

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	050 - PRJ013014	Issued on Date	21/10/2024
Assessment Reference	050	Prop Type Ref	4B
Property	8 Erwood Close, Netley Abbey, Southampton, SO31 5TJ		

SAP Rating	85 B	DER	14.41	TER	18.07
Environmental	87 B	% DER<TER	20.25		
CO ₂ Emissions (t/year)	1.28	DFEE	47.92	TTEE	56.49
General Requirements Compliance	Pass	% DFEE<TFEE	15.18		

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	53.3300 (1b)	x 2.3700 (2b)	= 126.3921 (1b) - (3b)
First floor	53.3300 (1c)	x 2.6200 (2c)	= 139.7246 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 266.1167 (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								2 * 10 =	20.0000 (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) =						20.0000 / (5) =		0.0752 (8)			
Pressure test								Yes				
Measured/design AP50									4.4800			
Infiltration rate									0.2992 (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) =		0.2992 (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	0.3665	0.3440	0.3365	0.3141	0.3141	0.3066	0.3066	0.2992	0.2992	0.3216	0.3216	0.3291 (22b)
Effective ac	0.5671	0.5592	0.5566	0.5493	0.5493	0.5470	0.5470	0.5447	0.5447	0.5517	0.5517	0.5541 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.8000	1.3258	15.6572		(27)
Floor - Ground			53.3290	0.1800	9.5992	75.6000	4031.6724 (28a)
W1 - Brick (Timber Frame)	149.9800	13.8930	136.0870	0.2100	28.5783	7.4000	1007.0438 (29a)
Rf - Ins Joist	53.3290		53.3290	0.0800	4.2663	7.4000	394.6346 (30)
Total net area of external elements Aum(A, m ²)			256.6450				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.6090		(33)
Stud			95.0702			7.4000	703.5193 (32c)
Internal Floor			53.3290			7.4000	394.6346 (32d)
Internal Ceiling			53.3290			7.4000	394.6346 (32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		6926.1393 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.9366 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							16.6634 (36)
Total fabric heat loss						(33) + (36) =	77.2724 (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
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CALCULATION OF HEAT DEMAND 09 Jan 2014

(38)m	49.8061	49.1062	48.8827	48.2416	48.2416	48.0378	48.0378	47.8389	47.8389	48.4504	48.4504	48.6641	(38)
Heat transfer coeff	127.0785	126.3786	126.1551	125.5140	125.5140	125.3102	125.3102	125.1113	125.1113	125.7228	125.7228	125.9365	(39)
Average = Sum(39)m / 12 =												125.7388	(39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1914	1.1849	1.1828	1.1768	1.1768	1.1749	1.1749	1.1730	1.1730	1.1787	1.1787	1.1807	(40)
Days in month												1.1789	(40)
	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7932	(42)
Average daily hot water use (litres/day)												100.5390	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	110.5929	106.5713	102.5498	98.5282	94.5066	90.4851	90.4851	94.5066	98.5282	102.5498	106.5713	110.5929	(44)
Energy conte	164.0060	143.4407	148.0180	129.0457	123.8224	106.8493	99.0116	113.6172	114.9742	133.9913	146.2620	158.8311	(45)
Energy content (annual)											Total = Sum (45)m =	1581.8696	(45)
Distribution loss (46)m = 0.15 x (45)m													
	24.6009	21.5161	22.2027	19.3568	18.5734	16.0274	14.8517	17.0426	17.2461	20.0987	21.9393	23.8247	(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	0.6698	0.6089	0.6522	0.5722	0.5266	0.4351	0.4032	0.4832	0.5098	0.5904	0.6209	0.6487	(61)
Total heat required for water heating calculated for each month													
	164.6759	144.0497	148.6702	129.6178	124.3490	107.2844	99.4147	114.1004	115.4840	134.5817	146.8829	159.4798	(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													
	164.6759	144.0497	148.6702	129.6178	124.3490	107.2844	99.4147	114.1004	115.4840	134.5817	146.8829	159.4798	(64)
	Total per year (kWh/year) = Sum (64)m =											1588.5905	(64)
RHI water heating demand												1589	(64)
Heat gains from water heating, kWh/month													
	54.6995	47.8463	49.3790	43.0507	41.3026	35.6362	33.0221	37.8985	38.3564	44.6997	48.7874	52.9735	(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	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	66.7430	59.2806	48.2102	36.4982	27.2828	23.0333	24.8883	32.3508	43.4211	55.1331	64.3485	68.5980	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.0106	402.1407	391.7329	369.5761	341.6071	315.3202	297.7589	293.6288	304.0365	326.1933	354.1623	380.4493	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	(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)	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	(71)
Water heating gains (Table 5)	73.5208	71.1998	66.3697	59.7927	55.5142	49.4947	44.3846	50.9389	53.2727	60.0803	67.7602	71.2010	(72)
Total internal gains	651.6913	646.0380	619.7297	579.2839	537.8211	501.2651	480.4488	490.3354	514.1473	554.8237	599.6880	633.6652	(73)

