

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	017 - PRJ013014	Issued on Date	28/03/2024
Assessment Reference	017	Prop Type Ref	2B
Property	7 Deeble Way, Netley Abbey, Southampton, SO31 5JP		

SAP Rating	85 B	DER	15.18	TER	18.52
Environmental	88 B	% DER<TER	18.06		
CO ₂ Emissions (t/year)	1.04	DFEE	45.81	TFEE	51.59
General Requirements Compliance	Pass	% DFEE<TFEE	11.19		

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

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (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) =	0.1470 (8)			
Pressure test								Yes				
Measured/design AP50								4.7600				
Infiltration rate								0.3850	(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) =	0.3561 (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	0.4362	0.4095	0.4006	0.3739	0.3739	0.3650	0.3650	0.3561	0.3561	0.3828	0.3828	0.3917 (22b)
Effective ac	0.5951	0.5838	0.5802	0.5699	0.5699	0.5666	0.5666	0.5634	0.5634	0.5733	0.5733	0.5767 (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)			9.0800	1.3258	12.0379		(27)
Fir - Ground			40.9100	0.1800	7.3638	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	90.3710	11.1690	79.2020	0.2100	16.6324	7.4000	586.0948 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			172.1940				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.8151		(33)
Party Wall			46.2040	0.0000	0.0000	7.4000	341.9096 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (32e)
Heat capacity Cm = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 5452.2404 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							66.6370 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							15.2477 (36)
Total fabric heat loss							(33) + (36) = 57.0628 (37)

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

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(38)m	Jan 40.0923	Feb 39.3316	Mar 39.0886	Apr 38.3920	May 38.3920	Jun 38.1704	Jul 38.1704	Aug 37.9542	Sep 37.9542	Oct 38.6188	Nov 38.6188	Dec 38.8511 (38)
Heat transfer coeff	97.1551	96.3943	96.1514	95.4547	95.4547	95.2332	95.2332	95.0169	95.0169	95.6816	95.6816	95.9138 (39)
Average = Sum(39)m / 12 =												95.6990 (39)
HLP	Jan 1.1874	Feb 1.1781	Mar 1.1752	Apr 1.1666	May 1.1666	Jun 1.1639	Jul 1.1639	Aug 1.1613	Sep 1.1613	Oct 1.1694	Nov 1.1694	Dec 1.1723 (40)
HLP (average)												1.1696 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)
Daily hot water use	Jan 102.8407	Feb 99.1011	Mar 95.3614	Apr 91.6217	May 87.8821	Jun 84.1424	Jul 84.1424	Aug 87.8821	Sep 91.6217	Oct 95.3614	Nov 99.1011	Dec 102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)										Total = Sum(45)m =		1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (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	0.6702	0.5948	0.5907	0.4948	0.4554	0.3762	0.3486	0.4178	0.4408	0.5347	0.6065	0.6490 (61)
Total heat required for water heating calculated for each month	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (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	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (64)
RHI water heating demand										Total per year (kWh/year) = Sum(64)m =		1477.1660 (64)
Heat gains from water heating, kWh/month	50.8771	44.4996	45.9138	40.0237	38.3989	33.1311	30.7008	35.2341	35.6594	41.5629	45.3748	49.2717 (65)

