

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	033 - PRJ013014	Issued on Date	09/10/2024
Assessment Reference	033	Prop Type Ref	B
Property	41 Deeble Way, Netley Abbey, Southampton, SO31 5JP		

SAP Rating	85 B	DER	14.62	TER	17.64
Environmental	87 B	% DER<TER	17.12		
CO ₂ Emissions (t/year)	1.36	DFEE	48.60	TTEE	56.49
General Requirements Compliance	Pass	% DFEE<TFEE	13.98		

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	55.9600 (1b)	x 2.3700 (2b)	= 132.6252 (1b) - (3b)
First floor	55.9600 (1c)	x 2.6200 (2c)	= 146.6152 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	111.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 279.2404 (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								5 * 10 =	50.0000 (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) =							50.0000 / (5) =	0.1791 (8)			
Pressure test								Yes				
Measured/design AP50								4.3100				
Infiltration rate								0.3946 (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) =	0.3946 (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	0.4833	0.4537	0.4439	0.4143	0.4143	0.4044	0.4044	0.3946	0.3946	0.4241	0.4241	0.4340 (22b)
Effective ac	0.6168	0.6029	0.5985	0.5858	0.5858	0.5818	0.5818	0.5778	0.5778	0.5900	0.5900	0.5942 (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			1.9000	1.2000	2.2800		(26)
Half Glazed Door			2.0900	1.4000	2.9260		(26a)
Windows (Uw = 1.40)			17.4200	1.3258	23.0947		(27)
F1r - Ground			55.9640	0.1800	10.0735	75.6000	4230.8784 (28a)
W1 - Brick (Timber Frame)	151.1190	21.4090	129.7100	0.2100	27.2391	7.4000	959.8540 (29a)
Rf - Ins Joist	55.9640		55.9640	0.0800	4.4771	7.4000	414.1336 (30)
Total net area of external elements Aum(A, m ²)			263.0480				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	70.0904			(33)
Stud			100.9904			7.4000	747.3293 (32c)
Internal Floor			55.9640			7.4000	414.1336 (32d)
Internal Ceiling			55.9640			7.4000	414.1336 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 7180.4625 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.1571 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							19.3336 (36)
Total fabric heat loss							(33) + (36) = 89.4240 (37)

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

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CALCULATION OF HEAT DEMAND 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	56.8382	55.5605	55.1526	53.9826	53.9826	53.6105	53.6105	53.2474	53.2474	54.3636	54.3636	54.7536	(38)
Heat transfer coeff	146.2622	144.9846	144.5766	143.4066	143.4066	143.0345	143.0345	142.6714	142.6714	143.7876	143.7876	144.1777	(39)
Average = Sum(39) / 12 =												143.8168	(39)
HLP	1.3068	1.2954	1.2918	1.2813	1.2813	1.2780	1.2780	1.2748	1.2748	1.2847	1.2847	1.2882	(40)
HLP (average)												1.2850	(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												2.8259	(42)
Average daily hot water use (litres/day)												101.3145	(43)
Daily hot water use	111.4459	107.3933	103.3408	99.2882	95.2356	91.1830	91.1830	95.2356	99.2882	103.3408	107.3933	111.4459	(44)
Energy conte	165.2711	144.5471	149.1597	130.0410	124.7775	107.6735	99.7753	114.4936	115.8610	135.0249	147.3902	160.0562	(45)
Energy content (annual)										Total = Sum(45)m =		1594.0712	(45)
Distribution loss (46)m = 0.15 x (45)m	24.7907	21.6821	22.3740	19.5062	18.7166	16.1510	14.9663	17.1740	17.3792	20.2537	22.1085	24.0084	(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	0.6694	0.6089	0.6525	0.5810	0.5347	0.4418	0.4094	0.4907	0.5177	0.5906	0.6208	0.6483	(61)
Total heat required for water heating calculated for each month	165.9405	145.1560	149.8122	130.6221	125.3122	108.1153	100.1847	114.9843	116.3787	135.6155	148.0111	160.7045	(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	165.9405	145.1560	149.8122	130.6221	125.3122	108.1153	100.1847	114.9843	116.3787	135.6155	148.0111	160.7045	(64)
RHI water heating demand										Total per year (kWh/year) = Sum(64)m =		1600.8370	(64)
Heat gains from water heating, kWh/month	55.1200	48.2141	49.7587	43.3839	41.6222	35.9119	33.2776	38.1918	38.6532	45.0434	49.1625	53.3808	(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	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	63.7726	56.6423	46.0646	34.8738	26.0686	22.0082	23.7807	30.9110	41.4887	52.6794	61.4846	65.5450	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	409.3823	413.6304	402.9253	380.1355	351.3673	324.3293	306.2663	302.0182	312.7233	335.5132	364.2813	391.3193	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	(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)	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	(71)
Water heating gains (Table 5)	74.0860	71.7472	66.8800	60.2554	55.9438	49.8776	44.7280	51.3331	53.6850	60.5422	68.2812	71.7483	(72)
Total internal gains	661.5395	656.3185	630.1685	589.5633	547.6783	510.5137	489.0735	498.5608	522.1956	563.0334	608.3457	642.9112	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
North					8.1710	13.4684	0.7300		0.7200		0.7700		40.0849 (74)	
South					9.2460	56.5862	0.7300		0.7200		0.7700		190.5694 (78)	
Solar gains	230.6542	330.6751	458.0026	580.5983	628.3084	698.0325	646.5672	603.6145	524.4174	397.8227	274.3651	194.7984 (83)		
Total gains	892.1937	986.9936	1088.1711	1170.1616	1175.9867	1208.5463	1135.6408	1102.1754	1046.6129	960.8561	882.7108	837.7096 (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	13.6370	13.7571	13.7960	13.9085	13.9085	13.9447	13.9447	13.9802	13.9802	13.8717	13.8717	13.8341	
alpha	1.9091	1.9171	1.9197	1.9272	1.9272	1.9296	1.9296	1.9320	1.9320	1.9248	1.9248	1.9223	
util living area	0.8884	0.8653	0.8204	0.7483	0.6460	0.4866	0.3673	0.3664	0.5611	0.7405	0.8470	0.8965	(86)
MIT	18.2592	18.5102	19.0332	19.6812	20.2842	20.7284	20.8946	20.8986	20.6202	19.9668	19.0722	18.2454	(87)
Th 2	19.8355	19.8444	19.8473	19.8555	19.8555	19.8581	19.8581	19.8607	19.8607	19.8528	19.8528	19.8501	(88)
util rest of house	0.8749	0.8494	0.7984	0.7153	0.5931	0.4038	0.2554	0.2512	0.4816	0.6975	0.8254	0.8838	(89)
MIT 2	16.3194	16.6725	17.4046	18.3005	19.1047	19.6416	19.8065	19.8131	19.5329	18.7043	17.4754	16.3058	(90)
Living area fraction									fLA = Living area / (4) =			0.1892	(91)