6. Solar gains

[Jan]												
				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W	
East				4.0860	25.1733	0.7300		0.7200		0.7700	37.4651 (76)	
West				7.7170	25.1733	0.7300		0.7200		0.7700	70.7582 (80)	
Solar gains	108.2232	180.0914	300.9833	440.9784	508.5346	574.3841	528.6750	473.7230	368.4176	233.3002	134.4999	87.4796 (83)
Total gains	759.9145	826.1294	920.7130	1020.2623	1046.3557	1075.6493	1009.1238	964.0584	882.5649	788.1238	734.1879	721.1448 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	15.1397	15.2235	15.2505	15.3284	15.3284	15.3533	15.3533	15.3777	15.3777	15.3029	15.3029	15.2770		
alpha	2.0093	2.0149	2.0167	2.0219	2.0219	2.0236	2.0236	2.0252	2.0252	2.0202	2.0202	2.0185		
util living area	0.9020	0.8836	0.8392	0.7610	0.6509	0.4881	0.3671	0.3712	0.5835	0.7706	0.8681	0.9083	(86)	
MIT	18.3767	18.5901	19.1064	19.7590	20.3488	20.7605	20.9097	20.9108	20.6363	19.9806	19.1212	18.3635	(87)	
Th 2	19.9269	19.9321	19.9338	19.9386	19.9386	19.9402	19.9402	19.9417	19.9417	19.9371	19.9371	19.9354	(88)	
util rest of house	0.8903	0.8699	0.8197	0.7305	0.6010	0.4103	0.2628	0.2626	0.5083	0.7323	0.8495	0.8973	(89)	
MIT 2	16.5085	16.8117	17.5407	18.4486	19.2403	19.7422	19.8928	19.8966	19.6152	18.7725	17.5761	16.4936	(90)	
Living area fraction									fLA = Living area / (4) =			0.1548	(91)	
MIT	16.7977	17.0870	17.7831	18.6515	19.4119	19.8998	20.0502	20.0536	19.7733	18.9595	17.8153	16.7831	(92)	

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Temperature adjustment													-0.1500
adjusted MIT	16.6477	16.9370	17.6331	18.5015	19.2619	19.7498	19.9002	19.9036	19.6233	18.8095	17.6653	16.6331	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8393	0.8168	0.7647	0.6801	0.5644	0.3949	0.2586	0.2584	0.4826	0.6814	0.7951	0.8476	(94)
Useful gains	637.8229	674.7824	704.0455	693.8394	590.5641	424.8081	260.9103	249.1049	425.8958	537.0411	583.7365	611.2264	(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	1391.2179	1369.5647	1253.1074	1054.5006	773.4080	482.4249	275.7109	263.1830	515.8664	818.3952	1114.5710	1364.2796	(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	560.5259	466.8937	408.5021	259.6761	136.0358	0.0000	0.0000	0.0000	0.0000	209.3274	382.2008	560.2716	(98)
RHI space heating demand												2983.4334	(98)
												2983	(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	53.3300 (1b)	x 2.3700 (2b)	= 126.3921 (1b) - (3b)
First floor	53.3300 (1c)	x 2.6200 (2c)	= 139.7246 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.6600		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 266.1167 (5)
Dwelling volume			

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					2 * 10 = 20.0000 (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) =					20.0000 / (5) = 0.0752 (8)
Pressure test					Yes
Measured/design AP50					4.4800
Infiltration rate					0.2992 (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) =	0.2992 (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	0.3814	0.3739	0.3665	0.3291	0.3216	0.2842	0.2842	0.2767	0.2992	0.3216	0.3365	0.3515 (22b)
Effective ac	0.5727	0.5699	0.5671	0.5541	0.5517	0.5404	0.5404	0.5383	0.5447	0.5517	0.5566	0.5618 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.8000	1.3258	15.6572		(27)
Flr - Ground			53.3290	0.1800	9.5992	75.6000	4031.6724 (28a)
Wl - Brick (Timber Frame)	149.9800	13.8930	136.0870	0.2100	28.5783	7.4000	1007.0438 (29a)
Rf - Ins Joist	53.3290		53.3290	0.0800	4.2663	7.4000	394.6346 (30)
Total net area of external elements Aum(A, m ²)			256.6450				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.6090		(33)
Stud			95.0702			7.4000	703.5193 (32c)
Internal Floor			53.3290			7.4000	394.6346 (32d)
Internal Ceiling			53.3290			7.4000	394.6346 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6926.1393 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.9366 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							16.6634 (36)
Total fabric heat loss						(33) + (36) =	77.2724 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	50.2973	50.0493	49.8061	48.6641	48.4504	47.4557	47.4557	47.2715	47.8389	48.4504	48.8827	49.3346 (38)
Heat transfer coeff	127.5697	127.3217	127.0785	125.9365	125.7228	124.7281	124.7281	124.5439	125.1113	125.7228	126.1551	126.6070 (39)
Average = Sum(39)m / 12 =												125.9355 (39)
HLP	1.1960	1.1937	1.1914	1.1807	1.1787	1.1694	1.1694	1.1677	1.1730	1.1787	1.1828	1.1870 (40)
HLP (average)												1.1807 (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												2.7932 (42)
Average daily hot water use (litres/day)												100.5390 (43)
Daily hot water use	110.5929	106.5713	102.5498	98.5282	94.5066	90.4851	90.4851	94.5066	98.5282	102.5498	106.5713	110.5929 (44)
Energy conte	164.0060	143.4407	148.0180	129.0457	123.8224	106.8493	99.0116	113.6172	114.9742	133.9913	146.2620	158.8311 (45)
Energy content (annual)										Total = Sum(45)m =		1581.8696 (45)
Distribution loss (46)m = 0.15 x (45)m	24.6009	21.5161	22.2027	19.3568	18.5734	16.0274	14.8517	17.0426	17.2461	20.0987	21.9393	23.8247 (46)