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

Metabolic gains (Table 5), Watts	Jan 149.7892	Feb 149.7892	Mar 149.7892	Apr 149.7892	May 149.7892	Jun 149.7892	Jul 149.7892	Aug 149.7892	Sep 149.7892	Oct 149.7892	Nov 149.7892	Dec 149.7892 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.8308	49.5885	40.3280	30.5309	22.8222	19.2675	20.8192	27.0616	36.3220	46.1191	53.8278	57.3825 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	333.1376	336.5945	327.8832	309.3378	285.9275	263.9252	249.2263	245.7693	254.4807	273.0261	296.4364	318.4387 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754 (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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595 (71)
Water heating gains (Table 5)	68.3832	66.2196	61.7121	55.5885	51.6114	46.0154	41.2646	47.3577	49.5270	55.8641	63.0206	66.2254 (72)
Total internal gains	562.7568	557.8078	535.3285	500.8623	465.7663	434.6133	416.7152	425.5938	445.7348	480.4144	518.6899	547.4518 (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	
Southeast	2.7240		45.0642		0.7300		0.7200		0.7700		44.7123 (77)	
Northwest	6.3550		14.6130		0.7300		0.7200		0.7700		33.8255 (81)	
Solar gains	78.5379	123.8216	199.1239	293.4539	347.8662	399.4431	364.9442	318.4939	243.0489	157.2851	95.8917	64.7126 (83)
Total gains	641.2946	681.6294	734.4523	794.3163	813.6325	834.0564	781.6594	744.0876	688.7837	637.6995	614.5816	612.1645 (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)												
tau	Jan 15.5886	Feb 15.7116	Mar 15.7513	Apr 15.8663	May 15.8663	Jun 15.9032	Jul 15.9032	Aug 15.9394	Sep 15.9394	Oct 15.8287	Nov 15.8287	Dec 15.7903
alpha	2.0392	2.0474	2.0501	2.0578	2.0578	2.0602	2.0602	2.0626	2.0626	2.0552	2.0552	2.0527
util living area	0.8890	0.8726	0.8326	0.7584	0.6471	0.4836	0.3629	0.3678	0.5772	0.7571	0.8525	0.8949 (86)
MIT	18.5369	18.7291	19.1968	19.8120	20.3827	20.7765	20.9168	20.9175	20.6602	20.0529	19.2572	18.5376 (87)
Th 2	19.9301	19.9375	19.9399	19.9468	19.9468	19.9490	19.9490	19.9511	19.9511	19.9445	19.9445	19.9423 (88)
util rest of house	0.8761	0.8579	0.8125	0.7277	0.5970	0.4063	0.2599	0.2606	0.5023	0.7176	0.8324	0.8825 (89)
MIT 2	16.7261	17.0002	17.6617	18.5196	19.2852	19.7645	19.9055	19.9095	19.6468	18.8662	17.7599	16.7325 (90)
Living area fraction									fLA = Living area / (4) =			0.1678 (91)

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MIT	17.0300	17.2903	17.9193	18.7365	19.4693	19.9344	20.0752	20.0787	19.8168	19.0653	18.0111	17.0354 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.8800	17.1403	17.7693	18.5865	19.3193	19.7844	19.9252	19.9287	19.6668	18.9153	17.8611	16.8854 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8248	0.8056	0.7594	0.6795	0.5629	0.3931	0.2574	0.2581	0.4793	0.6702	0.7793	0.8323 (94)	
Useful gains	528.9612	549.1134	557.7424	539.7772	458.0159	327.8672	201.2214	192.0402	330.1241	427.3754	478.9699	509.5108 (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													
	1086.1899	1064.2210	968.1751	810.0756	593.6640	369.9192	211.9131	202.2590	395.9193	632.9628	866.9851	1063.2409 (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													
	414.5781	346.1523	305.3620	194.6148	100.9222	0.0000	0.0000	0.0000	0.0000	152.9571	279.3710	411.9753 (98)	
Space heating													2205.9328 (98)
RHI space heating demand													2206 (98)

FULL SAP CALCULATION PRINTOUT

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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	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (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) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					4.7600
Infiltration rate					0.3850 (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) =	0.3561 (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	0.4540	0.4451	0.4362	0.3917	0.3828	0.3383	0.3383	0.3294	0.3561	0.3828	0.4006	0.4184 (22b)
Effective ac	0.6031	0.5991	0.5951	0.5767	0.5733	0.5572	0.5572	0.5542	0.5634	0.5733	0.5802	0.5875 (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)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1800	7.3638	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	90.3710	11.1690	79.2020	0.2100	16.6324	7.4000	586.0948 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			172.1940				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.8151		(33)
Party Wall			46.2040	0.0000	0.0000	7.4000	341.9096 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 5452.2404 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							66.6370 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							15.2477 (36)
Total fabric heat loss							(33) + (36) = 57.0628 (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	40.6262	40.3566	40.0923	38.8511	38.6188	37.5378	37.5378	37.3376	37.9542	38.6188	39.0886	39.5798 (38)
Heat transfer coeff	97.6889	97.4193	97.1551	95.9138	95.6816	94.6005	94.6005	94.4003	95.0169	95.6816	96.1514	96.6426 (39)
Average = Sum(39)m / 12 =												95.9127 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1939	1.1907	1.1874	1.1723	1.1694	1.1562	1.1562	1.1538	1.1613	1.1694	1.1752	1.1812 (40)
HLP (average)												1.1722 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	102.8407	99.1011	95.3614	91.6217	87.8821	84.1424	84.1424	87.8821	91.6217	95.3614	99.1011	102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)												Total = Sum(45)m = 1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												