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CALCULATION OF HEAT DEMAND 09 Jan 2014

MIT	16.6863	17.0201	17.7127	18.5616	19.3278	19.8472	20.0123	20.0184	19.7386	18.9431	17.7774	16.6727 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.5363	16.8701	17.5627	18.4116	19.1778	19.6972	19.8623	19.8684	19.5886	18.7931	17.6274	16.5227 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8203	0.7930	0.7417	0.6644	0.5567	0.3909	0.2559	0.2520	0.4601	0.6486	0.7687	0.8307 (94)	
Useful gains	731.8690	782.7030	807.1246	777.4946	654.6753	472.4461	290.5815	277.7978	481.5257	623.2073	678.5026	695.8568 (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													
	1584.9415	1561.5016	1425.9119	1191.9406	871.5971	543.1236	309.2881	295.1043	583.3272	933.6334	1269.2774	1545.9673 (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													
	634.6859	523.3527	460.3777	298.4011	161.3898	0.0000	0.0000	0.0000	0.0000	230.9570	425.3579	632.4823 (98)	
Space heating												3367.0044 (98)	
RHI space heating demand												3367 (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	55.9600 (1b)	x 2.3700 (2b)	= 132.6252 (1b) - (3b)
First floor	55.9600 (1c)	x 2.6200 (2c)	= 146.6152 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	111.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 279.2404 (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					5 * 10 = 50.0000 (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)					50.0000 / (5) = 0.1791 (8)
Pressure test					Yes
Measured/design AP50					4.3100
Infiltration rate					0.3946 (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) =	0.3946 (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	0.5031	0.4932	0.4833	0.4340	0.4241	0.3748	0.3748	0.3650	0.3946	0.4241	0.4439	0.4636 (22b)
Effective ac	0.6265	0.6216	0.6168	0.5942	0.5900	0.5702	0.5702	0.5666	0.5778	0.5900	0.5985	0.6075 (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			1.9000	1.2000	2.2800		(26)
Half Glazed Door			2.0900	1.4000	2.9260		(26a)
Windows (Uw = 1.40)			17.4200	1.3258	23.0947		(27)
Flr - Ground			55.9640	0.1800	10.0735	75.6000	4230.8784 (28a)
Wl - Brick (Timber Frame)	151.1190	21.4090	129.7100	0.2100	27.2391	7.4000	959.8540 (29a)
Rf - Ins Joist	55.9640		55.9640	0.0800	4.4771	7.4000	414.1336 (30)
Total net area of external elements Aum(A, m ²)			263.0480				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	70.0904		(33)
Stud			100.9904			7.4000	747.3293 (32c)
Internal Floor			55.9640			7.4000	414.1336 (32d)
Internal Ceiling			55.9640			7.4000	414.1336 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 7180.4625 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.1571 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							19.3336 (36)
Total fabric heat loss							(33) + (36) = 89.4240 (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	57.7348	57.2820	56.8382	54.7536	54.3636	52.5480	52.5480	52.2118	53.2474	54.3636	55.1526	55.9775 (38)
Heat transfer coeff	147.1588	146.7060	146.2622	144.1777	143.7876	141.9721	141.9721	141.6358	142.6714	143.7876	144.5766	145.4015 (39)
Average = Sum(39)m / 12 =												144.1758 (39)
HLP	1.3149	1.3108	1.3068	1.2882	1.2847	1.2685	1.2685	1.2655	1.2748	1.2847	1.2918	1.2992 (40)
HLP (average)												1.2882 (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												2.8259 (42)
Average daily hot water use (litres/day)												101.3145 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	111.4459	107.3933	103.3408	99.2882	95.2356	91.1830	91.1830	95.2356	99.2882	103.3408	107.3933	111.4459 (44)
Energy conte	165.2711	144.5471	149.1597	130.0410	124.7775	107.6735	99.7753	114.4936	115.8610	135.0249	147.3902	160.0562 (45)
Energy content (annual)										Total = Sum(45)m =		1594.0712 (45)
Distribution loss (46)m = 0.15 x (45)m												

