646.8340	716.1545	748.8225	736.1101	656.2070	495.7130	344.2818	355.5418	492.8489	587.6897	607.4363	619.6645 (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	1419.8666	1402.3258	1295.8883	1105.0473	864.0103	581.2494	374.9277	393.9367	619.9324	919.4602	1186.2902	1407.1538 (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	575.1362	461.1071	407.0170	265.6348	154.6057	0.0000	0.0000	0.0000	0.0000	246.8373	416.7748	585.8920 (98)
Space heating												3113.0050 (98)
Space heating per m2												33.1523 (99)

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													3451.2250 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	575.1362	461.1071	407.0170	265.6348	154.6057	0.0000	0.0000	0.0000	0.0000	246.8373	416.7748	585.8920	(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)	637.6233	511.2052	451.2384	294.4954	171.4032	0.0000	0.0000	0.0000	0.0000	273.6555	462.0564	649.5477	(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	107.6029	93.8555	97.3893	87.1975	84.8498	74.5687	71.4857	80.4594	80.9153	92.1030	97.9325	104.3075	(64)
Efficiency of water heater (217)m	87.7033	87.5263	87.1603	86.3456	84.7741	76.4000	76.4000	76.4000	76.4000	85.9798	87.2030	87.8032	(216)
Fuel for water heating, kWh/month	122.6897	107.2312	111.7358	100.9867	100.0894	97.6030	93.5677	105.3133	105.9100	107.1217	112.3041	118.7969	(219)
Water heating fuel used												1283.3494	(219)
Annual totals kWh/year													
Space heating fuel - main system												3451.2250	(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)												393.1448	(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												3475.4798	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3451.2250	3.4800	120.1026 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1283.3494	3.4800	44.6606 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	393.1448	13.1900	51.8558 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-1727.2394	13.1900	-227.8229 (252)
Total energy cost			118.6886 (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] =	0.3589 (257)
SAP value		94.9935
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	3451.2250	0.2160	745.4646 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1283.3494	0.2160	277.2035 (264)
Space and water heating			1022.6681 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	393.1448	0.5190	204.0422 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			369.1980 (272)
CO2 emissions per m2			3.9300 (273)
EI value			96.4383
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	46.9500 (1b)	x 2.3700 (2b)	= 111.2715 (1b) - (3b)
First floor	46.9500 (1c)	x 2.6200 (2c)	= 123.0090 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 234.2805 (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					3 * 10 = 30.0000 (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)					30.0000 / (5) = 0.1281 (8)
Pressure test					Yes
Measured/design AP50					4.8100
Infiltration rate					0.3686 (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) =	0.3409 (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	0.4176	0.3920	0.3835	0.3580	0.3580	0.3494	0.3494	0.3409	0.3409	0.3665	0.3665	0.3750 (22b)
Effective ac	0.5872	0.5769	0.5735	0.5641	0.5641	0.5611	0.5611	0.5581	0.5581	0.5672	0.5672	0.5703 (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)			17.1600	1.3258	22.7500		(27)
Flr - Ground			46.9500	0.1800	8.4510	75.6000	3549.4200 (28a)
Wl - Brick (Timber Frame)	96.8930	19.2470	77.6460	0.2100	16.3057	7.4000	574.5804 (29a)
Rf - Ins Joist	46.9540		46.9540	0.0800	3.7563	7.4000	347.4596 (30)
Total net area of external elements Aum(A, m ²)			190.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.7710		(33)
Party Wall			46.2060	0.0000	0.0000	7.4000	341.9244 (32)
Stud			67.7630			7.4000	501.4465 (32c)
Internal Floor			46.9540			7.4000	347.4596 (32d)
Internal Ceiling			46.9540			7.4000	347.4596 (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	45.3980	44.5978	44.3423	43.6094	43.6094	43.3763	43.3763	43.1489	43.1489	43.8481	43.8481	44.0924 (38)
Heat transfer coeff	118.2811	117.4809	117.2253	116.4925	116.4925	116.2594	116.2594	116.0320	116.0320	116.7312	116.7312	116.9754 (39)
Average = Sum(39)m / 12 =												116.7494 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2596	1.2511	1.2484	1.2406	1.2406	1.2381	1.2381	1.2357	1.2357	1.2431	1.2431	1.2457 (40)
HLP (average)												1.2433 (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												2.6754 (42)
Average daily hot water use (litres/day)												97.7415 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	107.5156	103.6060	99.6963	95.7866	91.8770	87.9673	87.9673	91.8770	95.7866	99.6963	103.6060	107.5156 (44)
Energy conte	159.4425	139.4495	143.8994	125.4549	120.3770	103.8762	96.2566	110.4558	111.7750	130.2630	142.1923	154.4116 (45)
Energy content (annual)												Total = Sum(45)m = 1537.8538 (45)
Distribution loss (46)m = 0.15 x (45)m												