	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (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	0.6702	0.5948	0.5907	0.4948	0.4554	0.3762	0.3486	0.4178	0.4408	0.5347	0.6065	0.6490 (61)
Total heat required for water heating calculated for each month	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (62)
WWHRS	-49.4854	-43.5394	-44.4384	-36.5722	-33.9630	-28.0213	-23.7216	-28.7193	-29.5543	-36.5280	-42.3034	-47.8278 eq. (G10)
Total of WWHRS savings												-444.6741
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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189 (64)
Heat gains from water heating, kWh/month	50.8771	44.4996	45.9138	40.0237	38.3989	33.1311	30.7008	35.2341	35.6594	41.5629	45.3748	49.2717 (65)

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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													2983.6914 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	481.1488	397.9495	362.0809	244.1541	147.3231	0.0000	0.0000	0.0000	0.0000	219.3105	352.4778	486.8450	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	533.4244	441.1856	401.4201	270.6808	163.3294	0.0000	0.0000	0.0000	0.0000	243.1380	390.7736	539.7395	(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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189	(64)
Efficiency of water heater (217)m	87.4009	87.2805	86.9680	86.2164	84.7423	76.4000	76.4000	76.4000	76.4000	85.7433	86.8871	76.4000	(216)
Fuel for water heating, kWh/month	118.6425	103.6216	107.8497	97.3396	96.3336	93.8672	89.9191	101.2456	101.8344	103.3383	108.5463	114.8848	(219)
Water heating fuel used												1237.4227	(219)
Annual totals kWh/year													
Space heating fuel - main system												2983.6914	(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)												394.3960	(232)
Total delivered energy for all uses												4690.5101	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2983.6914	3.4800	103.8325 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1237.4227	3.4800	43.0623 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	394.3960	13.1900	52.0208 (250)
Additional standing charges			120.0000 (251)
Total energy cost			328.8081 (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] =	1.0889 (257)
SAP value		84.8093
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	2983.6914	0.2160	644.4773 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1237.4227	0.2160	267.2833 (264)
Space and water heating			911.7606 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	394.3960	0.5190	204.6915 (268)
Total kg/year			1155.3772 (272)
CO2 emissions per m2			14.1200 (273)
EI value			87.7921
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	$3.48 / 0.8319 = 4.183$, stars = 5
Water heating environmental impact	$0.216 / 0.8319 = 0.2596$, 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	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (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) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					4.7600
Infiltration rate					0.3850 (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)	=	0.3561 (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												
	0.4362	0.4095	0.4006	0.3739	0.3739	0.3650	0.3650	0.3561	0.3561	0.3828	0.3828	0.3917 (22b)
Effective ac	0.5951	0.5838	0.5802	0.5699	0.5699	0.5666	0.5666	0.5634	0.5634	0.5733	0.5733	0.5767 (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)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1800	7.3638	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	90.3710	11.1690	79.2020	0.2100	16.6324	7.4000	586.0948 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			172.1940				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.8151		(33)
Party Wall			46.2040	0.0000	0.0000	7.4000	341.9096 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5452.2404 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							66.6370 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							15.2477 (36)
Total fabric heat loss						(33) + (36) =	57.0628 (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	40.0923	39.3316	39.0886	38.3920	38.3920	38.1704	38.1704	37.9542	37.9542	38.6188	38.6188	38.8511 (38)
Heat transfer coeff	97.1551	96.3943	96.1514	95.4547	95.4547	95.2332	95.2332	95.0169	95.0169	95.6816	95.6816	95.9138 (39)
Average = Sum(39)m / 12 =												95.6990 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.1874	1.1781	1.1752	1.1666	1.1666	1.1639	1.1639	1.1613	1.1613	1.1694	1.1694	1.1723 (40)
HLP (average)												1.1696 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	102.8407	99.1011	95.3614	91.6217	87.8821	84.1424	84.1424	87.8821	91.6217	95.3614	99.1011	102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)												Total = Sum(45)m = 1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												

[illegible]

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.8308	49.5885	40.3280	30.5309	22.8222	19.2675	20.8192	27.0616	36.3220	46.1191	53.8278	57.3825 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	333.1376	336.5945	327.8832	309.3378	285.9275	263.9252	249.2263	245.7693	254.4807	273.0261	296.4364	318.4387 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754 (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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595 (71)
Water heating gains (Table 5)	68.3832	66.2196	61.7121	55.5885	51.6114	46.0154	41.2646	47.3577	49.5270	55.8641	63.0206	66.2254 (72)
Total internal gains	562.7568	557.8078	535.3285	500.8623	465.7663	434.6133	416.7152	425.5938	445.7348	480.4144	518.6899	547.4518 (73)

[Jan				Area	Solar flux	g		FF	Access		Gains	
				m2	Table 6a	Specific data		Specific data	factor		W	
					W/m2	or Table 6b		or Table 6c	Table 6d			