Water storage loss:	24.7907	21.6821	22.3740	19.5062	18.7166	16.1510	14.9663	17.1740	17.3792	20.2537	22.1085	24.0084 (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	0.6694	0.6089	0.6525	0.5810	0.5347	0.4418	0.4094	0.4907	0.5177	0.5906	0.6208	0.6483 (61)
Total heat required for water heating calculated for each month												
WWHRS	165.9405	145.1560	149.8122	130.6221	125.3122	108.1153	100.1847	114.9843	116.3787	135.6155	148.0111	160.7045 (62)
	-55.0538	-48.4415	-49.4402	-40.6697	-37.7584	-31.1459	-26.3543	-31.9108	-32.8442	-40.6077	-47.0466	-53.2138 eq. (G10)
Total of WWHRS savings												-494.4869
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	110.8867	96.7145	100.3720	89.9523	87.5538	76.9694	73.8304	83.0735	83.5345	95.0078	100.9645	107.4907 (64)
								Total per year (kWh/year)	=	Sum (64)m =		1106.3501 (64)
Heat gains from water heating, kWh/month												
	55.1200	48.2141	49.7587	43.3839	41.6222	35.9119	33.2776	38.1918	38.6532	45.0434	49.1625	53.3808 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	63.7726	56.6423	46.0646	34.8738	26.0686	22.0082	23.7807	30.9110	41.4887	52.6794	61.4846	65.5450 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	409.3823	413.6304	402.9253	380.1355	351.3673	324.3293	306.2663	302.0182	312.7233	335.5132	364.2813	391.3193 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811 (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)	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349 (71)
Water heating gains (Table 5)	74.0860	71.7472	66.8800	60.2554	55.9438	49.8776	44.7280	51.3331	53.6850	60.5422	68.2812	71.7483 (72)
Total internal gains	661.5395	656.3185	630.1685	589.5633	547.6783	510.5137	489.0735	498.5608	522.1956	563.0334	608.3457	642.9112 (73)

[Jan]					Area	Solar flux		g	FF	Access		Gains
					m2	Table 6a	W/m2	Specific data	Specific data	factor	W	
								or Table 6b	or Table 6c	Table 6d		
North					8.1710	10.6334		0.7300	0.7200			31.6472 (74)
South					9.2460	46.7521		0.7300	0.7200	0.7700	0.7700	157.4502 (78)
Solar gains	189.0974	318.3424	431.2410	536.3182	609.2292	610.3530	586.0126	529.5903	466.6895	350.1222	225.6731	162.4342 (84)
Total gains	850.6369	974.6608	1061.4095	1125.8815	1156.9075	1120.8668	1075.0862	1028.1512	988.8850	913.1556	834.0188	805.3454 (83)