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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	0.6698	0.6089	0.6522	0.5722	0.5266	0.4351	0.4032	0.4832	0.5098	0.5904	0.6209	0.6487	(61)
Total heat required for water heating calculated for each month	164.6759	144.0497	148.6702	129.6178	124.3490	107.2844	99.4147	114.1004	115.4840	134.5817	146.8829	159.4798	(62)
WWHRS	-54.5018	-47.9555	-48.9443	-40.2635	-37.3822	-30.8361	-26.0934	-31.5945	-32.5181	-40.2033	-46.5764	-52.6799	eq. (G10)
Total of WWHRS savings												-489.5489	
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	110.1741	96.0941	99.7258	89.3543	86.9668	76.4483	73.3214	82.5060	82.9659	94.3784	100.3065	106.7999	(64)
Heat gains from water heating, kWh/month	54.6995	47.8463	49.3790	43.0507	41.3026	35.6362	33.0221	37.8985	38.3564	44.6997	48.7874	52.9735	(65)
Solar input (sum of months) = Sum(63)m = 0.0000 (63)													
Total per year (kWh/year) = Sum(64)m = 1099.0416 (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	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	66.7430	59.2806	48.2102	36.4982	27.2828	23.0333	24.8883	32.3508	43.4211	55.1331	64.3485	68.5980	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.0106	402.1407	391.7329	369.5761	341.6071	315.3202	297.7589	293.6288	304.0365	326.1933	354.1623	380.4493	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	(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)	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	(71)
Water heating gains (Table 5)	73.5208	71.1998	66.3697	59.7927	55.5142	49.4947	44.3846	50.9389	53.2727	60.0803	67.7602	71.2010	(72)
Total internal gains	651.6913	646.0380	619.7297	579.2839	537.8211	501.2651	480.4488	490.3354	514.1473	554.8237	599.6880	633.6652	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
East				4.0860	19.6403	0.7300	0.7200			0.7700			29.2304 (76)
West				7.7170	19.6403	0.7300	0.7200			0.7700			55.2058 (80)
Solar gains	84.4361	165.1750	272.0197	396.7245	486.2007	497.7130	473.8430	407.0242	316.3701	195.9940	105.2819	69.4362	(83)
Total gains	736.1274	811.2129	891.7494	976.0084	1024.0218	998.9781	954.2918	897.3596	830.5175	750.8177	704.9699	703.1014	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	15.0814	15.1108	15.1397	15.2770	15.3029	15.4250	15.4250	15.4478	15.3777	15.3029	15.2505	15.1961	
alpha	2.0054	2.0074	2.0093	2.0185	2.0202	2.0283	2.0283	2.0299	2.0252	2.0202	2.0167	2.0131	
util living area	0.9190	0.8998	0.8647	0.8022	0.7121	0.5924	0.4772	0.5135	0.6823	0.8292	0.8983	0.9252	(86)
MIT	17.9765	18.2523	18.7671	19.4487	20.0779	20.5656	20.8034	20.7639	20.3768	19.5646	18.6565	17.9172	(87)
Th 2	19.9232	19.9250	19.9269	19.9354	19.9371	19.9446	19.9446	19.9459	19.9417	19.9371	19.9338	19.9304	(88)
util rest of house	0.9099	0.8887	0.8490	0.7776	0.6726	0.5289	0.3871	0.4250	0.6258	0.8027	0.8851	0.9168	(89)
MIT 2	15.9342	16.3271	17.0589	18.0193	18.8827	19.5223	19.7988	19.7619	19.2980	18.2004	16.9143	15.8518	(90)
Living area fraction	16.2503	16.6251	17.3233	18.2405	19.0677	19.6838	19.9543	19.9170	19.4650	18.4116	17.1840	16.1715	(92)
Temperature adjustment	16.1003	16.4751	17.1733	18.0905	18.9177	19.5338	19.8043	19.7670	19.3150	18.2616	17.0340	16.0215	(93)
adjusted MIT													

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	634.7147	679.3027	708.2941	706.4275	642.8179	500.4317	356.8465	366.3694	486.8283	561.5244	587.6238	612.3177	(94)
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	1505.3631	1473.7653	1356.3479	1157.4248	907.4262	615.3824	399.6654	419.3376	652.4580	963.2340	1253.2184	1496.6823	(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	647.7624	533.8788	482.1521	324.7181	196.8685	0.0000	0.0000	0.0000	0.0000	298.8719	479.2281	657.9673	(98)
Space heating												3621.4472	(98)
Space heating per m ²												33.9532	(99)
(98) / (4) =													