Southeast				2.7240	45.0642	0.7300		0.7200	0.7700		44.7123 (77)	
Northwest				6.3550	14.6130	0.7300		0.7200	0.7700		33.8255 (81)	

Solar gains	78.5379	123.8216	199.1239	293.4539	347.8662	399.4431	364.9442	318.4939	243.0489	157.2851	95.8917	64.7126 (83)
Total gains	641.2946	681.6294	734.4523	794.3163	813.6325	834.0564	781.6594	744.0876	688.7837	637.6995	614.5816	612.1645 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nll,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	15.5886	15.7116	15.7513	15.8663	15.8663	15.9032	15.9032	15.9394	15.9394	15.8287	15.8287	15.7903
alpha	2.0392	2.0474	2.0501	2.0578	2.0578	2.0602	2.0602	2.0626	2.0626	2.0552	2.0552	2.0527
util living area	0.8890	0.8726	0.8326	0.7584	0.6471	0.4836	0.3629	0.3678	0.5772	0.7571	0.8525	0.8949 (86)
MIT	18.5369	18.7291	19.1968	19.8120	20.3827	20.7765	20.9168	20.9175	20.6602	20.0529	19.2572	18.5376 (87)
Th 2	19.9301	19.9375	19.9399	19.9468	19.9468	19.9490	19.9490	19.9511	19.9511	19.9445	19.9445	19.9423 (88)
util rest of house	0.8761	0.8579	0.8125	0.7277	0.5970	0.4063	0.2599	0.2606	0.5023	0.7176	0.8324	0.8825 (89)
MIT 2	16.7261	17.0002	17.6617	18.5196	19.2852	19.7645	19.9055	19.9095	19.6468	18.8662	17.7599	16.7325 (90)
Living area fraction									fLA = Living area / (4) =			0.1678 (91)
MIT	17.0300	17.2903	17.9193	18.7365	19.4693	19.9344	20.0752	20.0787	19.8168	19.0653	18.0111	17.0354 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.8800	17.1403	17.7693	18.5865	19.3193	19.7844	19.9252	19.9287	19.6668	18.9153	17.8611	16.8854 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8248	0.8056	0.7594	0.6795	0.5629	0.3931	0.2574	0.2581	0.4793	0.6702	0.7793	0.8323 (94)
Useful gains	528.9612	549.1134	557.7424	539.7772	458.0159	327.8672	201.2214	192.0402	330.1241	427.3754	478.9699	509.5108 (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	1086.1899	1064.2210	968.1751	810.0756	593.6640	369.9192	211.9131	202.2590	395.9193	632.9628	866.9851	1063.2409 (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	414.5781	346.1523	305.3620	194.6148	100.9222	0.0000	0.0000	0.0000	0.0000	152.9571	279.3710	411.9753 (98)
Space heating												2205.9328 (98)
Space heating per m2												26.9608 (99)
										(98) / (4) =		

Regs Region: England
Elmhurst Energy Systems
SAP2012 Calculator (Design
System) version 4.14r19

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													2445.6018 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	414.5781	346.1523	305.3620	194.6148	100.9222	0.0000	0.0000	0.0000	0.0000	152.9571	279.3710	411.9753	(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)	459.6210	383.7609	338.5388	215.7592	111.8871	0.0000	0.0000	0.0000	0.0000	169.5755	309.7240	456.7353	(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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189	(64)
Efficiency of water heater (217)m	87.0539	86.9467	86.5274	85.5444	83.4588	76.4000	76.4000	76.4000	76.4000	84.5952	86.2672	76.4000	(216)
Fuel for water heating, kWh/month	119.1154	104.0195	108.3989	98.1041	97.8151	93.8672	89.9191	101.2456	101.8344	104.7408	109.3263	115.3881	(219)
Water heating fuel used												1243.7744	(219)
Annual totals kWh/year													
Space heating fuel - main system												2445.6018	(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)												394.3960	(232)
Total delivered energy for all uses												4158.7722	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2445.6018	7.6100	186.1103 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1243.7744	7.6100	94.6512 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	394.3960	31.0800	122.5783 (250)
Additional standing charges			105.0000 (251)
Total energy cost			531.6498 (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	2445.6018	0.2160	528.2500 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1243.7744	0.2160	268.6553 (264)
Space and water heating			796.9053 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	394.3960	0.5190	204.6915 (268)
Total kg/year			1040.5218 (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	2445.6018	1.2200	2983.6341 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1243.7744	1.2200	1517.4048 (264)
Space and water heating			4501.0390 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	394.3960	3.0700	1210.7958 (268)
Primary energy kWh/year			5942.0847 (272)
Primary energy kWh/m2/year			72.6239 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 85
Current environmental impact rating: 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
F	Already installed
G	Not considered
H	Not considered
I	Not considered
J	Not considered
K	Not considered
M	Not considered
N	Solar water heating
O	SAP increase too small
P	Not considered
R	Not considered
S	Not considered
T	Not considered
U	Solar photovoltaic panels
A2	Recommended
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
L2	Not applicable
Q3	Not considered
O3	Not considered