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	13.5539	13.5957	13.6370	13.8341	13.8717	14.0491	14.0491	14.0824	13.9802	13.8717	13.7960	13.7177
alpha	1.9036	1.9064	1.9091	1.9223	1.9248	1.9366	1.9366	1.9388	1.9320	1.9248	1.9197	1.9145
util living area	0.9090	0.8824	0.8462	0.7883	0.7045	0.5885	0.4743	0.5039	0.6574	0.8027	0.8829	0.9166 (86)
MIT	17.8171	18.1565	18.6813	19.3612	20.0000	20.5196	20.7786	20.7422	20.3569	19.5398	18.5690	17.7562 (87)
Th 2	19.8292	19.8324	19.8355	19.8501	19.8528	19.8656	19.8656	19.8679	19.8607	19.8528	19.8473	19.8415 (88)
util rest of house	0.8986	0.8690	0.8281	0.7614	0.6624	0.5212	0.3787	0.4105	0.5966	0.7723	0.8674	0.9070 (89)
MIT 2	15.6902	16.1684	16.9078	17.8605	18.7316	19.4107	19.7082	19.6751	19.2169	18.1257	16.7657	15.6073 (90)
Living area fraction									fLA = Living area / (4) =			0.1892 (91)
MIT	16.0925	16.5445	17.2432	18.1443	18.9715	19.6205	19.9107	19.8770	19.4325	18.3932	17.1068	16.0138 (92)
Temperature adjustment												-0.1500
adjusted MIT	15.9425	16.3945	17.0932	17.9943	18.8215	19.4705	19.7607	19.7270	19.2825	18.2432	16.9568	15.8638 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8472	0.8137	0.7707	0.7066	0.6173	0.4945	0.3689	0.3975	0.5602	0.7170	0.8125	0.8575 (94)
Useful gains	720.6685	793.1159	818.0791	795.5084	714.1330	554.3215	396.5844	408.6638	553.9601	654.7231	677.5998	690.6168 (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	1713.2980	1686.3071	1549.3907	1311.2011	1023.9871	691.4707	448.7327	471.2176	739.3945	1098.9989	1425.0661	1695.9344 (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	738.5163	600.2245	544.0958	371.2987	230.5315	0.0000	0.0000	0.0000	0.0000	330.5412	538.1757	747.9563 (98)
Space heating												4101.3400 (98)
Space heating per m2												36.6453 (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 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												4546.9402 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	738.5163	600.2245	544.0958	371.2987	230.5315	0.0000	0.0000	0.0000	0.0000	330.5412	538.1757	747.9563 (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)	818.7542	665.4374	603.2104	411.6394	255.5782	0.0000	0.0000	0.0000	0.0000	366.4537	596.6472	829.2198 (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	110.8867	96.7145	100.3720	89.9523	87.5538	76.9694	73.8304	83.0735	83.5345	95.0078	100.9645	107.4907 (64)
Efficiency of water heater (217)m	88.1220	87.9943	87.7319	87.1307	85.9278	76.4000	76.4000	76.4000	76.4000	86.7035	87.6977	76.4000 (216)
Fuel for water heating, kWh/month	125.8331	109.9099	114.4076	103.2383	101.8923	100.7453	96.6366	108.7349	109.3383	109.5778	115.1279	121.8740 (219)
Water heating fuel used												1317.3161 (219)
Annual totals kWh/year												
Space heating fuel - main system												4546.9402 (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)												450.4976 (232)
Total delivered energy for all uses												6389.7539 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4546.9402	3.4800	158.2335 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1317.3161	3.4800	45.8426 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	450.4976	13.1900	59.4206 (250)
Additional standing charges			120.0000 (251)
Total energy cost			393.3892 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.0529 (257)
SAP value		85.3118
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	4546.9402	0.2160	982.1391 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1317.3161	0.2160	284.5403 (264)
Space and water heating			1266.6794 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	450.4976	0.5190	233.8082 (268)
Total kg/year			1539.4126 (272)
CO2 emissions per m2			13.7500 (273)
EI value			86.8544
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	$3.48 / 0.8376 = 4.155$, stars = 5
Water heating environmental impact	$0.216 / 0.8376 = 0.2579$, 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	55.9600 (1b)	x 2.3700 (2b)	= 132.6252 (1b) - (3b)
First floor	55.9600 (1c)	x 2.6200 (2c)	= 146.6152 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	111.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 279.2404 (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					5 * 10 = 50.0000 (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) =				50.0000 / (5) = 0.1791 (8)
Pressure test					Yes
Measured/design AP50					4.3100
Infiltration rate					0.3946 (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) =				0.3946 (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	0.4833	0.4537	0.4439	0.4143	0.4143	0.4044	0.4044	0.3946	0.3946	0.4241	0.4241	0.4340 (22b)
Effective ac	0.6168	0.6029	0.5985	0.5858	0.5858	0.5818	0.5818	0.5778	0.5778	0.5900	0.5900	0.5942 (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			1.9000	1.2000	2.2800		(26)
Half Glazed Door			2.0900	1.4000	2.9260		(26a)
Windows (Uw = 1.40)			17.4200	1.3258	23.0947		(27)
Flr - Ground			55.9640	0.1800	10.0735	75.6000	4230.8784 (28a)
Wl - Brick (Timber Frame)	151.1190	21.4090	129.7100	0.2100	27.2391	7.4000	959.8540 (29a)
Rf - Ins Joist	55.9640		55.9640	0.0800	4.4771	7.4000	414.1336 (30)
Total net area of external elements Aum(A, m ²)			263.0480				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		70.0904		(33)
Stud			100.9904			7.4000	747.3293 (32c)
Internal Floor			55.9640			7.4000	414.1336 (32d)
Internal Ceiling			55.9640			7.4000	414.1336 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 7180.4625 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.1571 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							19.3336 (36)
Total fabric heat loss							(33) + (36) = 89.4240 (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	56.8382	55.5605	55.1526	53.9826	53.9826	53.6105	53.6105	53.2474	53.2474	54.3636	54.3636	54.7536 (38)
Heat transfer coeff	146.2622	144.9846	144.5766	143.4066	143.4066	143.0345	143.0345	142.6714	142.6714	143.7876	143.7876	144.1777 (39)
Average = Sum(39)m / 12 =												143.8168 (39)
HLP	1.3068	1.2954	1.2918	1.2813	1.2813	1.2780	1.2780	1.2748	1.2748	1.2847	1.2847	1.2882 (40)
HLP (average)												1.2850 (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												2.8259 (42)
Average daily hot water use (litres/day)												101.3145 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	111.4459	107.3933	103.3408	99.2882	95.2356	91.1830	91.1830	95.2356	99.2882	103.3408	107.3933	111.4459 (44)
Energy conte	165.2711	144.5471	149.1597	130.0410	124.7775	107.6735	99.7753	114.4936	115.8610	135.0249	147.3902	160.0562 (45)
Energy content (annual)										Total = Sum(45)m =		1594.0712 (45)
Distribution loss (46)m = 0.15 x (45)m												