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

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													4014.9082 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	647.7624	533.8788	482.1521	324.7181	196.8685	0.0000	0.0000	0.0000	0.0000	298.8719	479.2281	657.9673	(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)	718.1401	591.8834	534.5367	359.9979	218.2578	0.0000	0.0000	0.0000	0.0000	331.3436	531.2950	729.4537	(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	110.1741	96.0941	99.7258	89.3543	86.9668	76.4483	73.3214	82.5060	82.9659	94.3784	100.3065	106.7999	(64)
Efficiency of water heater (217)m	87.8923	87.7814	87.4915	86.8160	85.4697	76.4000	76.4000	76.4000	76.4000	86.4523	87.4655	87.9807	(216)
Fuel for water heating, kWh/month	125.3513	109.4698	113.9834	102.9237	101.7516	100.0632	95.9704	107.9921	108.5941	109.1682	114.6812	121.3902	(219)
Water heating fuel used												1311.3392	(219)
Annual totals kWh/year													
Space heating fuel - main system													4014.9082 (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)													471.4810 (232)
Total delivered energy for all uses													5872.7284 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4014.9082	3.4800	139.7188 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1311.3392	3.4800	45.6346 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	471.4810	13.1900	62.1883 (250)
Additional standing charges			120.0000 (251)
Total energy cost			377.4343 (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] =	1.0452 (257)
SAP value		85.4188
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	4014.9082	0.2160	867.2202 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1311.3392	0.2160	283.2493 (264)
Space and water heating			1150.4694 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	471.4810	0.5190	244.6986 (268)
Total kg/year			1434.0931 (272)
CO2 emissions per m2			13.4500 (273)
EI value			87.3290
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	$3.48 / 0.8358 = 4.164$, stars = 5
Water heating environmental impact	$0.216 / 0.8358 = 0.2584$, 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	53.3300 (1b)	x 2.3700 (2b)	= 126.3921 (1b) - (3b)
First floor	53.3300 (1c)	x 2.6200 (2c)	= 139.7246 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 266.1167 (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					2 * 10 = 20.0000 (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) =					20.0000 / (5) = 0.0752 (8)
Pressure test					Yes
Measured/design AP50					4.4800
Infiltration rate					0.2992 (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) =	0.2992 (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												
Effective ac	0.3665	0.3440	0.3365	0.3141	0.3141	0.3066	0.3066	0.2992	0.2992	0.3216	0.3216	0.3291 (22b)
	0.5671	0.5592	0.5566	0.5493	0.5493	0.5470	0.5470	0.5447	0.5447	0.5517	0.5517	0.5541 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.8000	1.3258	15.6572		(27)
Flr - Ground			53.3290	0.1800	9.5992	75.6000	4031.6724 (28a)
Wl - Brick (Timber Frame)	149.9800	13.8930	136.0870	0.2100	28.5783	7.4000	1007.0438 (29a)
Rf - Ins Joist	53.3290		53.3290	0.0800	4.2663	7.4000	394.6346 (30)
Total net area of external elements Aum(A, m ²)			256.6450				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.6090		(33)
Stud			95.0702			7.4000	703.5193 (32c)
Internal Floor			53.3290			7.4000	394.6346 (32d)
Internal Ceiling			53.3290			7.4000	394.6346 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6926.1393 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.9366 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							16.6634 (36)
Total fabric heat loss						(33) + (36) =	77.2724 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	49.8061	49.1062	48.8827	48.2416	48.2416	48.0378	48.0378	47.8389	47.8389	48.4504	48.4504	48.6641 (38)
Heat transfer coeff	127.0785	126.3786	126.1551	125.5140	125.5140	125.3102	125.3102	125.1113	125.1113	125.7228	125.7228	125.9365 (39)
Average = Sum(39)m / 12 =												125.7388 (39)
HLP	1.1914	1.1849	1.1828	1.1768	1.1768	1.1749	1.1749	1.1730	1.1730	1.1787	1.1787	1.1807 (40)
HLP (average)												1.1789 (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												2.7932 (42)
Average daily hot water use (litres/day)												100.5390 (43)
Daily hot water use	110.5929	106.5713	102.5498	98.5282	94.5066	90.4851	90.4851	94.5066	98.5282	102.5498	106.5713	110.5929 (44)
Energy conte	164.0060	143.4407	148.0180	129.0457	123.8224	106.8493	99.0116	113.6172	114.9742	133.9913	146.2620	158.8311 (45)
Energy content (annual)										Total = Sum(45)m =		1581.8696 (45)
Distribution loss (46)m = 0.15 x (45)m	24.6009	21.5161	22.2027	19.3568	18.5734	16.0274	14.8517	17.0426	17.2461	20.0987	21.9393	23.8247 (46)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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	0.6698	0.6089	0.6522	0.5722	0.5266	0.4351	0.4032	0.4832	0.5098	0.5904	0.6209	0.6487	(61)
Total heat required for water heating calculated for each month	164.6759	144.0497	148.6702	129.6178	124.3490	107.2844	99.4147	114.1004	115.4840	134.5817	146.8829	159.4798	(62)
WWHRS	-54.5018	-47.9555	-48.9443	-40.2635	-37.3822	-30.8361	-26.0934	-31.5945	-32.5181	-40.2033	-46.5764	-52.6799	eq. (G10)
Total of WWHRS savings												-489.5489	
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	110.1741	96.0941	99.7258	89.3543	86.9668	76.4483	73.3214	82.5060	82.9659	94.3784	100.3065	106.7999	(64)
Heat gains from water heating, kWh/month	54.6995	47.8463	49.3790	43.0507	41.3026	35.6362	33.0221	37.8985	38.3564	44.6997	48.7874	52.9735	(65)
Solar input (sum of months) = Sum(63)m =													
Total per year (kWh/year) = Sum(64)m =													

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	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	66.7430	59.2806	48.2102	36.4982	27.2828	23.0333	24.8883	32.3508	43.4211	55.1331	64.3485	68.5980	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.0106	402.1407	391.7329	369.5761	341.6071	315.3202	297.7589	293.6288	304.0365	326.1933	354.1623	380.4493	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	(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)	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	(71)
Water heating gains (Table 5)	73.5208	71.1998	66.3697	59.7927	55.5142	49.4947	44.3846	50.9389	53.2727	60.0803	67.7602	71.2010	(72)
Total internal gains	651.6913	646.0380	619.7297	579.2839	537.8211	501.2651	480.4488	490.3354	514.1473	554.8237	599.6880	633.6652	(73)