Recommended measures:	SAP change	Cost change	CO2 change
U Solar photovoltaic panels	+ 10.5	-£ 605	-1010 kg (97.1%)

Measures omitted - SAP change or cost saving too small:

N Solar water heating	+ 0.9	-£ 44	-143 kg (13.7%)
-----------------------	-------	-------	-----------------

Recommended measures	Typical annual savings		Energy efficiency	Environmental impact
Solar photovoltaic panels	£605	12.35 kg/m²	A 95	A 97
Total Savings	£605	12.35 kg/m²		
Potential energy efficiency rating:			A 95	
Potential environmental impact rating:				A 97

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

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

	Current	Potential	Saving
Electricity	£146	£146	£0
Mains gas	£386	£386	£0
Space heating	£314	£314	£0
Water heating	£95	£95	£0
Lighting	£123	£123	£0
Generated (PV)	-£0	-£605	£605
Total cost of fuels	£532	-£73	£605
Total cost of uses	£532	-£73	£605
Delivered energy	51 kWh/m²	27 kWh/m²	24 kWh/m²
Carbon dioxide emissions	1.0 tonnes	0.0 tonnes	1.0 tonnes
CO2 emissions per m²	13 kg/m²	0 kg/m²	12 kg/m²
Primary energy	73 kWh/m²	0 kWh/m²	73 kWh/m²

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	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (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) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					4.7600
Infiltration rate					0.3850 (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) =	0.3561 (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	0.4540	0.4451	0.4362	0.3917	0.3828	0.3383	0.3383	0.3294	0.3561	0.3828	0.4006	0.4184 (22b)
Effective ac	0.6031	0.5991	0.5951	0.5767	0.5733	0.5572	0.5572	0.5542	0.5634	0.5733	0.5802	0.5875 (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)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1800	7.3638	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	90.3710	11.1690	79.2020	0.2100	16.6324	7.4000	586.0948 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			172.1940				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.8151		(33)
Party Wall			46.2040	0.0000	0.0000	7.4000	341.9096 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5452.2404 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 66.6370 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 15.2477 (36)
Total fabric heat loss (33) + (36) = 57.0628 (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	40.6262	40.3566	40.0923	38.8511	38.6188	37.5378	37.5378	37.3376	37.9542	38.6188	39.0886	39.5798 (38)
Heat transfer coeff	97.6889	97.4193	97.1551	95.9138	95.6816	94.6005	94.6005	94.4003	95.0169	95.6816	96.1514	96.6426 (39)
Average = Sum(39)m / 12 =												95.9127 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1939	1.1907	1.1874	1.1723	1.1694	1.1562	1.1562	1.1538	1.1613	1.1694	1.1752	1.1812 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	102.8407	99.1011	95.3614	91.6217	87.8821	84.1424	84.1424	87.8821	91.6217	95.3614	99.1011	102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)												Total = Sum(45)m = 1470.9864 (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