	24.7907	21.6821	22.3740	19.5062	18.7166	16.1510	14.9663	17.1740	17.3792	20.2537	22.1085	24.0084 (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	0.6694	0.6089	0.6525	0.5810	0.5347	0.4418	0.4094	0.4907	0.5177	0.5906	0.6208	0.6483 (61)
Total heat required for water heating calculated for each month	165.9405	145.1560	149.8122	130.6221	125.3122	108.1153	100.1847	114.9843	116.3787	135.6155	148.0111	160.7045 (62)
WWHRS	-55.0538	-48.4415	-49.4402	-40.6697	-37.7584	-31.1459	-26.3543	-31.9108	-32.8442	-40.6077	-47.0466	-53.2138 eq. (G10)
Total of WWHRS savings												-494.4869
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 (64)
Output from w/h	110.8867	96.7145	100.3720	89.9523	87.5538	76.9694	73.8304	83.0735	83.5345	95.0078	100.9645	107.4907 (63)
								Total per year (kWh/year) = Sum(64)m =				1106.3501 (64)
Heat gains from water heating, kWh/month	55.1200	48.2141	49.7587	43.3839	41.6222	35.9119	33.2776	38.1918	38.6532	45.0434	49.1625	53.3808 (65)

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												3732.8208 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	634.6859	523.3527	460.3777	298.4011	161.3898	0.0000	0.0000	0.0000	0.0000	230.9570	425.3579	632.4823 (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)	703.6429	580.2136	510.3966	330.8216	178.9244	0.0000	0.0000	0.0000	0.0000	256.0499	471.5719	701.1998 (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	110.8867	96.7145	100.3720	89.9523	87.5538	76.9694	73.8304	83.0735	83.5345	95.0078	100.9645	107.4907 (64)
Efficiency of water heater (217)m	87.8402	87.7284	87.3750	86.5778	84.8121	76.4000	76.4000	76.4000	76.4000	85.6887	87.1792	76.4000 (216)
Fuel for water heating, kWh/month	126.2368	110.2431	114.8750	103.8978	103.2326	100.7453	96.6366	108.7349	109.3383	110.8754	115.8125	122.2961 (219)
Water heating fuel used												1322.9245 (219)
Annual totals kWh/year												
Space heating fuel - main system												3732.8208 (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)												450.4976 (232)
Total delivered energy for all uses												5581.2429 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3732.8208	7.6100	284.0677 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1322.9245	7.6100	100.6746 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	450.4976	31.0800	140.0146 (250)
Additional standing charges			105.0000 (251)
Total energy cost			653.0669 (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	3732.8208	0.2160	806.2893 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1322.9245	0.2160	285.7517 (264)
Space and water heating			1092.0410 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	450.4976	0.5190	233.8082 (268)
Total kg/year			1364.7742 (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	3732.8208	1.2200	4554.0414 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1322.9245	1.2200	1613.9679 (264)
Space and water heating			6168.0093 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	450.4976	3.0700	1383.0276 (268)
Primary energy kWh/year			7781.2869 (272)
Primary energy kWh/m2/year			69.5254 (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
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	+ 8.5	-£ 605	-1010 kg (74.0%)

Measures omitted - SAP change or cost saving too small:

N Solar water heating	+ 0.8	-£ 47	-151 kg (11.1%)
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Recommended measures	Typical annual savings		Energy efficiency	Environmental impact
Solar photovoltaic panels	£605	9.03 kg/m²	A 94	A 95
Total Savings	£605	9.03 kg/m²		
Potential energy efficiency rating:			A 94	
Potential environmental impact rating:				A 95

Fuel prices for cost data on this page from database revision number 542 TEST (30 Apr 2024)
Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£163	£163	£0
Mains gas	£490	£490	£0
Space heating	£412	£412	£0
Water heating	£101	£101	£0
Lighting	£140	£140	£0
Generated (PV)	-£0	-£605	£605