6. Solar gains

[Jan]			Area m2		Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
East			4.0860		25.1733		0.7300		0.7200		0.7700		37.4651 (76)	
West			7.7170		25.1733		0.7300		0.7200		0.7700		70.7582 (80)	
Solar gains	108.2232	180.0914	300.9833	440.9784	508.5346	574.3841	528.6750	473.7230	368.4176	233.3002	134.4999	87.4796	(83)	
Total gains	759.9145	826.1294	920.7130	1020.2623	1046.3557	1075.6493	1009.1238	964.0584	882.5649	788.1238	734.1879	721.1448	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	15.1397	15.2235	15.2505	15.3284	15.3284	15.3533	15.3533	15.3777	15.3777	15.3029	15.3029	15.2770	
alpha	2.0093	2.0149	2.0167	2.0219	2.0219	2.0236	2.0236	2.0252	2.0252	2.0202	2.0202	2.0185	
util living area	0.9020	0.8836	0.8392	0.7610	0.6509	0.4881	0.3671	0.3712	0.5835	0.7706	0.8681	0.9083	(86)
MIT	18.3767	18.5901	19.1064	19.7590	20.3488	20.7605	20.9097	20.9108	20.6363	19.9806	19.1212	18.3635	(87)
Th 2	19.9269	19.9321	19.9338	19.9386	19.9386	19.9402	19.9402	19.9417	19.9417	19.9371	19.9371	19.9354	(88)
util rest of house	0.8903	0.8699	0.8197	0.7305	0.6010	0.4103	0.2628	0.2626	0.5083	0.7323	0.8495	0.8973	(89)
MIT 2	16.5085	16.8117	17.5407	18.4486	19.2403	19.7422	19.8928	19.8966	19.6152	18.7725	17.5761	16.4936	(90)
Living area fraction	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(91)
MIT	16.7977	17.0870	17.7831	18.6515	19.4119	19.8998	20.0502	20.0536	19.7733	18.9595	17.8153	16.7831	(92)
Temperature adjustment												-0.1500	
adjusted MIT	16.6477	16.9370	17.6331	18.5015	19.2619	19.7498	19.9002	19.9036	19.6233	18.8095	17.6653	16.6331	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	637.8229	674.7824	704.0455	693.8394	590.5641	424.8081	260.9103	249.1049	425.8958	537.0411	583.7365	611.2264	(94)
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	1391.2179	1369.5647	1253.1074	1054.5006	773.4080	482.4249	275.7109	263.1830	515.8664	818.3952	1114.5710	1364.2796	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	560.5259	466.8937	408.5021	259.6761	136.0358	0.0000	0.0000	0.0000	0.0000	209.3274	382.2008	560.2716	(98)
Space heating												2983.4334	(98)
Space heating per m2												27.9714	(99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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													3307.5759 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	560.5259	466.8937	408.5021	259.6761	136.0358	0.0000	0.0000	0.0000	0.0000	209.3274	382.2008	560.2716	(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)	621.4256	517.6205	452.8848	287.8892	150.8158	0.0000	0.0000	0.0000	0.0000	232.0703	423.7260	621.1437	(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	110.1741	96.0941	99.7258	89.3543	86.9668	76.4483	73.3214	82.5060	82.9659	94.3784	100.3065	106.7999	(64)
Efficiency of water heater (217)m	87.6008	87.5022	87.1124	86.2133	84.2643	76.4000	76.4000	76.4000	76.4000	85.4060	86.9356	87.6648	(216)
Fuel for water heating, kWh/month	125.7684	109.8190	114.4794	103.6433	103.2072	100.0632	95.9704	107.9921	108.5941	110.5055	115.3803	121.8276	(219)
Water heating fuel used												1317.2506	(219)
Annual totals kWh/year													
Space heating fuel - main system												3307.5759	(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)												471.4810	(232)
Total delivered energy for all uses												5171.3075	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3307.5759	5.9600	197.1315 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1317.2506	5.9600	78.5081 (247)
Pumps and fans for heating	75.0000	25.0500	18.7875 (249)
Energy for lighting	471.4810	25.0500	118.1060 (250)
Additional standing charges			112.0000 (251)
Total energy cost			524.5331 (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	3307.5759	0.2160	714.4364 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1317.2506	0.2160	284.5261 (264)
Space and water heating			998.9625 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	471.4810	0.5190	244.6986 (268)
Total kg/year			1282.5862 (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	3307.5759	1.2200	4035.2426 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1317.2506	1.2200	1607.0458 (264)
Space and water heating			5642.2883 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	471.4810	3.0700	1447.4466 (268)
Primary energy kWh/year			7319.9849 (272)
Primary energy kWh/m2/year			68.6291 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 85
Current environmental impact rating: 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	+ 8.8	-£ 488	-1010 kg (78.8%)

Measures omitted - SAP change or cost saving too small:	SAP change	Cost change	CO2 change
N Solar water heating	+ 0.8	-£ 36	-150 kg (11.7%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar photovoltaic panels	£488 9.47 kg/m ²	A 94	A 95
Total Savings	£488 9.47 kg/m ²		
Potential energy efficiency rating:		A 94	
Potential environmental impact rating:			A 95