Water storage loss:	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (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	0.6702	0.5948	0.5907	0.4948	0.4554	0.3762	0.3486	0.4178	0.4408	0.5347	0.6065	0.6490 (61)
Total heat required for water heating calculated for each month	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (62)
WWHRS	-49.4854	-43.5394	-44.4384	-36.5722	-33.9630	-28.0213	-23.7216	-28.7193	-29.5543	-36.5280	-42.3034	-47.8278 eq. (G10)
Total of WWHRS savings												-444.6741
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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189 (64)
Heat gains from water heating, kWh/month	50.8771	44.4996	45.9138	40.0237	38.3989	33.1311	30.7008	35.2341	35.6594	41.5629	45.3748	49.2717 (65)
Total per year (kWh/year) = Sum(64)m = 1032.4919 (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	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.8308	49.5885	40.3280	30.5309	22.8222	19.2675	20.8192	27.0616	36.3220	46.1191	53.8278	57.3825 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	333.1376	336.5945	327.8832	309.3378	285.9275	263.9252	249.2263	245.7693	254.4807	273.0261	296.4364	318.4387 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754 (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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595 (71)
Water heating gains (Table 5)	68.3832	66.2196	61.7121	55.5885	51.6114	46.0154	41.2646	47.3577	49.5270	55.8641	63.0206	66.2254 (72)
Total internal gains	562.7568	557.8078	535.3285	500.8623	465.7663	434.6133	416.7152	425.5938	445.7348	480.4144	518.6899	547.4518 (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
Southeast				2.7240	36.7938	0.7300	0.7200	0.7700	36.5065 (77)
Northwest				6.3550	11.2829	0.7300	0.7200	0.7700	26.1172 (81)
Solar gains	62.6237	115.3465	180.8646	262.7229	329.5247	342.6484	323.8964	208.8383	52.5706 (83)
Total gains	625.3805	673.1542	716.1931	763.5852	795.2909	777.2616	740.6116	697.2824	600.0224 (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	15.5034	15.5463	15.5886	15.7903	15.8287	16.0095	16.0095	16.0435	15.9394	15.8287	15.7513	15.6713
alpha	2.0336	2.0364	2.0392	2.0527	2.0552	2.0673	2.0673	2.0696	2.0626	2.0552	2.0501	2.0448
util living area	0.9072	0.8896	0.8581	0.7992	0.7097	0.5870	0.4718	0.5077	0.6740	0.8159	0.8845	0.9135 (86)
MIT	18.1480	18.3974	18.8653	19.5111	20.1183	20.5935	20.8180	20.7812	20.4171	19.6617	18.8113	18.1013 (87)
Th 2	19.9248	19.9275	19.9301	19.9423	19.9445	19.9552	19.9552	19.9572	19.9511	19.9445	19.9399	19.9351 (88)
util rest of house	0.8970	0.8774	0.8417	0.7743	0.6700	0.5236	0.3827	0.4200	0.6172	0.7880	0.8699	0.9039 (89)
MIT 2	16.1677	16.5233	17.1895	18.1024	18.9363	19.5604	19.8205	19.7868	19.3503	18.3294	17.1252	16.1043 (90)
Living area fraction									fLA = Living area / (4) =			0.1678 (91)
MIT	16.5000	16.8378	17.4708	18.3388	19.1346	19.7338	19.9879	19.9537	19.5293	18.5529	17.4081	16.4394 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.3500	16.6878	17.3208	18.1888	18.9846	19.5838	19.8379	19.8037	19.3793	18.4029	17.2581	16.2894 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	530.4460	556.1714	564.6231	551.8203	498.9909	387.3217	275.2844	282.8913	380.1702	451.8241	487.1644	513.9935 (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	1177.1514	1148.3581	1051.2910	890.9232	697.0058	471.4701	306.3042	321.3108	501.6238	746.5963	976.7169	1168.3551 (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	481.1488	397.9495	362.0809	244.1541	147.3231	0.0000	0.0000	0.0000	0.0000	219.3105	352.4778	486.8450 (98)
Space heating												2691.2897 (98)
Space heating per m2										(98) / (4) =		32.8928 (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													2983.6914 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	481.1488	397.9495	362.0809	244.1541	147.3231	0.0000	0.0000	0.0000	0.0000	219.3105	352.4778	486.8450	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	533.4244	441.1856	401.4201	270.6808	163.3294	0.0000	0.0000	0.0000	0.0000	243.1380	390.7736	539.7395	(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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189	(64)
Efficiency of water heater (217)m	87.4009	87.2805	86.9680	86.2164	84.7423	76.4000	76.4000	76.4000	76.4000	85.7433	86.8871	76.4000	(216)
Fuel for water heating, kWh/month	118.6425	103.6216	107.8497	97.3396	96.3336	93.8672	89.9191	101.2456	101.8344	103.3383	108.5463	114.8848	(219)
Water heating fuel used												1237.4227	(219)
Annual totals kWh/year													
Space heating fuel - main system												2983.6914	(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)												394.3960	(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												2963.2707	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2983.6914	3.4800	103.8325 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1237.4227	3.4800	43.0623 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	394.3960	13.1900	52.0208 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-1727.2394	13.1900	-227.8229 (252)
Total energy cost			100.9852 (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] =	0.3344 (257)
SAP value		95.3345
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	2983.6914	0.2160	644.4773 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1237.4227	0.2160	267.2833 (264)
Space and water heating			911.7606 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	394.3960	0.5190	204.6915 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			258.9399 (272)
CO2 emissions per m2			3.1600 (273)
EI value			97.2640
EI rating			97 (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	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (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) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					4.7600
Infiltration rate					0.3850 (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) =		0.3561 (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	0.4362	0.4095	0.4006	0.3739	0.3739	0.3650	0.3650	0.3561	0.3561	0.3828	0.3828	0.3917 (22b)
Effective ac	0.5951	0.5838	0.5802	0.5699	0.5699	0.5666	0.5666	0.5634	0.5634	0.5733	0.5733	0.5767 (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)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1800	7.3638	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	90.3710	11.1690	79.2020	0.2100	16.6324	7.4000	586.0948 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			172.1940				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.8151		(33)
Party Wall			46.2040	0.0000	0.0000	7.4000	341.9096 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (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) = 5452.2404 (34)
 (33) + (36) = 57.0628 (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	40.0923	39.3316	39.0886	38.3920	38.3920	38.1704	38.1704	37.9542	37.9542	38.6188	38.6188	38.8511 (38)
Heat transfer coeff	97.1551	96.3943	96.1514	95.4547	95.4547	95.2332	95.2332	95.0169	95.0169	95.6816	95.6816	95.9138 (39)
Average = Sum(39)m / 12 =												95.6990 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1874	1.1781	1.1752	1.1666	1.1666	1.1639	1.1639	1.1613	1.1613	1.1694	1.1694	1.1723 (40)
HLP (average)												1.1696 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	102.8407	99.1011	95.3614	91.6217	87.8821	84.1424	84.1424	87.8821	91.6217	95.3614	99.1011	102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)												Total = Sum(45)m = 1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												