Total cost of fuels	£653	£48	£605
Total cost of uses	£653	£48	£605
Delivered energy	50 kWh/m²	32 kWh/m²	17 kWh/m²
Carbon dioxide emissions	1.4 tonnes	0.4 tonnes	1.0 tonnes
CO2 emissions per m²	12 kg/m²	3 kg/m²	9 kg/m²
Primary energy	70 kWh/m²	16 kWh/m²	53 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	55.9600 (1b)	x 2.3700 (2b)	= 132.6252 (1b) - (3b)
First floor	55.9600 (1c)	x 2.6200 (2c)	= 146.6152 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	111.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 279.2404 (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					5 * 10 = 50.0000 (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)					50.0000 / (5) = 0.1791 (8)
Pressure test					Yes
Measured/design AP50					4.3100
Infiltration rate					0.3946 (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) =	0.3946 (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	0.5031	0.4932	0.4833	0.4340	0.4241	0.3748	0.3748	0.3650	0.3946	0.4241	0.4439	0.4636 (22b)
Effective ac	0.6265	0.6216	0.6168	0.5942	0.5900	0.5702	0.5702	0.5666	0.5778	0.5900	0.5985	0.6075 (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			1.9000	1.2000	2.2800		(26)
Half Glazed Door			2.0900	1.4000	2.9260		(26a)
Windows (Uw = 1.40)			17.4200	1.3258	23.0947		(27)
Flr - Ground			55.9640	0.1800	10.0735	75.6000	4230.8784 (28a)
Wl - Brick (Timber Frame)	151.1190	21.4090	129.7100	0.2100	27.2391	7.4000	959.8540 (29a)
Rf - Ins Joist	55.9640		55.9640	0.0800	4.4771	7.4000	414.1336 (30)
Total net area of external elements Aum(A, m ²)			263.0480				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		70.0904		(33)
Stud			100.9904			7.4000	747.3293 (32c)
Internal Floor			55.9640			7.4000	414.1336 (32d)
Internal Ceiling			55.9640			7.4000	414.1336 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 7180.4625 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.1571 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							19.3336 (36)
Total fabric heat loss							(33) + (36) = 89.4240 (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	57.7348	57.2820	56.8382	54.7536	54.3636	52.5480	52.5480	52.2118	53.2474	54.3636	55.1526	55.9775 (38)
Heat transfer coeff	147.1588	146.7060	146.2622	144.1777	143.7876	141.9721	141.9721	141.6358	142.6714	143.7876	144.5766	145.4015 (39)
Average = Sum(39)m / 12 =												144.1758 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3149	1.3108	1.3068	1.2882	1.2847	1.2685	1.2685	1.2655	1.2748	1.2847	1.2918	1.2992 (40)
HLP (average)												1.2882 (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												2.8259 (42)
Average daily hot water use (litres/day)												101.3145 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	111.4459	107.3933	103.3408	99.2882	95.2356	91.1830	91.1830	95.2356	99.2882	103.3408	107.3933	111.4459 (44)
Energy conte	165.2711	144.5471	149.1597	130.0410	124.7775	107.6735	99.7753	114.4936	115.8610	135.0249	147.3902	160.0562 (45)
Energy content (annual)										Total = Sum(45)m =		1594.0712 (45)
Distribution loss (46)m = 0.15 x (45)m												

	24.7907	21.6821	22.3740	19.5062	18.7166	16.1510	14.9663	17.1740	17.3792	20.2537	22.1085	24.0084 (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	0.6694	0.6089	0.6525	0.5810	0.5347	0.4418	0.4094	0.4907	0.5177	0.5906	0.6208	0.6483 (61)
Total heat required for water heating calculated for each month	165.9405	145.1560	149.8122	130.6221	125.3122	108.1153	100.1847	114.9843	116.3787	135.6155	148.0111	160.7045 (62)
WWHRS	-55.0538	-48.4415	-49.4402	-40.6697	-37.7584	-31.1459	-26.3543	-31.9108	-32.8442	-40.6077	-47.0466	-53.2138 eq. (G10)
Total of WWHRS savings												-494.4869
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h								Solar input (sum of months) =	Sum(63)m =			0.0000 (63)
	110.8867	96.7145	100.3720	89.9523	87.5538	76.9694	73.8304	83.0735	83.5345	95.0078	100.9645	107.4907 (64)
								Total per year (kWh/year) =	Sum(64)m =			1106.3501 (64)
Heat gains from water heating, kWh/month	55.1200	48.2141	49.7587	43.3839	41.6222	35.9119	33.2776	38.1918	38.6532	45.0434	49.1625	53.3808 (65)