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 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	£137	£137	£0
Mains gas	£388	£388	£0
Space heating	£328	£328	£0
Water heating	£79	£79	£0
Lighting	£118	£118	£0
Generated (PV)	-£0	-£488	£488
Total cost of fuels	£525	£37	£488
Total cost of uses	£525	£37	£488
Delivered energy	48 kWh/m ²	30 kWh/m ²	18 kWh/m ²
Carbon dioxide emissions	1.3 tonnes	0.3 tonnes	1.0 tonnes
CO2 emissions per m ²	12 kg/m ²	3 kg/m ²	9 kg/m ²
Primary energy	69 kWh/m ²	13 kWh/m ²	56 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	53.3300 (1b)	x 2.3700 (2b)	= 126.3921 (1b) - (3b)
First floor	53.3300 (1c)	x 2.6200 (2c)	= 139.7246 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 266.1167 (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					2 * 10 = 20.0000 (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) =					20.0000 / (5) = 0.0752 (8)
Pressure test					Yes
Measured/design AP50					4.4800
Infiltration rate					0.2992 (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) =	0.2992 (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	0.3814	0.3739	0.3665	0.3291	0.3216	0.2842	0.2842	0.2767	0.2992	0.3216	0.3365	0.3515 (22b)
Effective ac	0.5727	0.5699	0.5671	0.5541	0.5517	0.5404	0.5404	0.5383	0.5447	0.5517	0.5566	0.5618 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.8000	1.3258	15.6572		(27)
Flr - Ground			53.3290	0.1800	9.5992	75.6000	4031.6724 (28a)
Wl - Brick (Timber Frame)	149.9800	13.8930	136.0870	0.2100	28.5783	7.4000	1007.0438 (29a)
Rf - Ins Joist	53.3290		53.3290	0.0800	4.2663	7.4000	394.6346 (30)
Total net area of external elements Aum(A, m ²)			256.6450				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.6090		(33)
Stud			95.0702			7.4000	703.5193 (32c)
Internal Floor			53.3290			7.4000	394.6346 (32d)
Internal Ceiling			53.3290			7.4000	394.6346 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6926.1393 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.9366 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							16.6634 (36)
Total fabric heat loss						(33) + (36) =	77.2724 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	50.2973	50.0493	49.8061	48.6641	48.4504	47.4557	47.4557	47.2715	47.8389	48.4504	48.8827	49.3346 (38)
Heat transfer coeff	127.5697	127.3217	127.0785	125.9365	125.7228	124.7281	124.7281	124.5439	125.1113	125.7228	126.1551	126.6070 (39)
Average = Sum(39)m / 12 =												125.9355 (39)
HLP	1.1960	1.1937	1.1914	1.1807	1.1787	1.1694	1.1694	1.1677	1.1730	1.1787	1.1828	1.1870 (40)
HLP (average)												1.1807 (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												2.7932 (42)
Average daily hot water use (litres/day)												100.5390 (43)
Daily hot water use	110.5929	106.5713	102.5498	98.5282	94.5066	90.4851	90.4851	94.5066	98.5282	102.5498	106.5713	110.5929 (44)
Energy conte	164.0060	143.4407	148.0180	129.0457	123.8224	106.8493	99.0116	113.6172	114.9742	133.9913	146.2620	158.8311 (45)
Energy content (annual)										Total = Sum(45)m =		1581.8696 (45)
Distribution loss (46)m = 0.15 x (45)m	24.6009	21.5161	22.2027	19.3568	18.5734	16.0274	14.8517	17.0426	17.2461	20.0987	21.9393	23.8247 (46)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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	0.6698	0.6089	0.6522	0.5722	0.5266	0.4351	0.4032	0.4832	0.5098	0.5904	0.6209	0.6487	(61)
Total heat required for water heating calculated for each month	164.6759	144.0497	148.6702	129.6178	124.3490	107.2844	99.4147	114.1004	115.4840	134.5817	146.8829	159.4798	(62)
WWHRS	-54.5018	-47.9555	-48.9443	-40.2635	-37.3822	-30.8361	-26.0934	-31.5945	-32.5181	-40.2033	-46.5764	-52.6799	eq. (G10)
Total of WWHRS savings												-489.5489	
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	110.1741	96.0941	99.7258	89.3543	86.9668	76.4483	73.3214	82.5060	82.9659	94.3784	100.3065	106.7999	(64)
Heat gains from water heating, kWh/month	54.6995	47.8463	49.3790	43.0507	41.3026	35.6362	33.0221	37.8985	38.3564	44.6997	48.7874	52.9735	(65)
Solar input (sum of months) = Sum(63)m = 0.0000 (63)													
Total per year (kWh/year) = Sum(64)m = 1099.0416 (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	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	66.7430	59.2806	48.2102	36.4982	27.2828	23.0333	24.8883	32.3508	43.4211	55.1331	64.3485	68.5980	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.0106	402.1407	391.7329	369.5761	341.6071	315.3202	297.7589	293.6288	304.0365	326.1933	354.1623	380.4493	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	(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)	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	(71)
Water heating gains (Table 5)	73.5208	71.1998	66.3697	59.7927	55.5142	49.4947	44.3846	50.9389	53.2727	60.0803	67.7602	71.2010	(72)
Total internal gains	651.6913	646.0380	619.7297	579.2839	537.8211	501.2651	480.4488	490.3354	514.1473	554.8237	599.6880	633.6652	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
East				4.0860	19.6403	0.7300	0.7200			0.7700			29.2304 (76)
West				7.7170	19.6403	0.7300	0.7200			0.7700			55.2058 (80)
Solar gains	84.4361	165.1750	272.0197	396.7245	486.2007	497.7130	473.8430	407.0242	316.3701	195.9940	105.2819	69.4362	(83)
Total gains	736.1274	811.2129	891.7494	976.0084	1024.0218	998.9781	954.2918	897.3596	830.5175	750.8177	704.9699	703.1014	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	15.0814	15.1108	15.1397	15.2770	15.3029	15.4250	15.4250	15.4478	15.3777	15.3029	15.2505	15.1961	
alpha	2.0054	2.0074	2.0093	2.0185	2.0202	2.0283	2.0283	2.0299	2.0252	2.0202	2.0167	2.0131	
util living area	0.9190	0.8998	0.8647	0.8022	0.7121	0.5924	0.4772	0.5135	0.6823	0.8292	0.8983	0.9252	(86)
MIT	17.9765	18.2523	18.7671	19.4487	20.0779	20.5656	20.8034	20.7639	20.3768	19.5646	18.6565	17.9172	(87)
Th 2	19.9232	19.9250	19.9269	19.9354	19.9371	19.9446	19.9446	19.9459	19.9417	19.9371	19.9338	19.9304	(88)
util rest of house	0.9099	0.8887	0.8490	0.7776	0.6726	0.5289	0.3871	0.4250	0.6258	0.8027	0.8851	0.9168	(89)
MIT 2	15.9342	16.3271	17.0589	18.0193	18.8827	19.5223	19.7988	19.7619	19.2980	18.2004	16.9143	15.8518	(90)
Living area fraction	16.2503	16.6251	17.3233	18.2405	19.0677	19.6838	19.9543	19.9170	19.4650	18.4116	17.1840	16.1715	(92)
Temperature adjustment	16.1003	16.4751	17.1733	18.0905	18.9177	19.5338	19.8043	19.7670	19.3150	18.2616	17.0340	16.0215	(93)
adjusted MIT													