	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (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	0.6702	0.5948	0.5907	0.4948	0.4554	0.3762	0.3486	0.4178	0.4408	0.5347	0.6065	0.6490 (61)
Total heat required for water heating calculated for each month	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (62)
WWHRS	-49.4854	-43.5394	-44.4384	-36.5722	-33.9630	-28.0213	-23.7216	-28.7193	-29.5543	-36.5280	-42.3034	-47.8278 eq. (G10)
Total of WWHRS savings												-444.6741
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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189 (64)
Heat gains from water heating, kWh/month	50.8771	44.4996	45.9138	40.0237	38.3989	33.1311	30.7008	35.2341	35.6594	41.5629	45.3748	49.2717 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.8308	49.5885	40.3280	30.5309	22.8222	19.2675	20.8192	27.0616	36.3220	46.1191	53.8278	57.3825 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	333.1376	336.5945	327.8832	309.3378	285.9275	263.9252	249.2263	245.7693	254.4807	273.0261	296.4364	318.4387 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754 (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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595 (71)
Water heating gains (Table 5)	68.3832	66.2196	61.7121	55.5885	51.6114	46.0154	41.2646	47.3577	49.5270	55.8641	63.0206	66.2254 (72)
Total internal gains	562.7568	557.8078	535.3285	500.8623	465.7663	434.6133	416.7152	425.5938	445.7348	480.4144	518.6899	547.4518 (73)

[Jan				Area	Solar flux	g		FF		Access		Gains
				m2	Table 6a	Specific data		Specific data		factor		W
					W/m2	or Table 6b		or Table 6c		Table 6d		

Southeast				2.7240	45.0642	0.7300		0.7200		0.7700		44.7123 (77)
Northwest				6.3550	14.6130	0.7300		0.7200		0.7700		33.8255 (81)