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 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												4546.9402	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	738.5163	600.2245	544.0958	371.2987	230.5315	0.0000	0.0000	0.0000	0.0000	330.5412	538.1757	747.9563	(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)	818.7542	665.4374	603.2104	411.6394	255.5782	0.0000	0.0000	0.0000	0.0000	366.4537	596.6472	829.2198	(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	110.8867	96.7145	100.3720	89.9523	87.5538	76.9694	73.8304	83.0735	83.5345	95.0078	100.9645	107.4907	(64)
Efficiency of water heater (217)m	88.1220	87.9943	87.7319	87.1307	85.9278	76.4000	76.4000	76.4000	76.4000	86.7035	87.6977	88.1982	(216)
Fuel for water heating, kWh/month	125.8331	109.9099	114.4076	103.2383	101.8923	100.7453	96.6366	108.7349	109.3383	109.5778	115.1279	121.8740	(219)
Water heating fuel used												1317.3161	(219)
Annual totals kWh/year													
Space heating fuel - main system												4546.9402	(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)												450.4976	(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												4662.5145	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4546.9402	3.4800	158.2335 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1317.3161	3.4800	45.8426 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	450.4976	13.1900	59.4206 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-1727.2394	13.1900	-227.8229 (252)
Total energy cost			165.5664 (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] =	0.4431 (257)
SAP value	93.8182	
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	4546.9402	0.2160	982.1391 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1317.3161	0.2160	284.5403 (264)
Space and water heating			1266.6794 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	450.4976	0.5190	233.8082 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			642.9754 (272)
CO2 emissions per m2			5.7400 (273)
EI value			94.5094
EI rating			95
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	55.9600 (1b)	x 2.3700 (2b)	= 132.6252 (1b) - (3b)
First floor	55.9600 (1c)	x 2.6200 (2c)	= 146.6152 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	111.9200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 279.2404 (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					5 * 10 = 50.0000 (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) =				50.0000 / (5) = 0.1791 (8)
Pressure test					Yes
Measured/design AP50					4.3100
Infiltration rate					0.3946 (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) =				0.3946 (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	0.4833	0.4537	0.4439	0.4143	0.4143	0.4044	0.4044	0.3946	0.3946	0.4241	0.4241	0.4340 (22b)
Effective ac	0.6168	0.6029	0.5985	0.5858	0.5858	0.5818	0.5818	0.5778	0.5778	0.5900	0.5900	0.5942 (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			1.9000	1.2000	2.2800		(26)
Half Glazed Door			2.0900	1.4000	2.9260		(26a)
Windows (Uw = 1.40)			17.4200	1.3258	23.0947		(27)
Flr - Ground			55.9640	0.1800	10.0735	75.6000	4230.8784 (28a)
Wl - Brick (Timber Frame)	151.1190	21.4090	129.7100	0.2100	27.2391	7.4000	959.8540 (29a)
Rf - Ins Joist	55.9640		55.9640	0.0800	4.4771	7.4000	414.1336 (30)
Total net area of external elements Aum(A, m ²)			263.0480				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		70.0904		(33)
Stud			100.9904			7.4000	747.3293 (32c)
Internal Floor			55.9640			7.4000	414.1336 (32d)
Internal Ceiling			55.9640			7.4000	414.1336 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 7180.4625 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							64.1571 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							19.3336 (36)
Total fabric heat loss							(33) + (36) = 89.4240 (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	56.8382	55.5605	55.1526	53.9826	53.9826	53.6105	53.6105	53.2474	53.2474	54.3636	54.3636	54.7536 (38)
Heat transfer coeff	146.2622	144.9846	144.5766	143.4066	143.4066	143.0345	143.0345	142.6714	142.6714	143.7876	143.7876	144.1777 (39)
Average = Sum(39)m / 12 =												143.8168 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3068	1.2954	1.2918	1.2813	1.2813	1.2780	1.2780	1.2748	1.2748	1.2847	1.2847	1.2882 (40)
HLP (average)												1.2850 (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												2.8259 (42)
Average daily hot water use (litres/day)												101.3145 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	111.4459	107.3933	103.3408	99.2882	95.2356	91.1830	91.1830	95.2356	99.2882	103.3408	107.3933	111.4459 (44)
Energy conte	165.2711	144.5471	149.1597	130.0410	124.7775	107.6735	99.7753	114.4936	115.8610	135.0249	147.3902	160.0562 (45)
Energy content (annual)										Total = Sum(45)m =		1594.0712 (45)
Distribution loss (46)m = 0.15 x (45)m												

	24.7907	21.6821	22.3740	19.5062	18.7166	16.1510	14.9663	17.1740	17.3792	20.2537	22.1085	24.0084	(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	0.6694	0.6089	0.6525	0.5810	0.5347	0.4418	0.4094	0.4907	0.5177	0.5906	0.6208	0.6483	(61)
Total heat required for water heating calculated for each month	165.9405	145.1560	149.8122	130.6221	125.3122	108.1153	100.1847	114.9843	116.3787	135.6155	148.0111	160.7045	(62)
WWHRS	-55.0538	-48.4415	-49.4402	-40.6697	-37.7584	-31.1459	-26.3543	-31.9108	-32.8442	-40.6077	-47.0466	-53.2138	eq. (G10)
Total of WWHRS savings												-494.4869	
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	(64)
Output from w/h	110.8867	96.7145	100.3720	89.9523	87.5538	76.9694	73.8304	83.0735	83.5345	95.0078	100.9645	107.4907	(63)
								Total per year (kWh/year) = Sum(64)m =				1106.3501	(64)
Heat gains from water heating, kWh/month	55.1200	48.2141	49.7587	43.3839	41.6222	35.9119	33.2776	38.1918	38.6532	45.0434	49.1625	53.3808	(65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524	169.5524 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	63.7726	56.6423	46.0646	34.8738	26.0686	22.0082	23.7807	30.9110	41.4887	52.6794	61.4846	65.5450 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	409.3823	413.6304	402.9253	380.1355	351.3673	324.3293	306.2663	302.0182	312.7233	335.5132	364.2813	391.3193 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811	54.7811 (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)	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349	-113.0349 (71)
Water heating gains (Table 5)	74.0860	71.7472	66.8800	60.2554	55.9438	49.8776	44.7280	51.3331	53.6850	60.5422	68.2812	71.7483 (72)
Total internal gains	661.5395	656.3185	630.1685	589.5633	547.6783	510.5137	489.0735	498.5608	522.1956	563.0334	608.3457	642.9112 (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		
North					8.1710	13.4684	0.7300		0.7200	0.7700		40.0849 (74)
South					9.2460	56.5862	0.7300		0.7200	0.7700		190.5694 (78)