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	634.7147	679.3027	708.2941	706.4275	642.8179	500.4317	356.8465	366.3694	486.8283	561.5244	587.6238	612.3177	(94)
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	1505.3631	1473.7653	1356.3479	1157.4248	907.4262	615.3824	399.6654	419.3376	652.4580	963.2340	1253.2184	1496.6823	(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	647.7624	533.8788	482.1521	324.7181	196.8685	0.0000	0.0000	0.0000	0.0000	298.8719	479.2281	657.9673	(98)
Space heating												3621.4472	(98)
Space heating per m2												33.9532	(99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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													4014.9082 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	647.7624	533.8788	482.1521	324.7181	196.8685	0.0000	0.0000	0.0000	0.0000	298.8719	479.2281	657.9673	(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)	718.1401	591.8834	534.5367	359.9979	218.2578	0.0000	0.0000	0.0000	0.0000	331.3436	531.2950	729.4537	(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	110.1741	96.0941	99.7258	89.3543	86.9668	76.4483	73.3214	82.5060	82.9659	94.3784	100.3065	106.7999	(64)
Efficiency of water heater (217)m	87.8923	87.7814	87.4915	86.8160	85.4697	76.4000	76.4000	76.4000	76.4000	86.4523	87.4655	87.9807	(216)
Fuel for water heating, kWh/month	125.3513	109.4698	113.9834	102.9237	101.7516	100.0632	95.9704	107.9921	108.5941	109.1682	114.6812	121.3902	(219)
Water heating fuel used												1311.3392	(219)
Annual totals kWh/year													
Space heating fuel - main system													4014.9082 (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)													471.4810 (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													4145.4890 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4014.9082	3.4800	139.7188 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1311.3392	3.4800	45.6346 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	471.4810	13.1900	62.1883 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-1727.2394	13.1900	-227.8229 (252)
Total energy cost			149.6114 (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] =	0.4143 (257)
SAP value		94.2201
SAP rating (Section 12)		94 (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	4014.9082	0.2160	867.2202 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1311.3392	0.2160	283.2493 (264)
Space and water heating			1150.4694 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	471.4810	0.5190	244.6986 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			537.6558 (272)
CO2 emissions per m2			5.0400 (273)
EI value			95.2495
EI rating			95 (274)
EI band			A

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	53.3300 (1b)	x 2.3700 (2b)	= 126.3921 (1b) - (3b)
First floor	53.3300 (1c)	x 2.6200 (2c)	= 139.7246 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 266.1167 (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																2 * 10 =	20.0000 (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) =					20.0000 / (5) =	0.0752 (8)		
Pressure test															Yes			
Measured/design AP50															4.4800			
Infiltration rate															0.2992 (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) =					0.2992 (21)			
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
	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	0.3665	0.3440	0.3365	0.3141	0.3141	0.3066	0.3066	0.2992	0.2992	0.3216	0.3216	0.3291 (22b)						
Effective ac	0.5671	0.5592	0.5566	0.5493	0.5493	0.5470	0.5470	0.5447	0.5447	0.5517	0.5517	0.5541 (25)						

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.8000	1.3258	15.6572		(27)
Flr - Ground			53.3290	0.1800	9.5992	75.6000	4031.6724 (28a)
Wl - Brick (Timber Frame)	149.9800	13.8930	136.0870	0.2100	28.5783	7.4000	1007.0438 (29a)
Rf - Ins Joist	53.3290		53.3290	0.0800	4.2663	7.4000	394.6346 (30)
Total net area of external elements Aum(A, m ²)			256.6450				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.6090		(33)
Stud			95.0702			7.4000	703.5193 (32c)
Internal Floor			53.3290			7.4000	394.6346 (32d)
Internal Ceiling			53.3290			7.4000	394.6346 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6926.1393 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.9366 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							16.6634 (36)
Total fabric heat loss						(33) + (36) =	77.2724 (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	49.8061	49.1062	48.8827	48.2416	48.2416	48.0378	48.0378	47.8389	47.8389	48.4504	48.4504	48.6641 (38)
Heat transfer coeff	127.0785	126.3786	126.1551	125.5140	125.5140	125.3102	125.3102	125.1113	125.1113	125.7228	125.7228	125.9365 (39)
Average = Sum(39)m / 12 =												125.7388 (39)
HLP	Jan 1.1914	Feb 1.1849	Mar 1.1828	Apr 1.1768	May 1.1768	Jun 1.1749	Jul 1.1749	Aug 1.1730	Sep 1.1730	Oct 1.1787	Nov 1.1787	Dec 1.1807 (40)
HLP (average)												1.1789 (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												2.7932 (42)
Average daily hot water use (litres/day)												100.5390 (43)
Daily hot water use	Jan 110.5929	Feb 106.5713	Mar 102.5498	Apr 98.5282	May 94.5066	Jun 90.4851	Jul 90.4851	Aug 94.5066	Sep 98.5282	Oct 102.5498	Nov 106.5713	Dec 110.5929 (44)
Energy conte	164.0060	143.4407	148.0180	129.0457	123.8224	106.8493	99.0116	113.6172	114.9742	133.9913	146.2620	158.8311 (45)
Energy content (annual)												Total = Sum(45)m = 1581.8696 (45)
Distribution loss (46)m = 0.15 x (45)m	24.6009	21.5161	22.2027	19.3568	18.5734	16.0274	14.8517	17.0426	17.2461	20.0987	21.9393	23.8247 (46)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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	0.6698	0.6089	0.6522	0.5722	0.5266	0.4351	0.4032	0.4832	0.5098	0.5904	0.6209	0.6487	(61)
Total heat required for water heating calculated for each month	164.6759	144.0497	148.6702	129.6178	124.3490	107.2844	99.4147	114.1004	115.4840	134.5817	146.8829	159.4798	(62)
WWHRS	-54.5018	-47.9555	-48.9443	-40.2635	-37.3822	-30.8361	-26.0934	-31.5945	-32.5181	-40.2033	-46.5764	-52.6799	eq. (G10)
Total of WWHRS savings												-489.5489	
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	110.1741	96.0941	99.7258	89.3543	86.9668	76.4483	73.3214	82.5060	82.9659	94.3784	100.3065	106.7999	(64)
Heat gains from water heating, kWh/month	54.6995	47.8463	49.3790	43.0507	41.3026	35.6362	33.0221	37.8985	38.3564	44.6997	48.7874	52.9735	(65)
Solar input (sum of months) = Sum(63)m = 0.0000 (63)													
Total per year (kWh/year) = Sum(64)m = 1099.0416 (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	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	167.5932	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	66.7430	59.2806	48.2102	36.4982	27.2828	23.0333	24.8883	32.3508	43.4211	55.1331	64.3485	68.5980	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.0106	402.1407	391.7329	369.5761	341.6071	315.3202	297.7589	293.6288	304.0365	326.1933	354.1623	380.4493	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	54.5525	(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)	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	-111.7288	(71)
Water heating gains (Table 5)	73.5208	71.1998	66.3697	59.7927	55.5142	49.4947	44.3846	50.9389	53.2727	60.0803	67.7602	71.2010	(72)
Total internal gains	651.6913	646.0380	619.7297	579.2839	537.8211	501.2651	480.4488	490.3354	514.1473	554.8237	599.6880	633.6652	(73)