Solar gains	78.5379	123.8216	199.1239	293.4539	347.8662	399.4431	364.9442	318.4939	243.0489	157.2851	95.8917	64.7126 (83)
Total gains	641.2946	681.6294	734.4523	794.3163	813.6325	834.0564	781.6594	744.0876	688.7837	637.6995	614.5816	612.1645 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nll,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	15.5886	15.7116	15.7513	15.8663	15.8663	15.9032	15.9032	15.9394	15.9394	15.8287	15.8287	15.7903
alpha	2.0392	2.0474	2.0501	2.0578	2.0578	2.0602	2.0602	2.0626	2.0626	2.0552	2.0552	2.0527
util living area	0.8890	0.8726	0.8326	0.7584	0.6471	0.4836	0.3629	0.3678	0.5772	0.7571	0.8525	0.8949 (86)
MIT	18.5369	18.7291	19.1968	19.8120	20.3827	20.7765	20.9168	20.9175	20.6602	20.0529	19.2572	18.5376 (87)
Th 2	19.9301	19.9375	19.9399	19.9468	19.9468	19.9490	19.9490	19.9511	19.9511	19.9445	19.9445	19.9423 (88)
util rest of house	0.8761	0.8579	0.8125	0.7277	0.5970	0.4063	0.2599	0.2606	0.5023	0.7176	0.8324	0.8825 (89)
MIT 2	16.7261	17.0002	17.6617	18.5196	19.2852	19.7645	19.9055	19.9095	19.6468	18.8662	17.7599	16.7325 (90)
Living area fraction									fLA = Living area / (4) =			0.1678 (91)
MIT	17.0300	17.2903	17.9193	18.7365	19.4693	19.9344	20.0752	20.0787	19.8168	19.0653	18.0111	17.0354 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.8800	17.1403	17.7693	18.5865	19.3193	19.7844	19.9252	19.9287	19.6668	18.9153	17.8611	16.8854 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8248	0.8056	0.7594	0.6795	0.5629	0.3931	0.2574	0.2581	0.4793	0.6702	0.7793	0.8323 (94)
Useful gains	528.9612	549.1134	557.7424	539.7772	458.0159	327.8672	201.2214	192.0402	330.1241	427.3754	478.9699	509.5108 (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	1086.1899	1064.2210	968.1751	810.0756	593.6640	369.9192	211.9131	202.2590	395.9193	632.9628	866.9851	1063.2409 (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	414.5781	346.1523	305.3620	194.6148	100.9222	0.0000	0.0000	0.0000	0.0000	152.9571	279.3710	411.9753 (98)
Space heating												2205.9328 (98)
Space heating per m2												26.9608 (99)
										(98) / (4) =		

Regs Region: England
Elmhurst Energy Systems
SAP2012 Calculator (Design
System) version 4.14r19

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												2445.6018	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	414.5781	346.1523	305.3620	194.6148	100.9222	0.0000	0.0000	0.0000	0.0000	152.9571	279.3710	411.9753	(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)	459.6210	383.7609	338.5388	215.7592	111.8871	0.0000	0.0000	0.0000	0.0000	169.5755	309.7240	456.7353	(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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189	(64)
Efficiency of water heater (217)m	87.0539	86.9467	86.5274	85.5444	83.4588	76.4000	76.4000	76.4000	76.4000	84.5952	86.2672	76.4000	(216)
Fuel for water heating, kWh/month	119.1154	104.0195	108.3989	98.1041	97.8151	93.8672	89.9191	101.2456	101.8344	104.7408	109.3263	115.3881	(219)
Water heating fuel used												1243.7744	(219)
Annual totals kWh/year													
Space heating fuel - main system												2445.6018	(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)												394.3960	(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												2212.3263	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2445.6018	7.6100	186.1103 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1243.7744	7.6100	94.6512 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	394.3960	31.0800	122.5783 (250)
Additional standing charges			105.0000 (251)
Energy saving/generation technologies			
PV Unit	-1946.4459	31.0800	-604.9554 (252)
Total energy cost			-73.3056 (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	2445.6018	0.2160	528.2500 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1243.7744	0.2160	268.6553 (264)
Space and water heating			796.9053 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	394.3960	0.5190	204.6915 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	0.5190	-1010.2054 (269)
Total kg/year			30.3163 (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	2445.6018	1.2200	2983.6341 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1243.7744	1.2200	1517.4048 (264)
Space and water heating			4501.0390 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	394.3960	3.0700	1210.7958 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	3.0700	-5975.5890 (269)
Primary energy kWh/year			-33.5043 (272)
Primary energy kWh/m2/year			-0.4095 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	017 - PRJ013014	Issued on Date	28/03/2024
Assessment Reference	017	Prop Type Ref	2B
Property	7 Deeble Way, Netley Abbey, Southampton, SO31 5JP		
SAP Rating	85 B	DER	15.18
Environmental	88 B	TER	18.52
CO ₂ Emissions (t/year)	1.04	% DER<TER	18.06
General Requirements Compliance	Pass	DfEE	45.81
		TfEE	51.59
		% DfEE<TfEE	11.19
Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk		Assessor ID
			4299-0004
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Built)

Criterion 1 – Achieving the TER and TfEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	18.52	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	15.18	kgCO ₂ /m ²	Pass
	-3.34 (-18.0%)	kgCO ₂ /m ²	

1b TfEE and DfEE

Target Fabric Energy Efficiency (TfEE)	51.59	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DfEE)	45.81	kWh/m ² /yr	
	-5.8 (-11.2%)	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
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	1.36 (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	4.76 (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 South East

2.72 m², No overhang

Windows facing North West

6.36 m², No overhang

Air change rate

4.67 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

4.76 (measured in this dwelling)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Roof U-value

0.08

W/m²K

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