Water storage loss:	23.9164	20.9174	21.5849	18.8182	18.0566	15.5814	14.4385	16.5684	16.7663	19.5395	21.3288	23.1617 (46)	
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	0.6085	0.6456	0.5408	0.4977	0.4112	0.3810	0.4567	0.4818	0.5844	0.6205	0.6497 (61)	
Total heat required for water heating calculated for each month													
	160.1134	140.0580	144.5449	125.9957	120.8747	104.2874	96.6376	110.9125	112.2568	130.8474	142.8128	155.0613 (62)	
WWHRS	-52.5105	-46.2025	-47.1557	-38.7982	-36.0249	-29.7187	-25.1519	-30.4531	-31.3416	-38.7444	-44.8802	-50.7538 eq. (G10)	
Total of WWHRS savings												-471.7356	
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	107.6029	93.8555	97.3893	87.1975	84.8498	74.5687	71.4857	80.4594	80.9153	92.1030	97.9325	104.3075 (64)	
								Total per year (kWh/year) = Sum(64)m =					1072.6669 (64)
Heat gains from water heating, kWh/month													
	53.1824	46.5191	48.0079	41.8490	40.1498	34.6416	32.1006	36.8407	37.2856	43.4586	47.4341	51.5043 (65)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7995	0.7664	0.7026	0.6084	0.4892	0.3258	0.2087	0.2088	0.4068	0.6089	0.7428	0.8114 (94)
Useful gains	656.3780	707.2305	738.6783	716.1125	593.5843	412.6421	247.3003	236.0277	421.4560	555.7500	606.7847	623.5768 (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												
	1316.4903	1302.4360	1196.1736	1005.4143	733.7559	453.6357	257.5775	245.8195	487.4672	781.1862	1058.9414	1286.0595 (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												
	491.1236	399.9781	340.3765	208.2973	104.2877	0.0000	0.0000	0.0000	0.0000	167.7245	325.5529	492.8871 (98)
Space heating												2530.2276 (98)
Space heating per m2												26.9460 (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													2805.1304 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	491.1236	399.9781	340.3765	208.2973	104.2877	0.0000	0.0000	0.0000	0.0000	167.7245	325.5529	492.8871	(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)	544.4829	443.4347	377.3575	230.9282	115.6183	0.0000	0.0000	0.0000	0.0000	185.9474	360.9233	546.4380	(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	107.6029	93.8555	97.3893	87.1975	84.8498	74.5687	71.4857	80.4594	80.9153	92.1030	97.9325	104.3075	(64)
Efficiency of water heater (217)m	87.3640	87.2063	86.7154	85.6355	83.4388	76.4000	76.4000	76.4000	76.4000	84.7722	86.5833	87.4413	(216)
Fuel for water heating, kWh/month	123.1662	107.6247	112.3091	101.8240	101.6911	97.6030	93.5677	105.3133	105.9100	108.6477	113.1079	119.2885	(219)
Water heating fuel used												1290.0532	(219)
Annual totals kWh/year													
Space heating fuel - main system												2805.1304	(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)												393.1448	(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												2616.8824	(238)

10a. Fuel costs - using BEDF prices (540)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2805.1304	7.6100	213.4704 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1290.0532	7.6100	98.1730 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	393.1448	31.0800	122.1894 (250)
Additional standing charges			105.0000 (251)
Energy saving/generation technologies			
PV Unit	-1946.4459	31.0800	-604.9554 (252)
Total energy cost			-42.8125 (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	2805.1304	0.2160	605.9082 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1290.0532	0.2160	278.6515 (264)
Space and water heating			884.5596 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	393.1448	0.5190	204.0422 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	0.5190	-1010.2054 (269)
Total kg/year			117.3214 (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	2805.1304	1.2200	3422.2591 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1290.0532	1.2200	1573.8649 (264)
Space and water heating			4996.1239 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	393.1448	3.0700	1206.9545 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	3.0700	-5975.5890 (269)
Primary energy kWh/year			457.7394 (272)
Primary energy kWh/m2/year			4.8748 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	016 - PRJ013014			Issued on Date	02/05/2024
Assessment Reference	016	Prop Type Ref	3B		
Property	9 Deeble way, Netley Abbey, Southampton, SO31 5JP				
SAP Rating	85 B	DER	14.34	TER	17.13
Environmental	88 B	% DER<TER	16.29		
CO ₂ Emissions (t/year)	1.13	DFEE	46.00	TFEE	49.99
General Requirements Compliance	Pass	% DFEE<TFEE	7.99		
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)	17.13	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.34	kgCO ₂ /m ²	Pass
	-2.79 (-16.3%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	49.99	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	46.00	kWh/m ² /yr	
	-4.0 (-8.0%)	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
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	1.38 (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 North East

5.88 m², No overhang

Windows facing South East

6.17 m², No overhang

Windows facing South West

5.11 m², No overhang

Air change rate

4.65 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