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
East	4.0860				25.1733		0.7300		0.7200		0.7700		37.4651 (76)	
West	7.7170				25.1733		0.7300		0.7200		0.7700		70.7582 (80)	
Solar gains	108.2232	180.0914	300.9833	440.9784	508.5346	574.3841	528.6750	473.7230	368.4176	233.3002	134.4999	87.4796	(83)	
Total gains	759.9145	826.1294	920.7130	1020.2623	1046.3557	1075.6493	1009.1238	964.0584	882.5649	788.1238	734.1879	721.1448	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	15.1397	15.2235	15.2505	15.3284	15.3284	15.3533	15.3533	15.3777	15.3777	15.3029	15.3029	15.2770	
alpha	2.0093	2.0149	2.0167	2.0219	2.0219	2.0236	2.0236	2.0252	2.0252	2.0202	2.0202	2.0185	
util living area	0.9020	0.8836	0.8392	0.7610	0.6509	0.4881	0.3671	0.3712	0.5835	0.7706	0.8681	0.9083	(86)
MIT	18.3767	18.5901	19.1064	19.7590	20.3488	20.7605	20.9097	20.9108	20.6363	19.9806	19.1212	18.3635	(87)
Th 2	19.9269	19.9321	19.9338	19.9386	19.9386	19.9402	19.9402	19.9417	19.9417	19.9371	19.9371	19.9354	(88)
util rest of house	0.8903	0.8699	0.8197	0.7305	0.6010	0.4103	0.2628	0.2626	0.5083	0.7323	0.8495	0.8973	(89)
MIT 2	16.5085	16.8117	17.5407	18.4486	19.2403	19.7422	19.8928	19.8966	19.6152	18.7725	17.5761	16.4936	(90)
Living area fraction	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(91)
MIT	16.7977	17.0870	17.7831	18.6515	19.4119	19.8998	20.0502	20.0536	19.7733	18.9595	17.8153	16.7831	(92)
Temperature adjustment												-0.1500	
adjusted MIT	16.6477	16.9370	17.6331	18.5015	19.2619	19.7498	19.9002	19.9036	19.6233	18.8095	17.6653	16.6331	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	637.8229	674.7824	704.0455	693.8394	590.5641	424.8081	260.9103	249.1049	425.8958	537.0411	583.7365	611.2264	(94)
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	1391.2179	1369.5647	1253.1074	1054.5006	773.4080	482.4249	275.7109	263.1830	515.8664	818.3952	1114.5710	1364.2796	(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	560.5259	466.8937	408.5021	259.6761	136.0358	0.0000	0.0000	0.0000	0.0000	209.3274	382.2008	560.2716	(98)
Space heating												2983.4334	(98)
Space heating per m2												27.9714	(99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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													3307.5759 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	560.5259	466.8937	408.5021	259.6761	136.0358	0.0000	0.0000	0.0000	0.0000	209.3274	382.2008	560.2716 (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)	621.4256	517.6205	452.8848	287.8892	150.8158	0.0000	0.0000	0.0000	0.0000	232.0703	423.7260	621.1437 (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	110.1741	96.0941	99.7258	89.3543	86.9668	76.4483	73.3214	82.5060	82.9659	94.3784	100.3065	106.7999 (64)	
Efficiency of water heater (217)m	87.6008	87.5022	87.1124	86.2133	84.2643	76.4000	76.4000	76.4000	76.4000	85.4060	86.9356	87.6648 (217)	
Fuel for water heating, kWh/month	125.7684	109.8190	114.4794	103.6433	103.2072	100.0632	95.9704	107.9921	108.5941	110.5055	115.3803	121.8276 (219)	
Water heating fuel used												1317.2506 (219)	
Annual totals kWh/year													
Space heating fuel - main system												3307.5759 (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)												471.4810 (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												3224.8615 (238)	

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3307.5759	5.9600	197.1315 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1317.2506	5.9600	78.5081 (247)
Pumps and fans for heating	75.0000	25.0500	18.7875 (249)
Energy for lighting	471.4810	25.0500	118.1060 (250)
Additional standing charges			112.0000 (251)
Energy saving/generation technologies			
PV Unit	-1946.4459	25.0500	-487.5847 (252)
Total energy cost			36.9484 (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	3307.5759	0.2160	714.4364 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1317.2506	0.2160	284.5261 (264)
Space and water heating			998.9625 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	471.4810	0.5190	244.6986 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	0.5190	-1010.2054 (269)
Total kg/year			272.3807 (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	3307.5759	1.2200	4035.2426 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1317.2506	1.2200	1607.0458 (264)
Space and water heating			5642.2883 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	471.4810	3.0700	1447.4466 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	3.0700	-5975.5890 (269)
Primary energy kWh/year			1344.3959 (272)
Primary energy kWh/m2/year			12.6045 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	050 - PRJ013014	Issued on Date	21/10/2024
Assessment Reference	050	Prop Type Ref	4B
Property	8 Erwood Close, Netley Abbey, Southampton, SO31 5TJ		
SAP Rating	85 B	DER	14.41
Environmental	87 B	TER	18.07
CO ₂ Emissions (t/year)	1.28	% DER<TER	20.25
General Requirements Compliance	Pass	DFEE	47.92
		TFEE	56.49
		% DFEE<TFEE	15.18
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)	18.07	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.41	kgCO ₂ /m ²	Pass
	-3.66 (-20.3%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	56.49	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	47.92	kWh/m ² /yr	
	-8.6 (-15.2%)	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	4.48 (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 East

4.09 m², No overhang

Windows facing West

7.72 m², No overhang

Air change rate

4.61 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

4.48 (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.