Solar gains	230.6542	330.6751	458.0026	580.5983	628.3084	698.0325	646.5672	603.6145	524.4174	397.8227	274.3651	194.7984 (83)
Total gains	892.1937	986.9936	1088.1711	1170.1616	1175.9867	1208.5463	1135.6408	1102.1754	1046.6129	960.8561	882.7108	837.7096 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, n11,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	13.6370	13.7571	13.7960	13.9085	13.9085	13.9447	13.9447	13.9802	13.9802	13.8717	13.8717	13.8341
alpha	1.9091	1.9171	1.9197	1.9272	1.9272	1.9296	1.9296	1.9320	1.9320	1.9248	1.9248	1.9223
util living area	0.8884	0.8653	0.8204	0.7483	0.6460	0.4866	0.3673	0.3664	0.5611	0.7405	0.8470	0.8965 (86)
MIT	18.2592	18.5102	19.0332	19.6812	20.2842	20.7284	20.8946	20.8986	20.6202	19.9668	19.0722	18.2454 (87)
Th 2	19.8355	19.8444	19.8473	19.8555	19.8555	19.8581	19.8581	19.8607	19.8607	19.8528	19.8528	19.8501 (88)
util rest of house	0.8749	0.8494	0.7984	0.7153	0.5931	0.4038	0.2554	0.2512	0.4816	0.6975	0.8254	0.8838 (89)
MIT 2	16.3194	16.6725	17.4046	18.3005	19.1047	19.6416	19.8065	19.8131	19.5329	18.7043	17.4754	16.3058 (90)
Living area fraction										fLA = Living area / (4) =		0.1892 (91)
MIT	16.6863	17.0201	17.7127	18.5616	19.3278	19.8472	20.0123	20.0184	19.7386	18.9431	17.7774	16.6727 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.5363	16.8701	17.5627	18.4116	19.1778	19.6972	19.8623	19.8684	19.5886	18.7931	17.6274	16.5227 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8203	0.7930	0.7417	0.6644	0.5567	0.3909	0.2559	0.2520	0.4601	0.6486	0.7687	0.8307 (94)
Useful gains	731.8690	782.7030	807.1246	777.4946	654.6753	472.4461	290.5815	277.7978	481.5257	623.2073	678.5026	695.8568 (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												
	1584.9415	1561.5016	1425.9119	1191.9406	871.5971	543.1236	309.2881	295.1043	583.3272	933.6334	1269.2774	1545.9673 (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												
	634.6859	523.3527	460.3777	298.4011	161.3898	0.0000	0.0000	0.0000	0.0000	230.9570	425.3579	632.4823 (98)
Space heating												3367.0044 (99)
Space heating per m2												30.0840 (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												3732.8208	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	634.6859	523.3527	460.3777	298.4011	161.3898	0.0000	0.0000	0.0000	0.0000	230.9570	425.3579	632.4823	(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)	703.6429	580.2136	510.3966	330.8216	178.9244	0.0000	0.0000	0.0000	0.0000	256.0499	471.5719	701.1998	(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	110.8867	96.7145	100.3720	89.9523	87.5538	76.9694	73.8304	83.0735	83.5345	95.0078	100.9645	107.4907	(64)
Efficiency of water heater	87.8402	87.7284	87.3750	86.5778	84.8121	76.4000	76.4000	76.4000	76.4000	85.6887	87.1792	76.4000	(216)
(217)m												87.8938	(217)
Fuel for water heating, kWh/month	126.2368	110.2431	114.8750	103.8978	103.2326	100.7453	96.6366	108.7349	109.3383	110.8754	115.8125	122.2961	(219)
Water heating fuel used												1322.9245	(219)
Annual totals kWh/year													
Space heating fuel - main system												3732.8208	(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)												450.4976	(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												3634.7970	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3732.8208	7.6100	284.0677 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1322.9245	7.6100	100.6746 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	450.4976	31.0800	140.0146 (250)
Additional standing charges			105.0000 (251)
Energy saving/generation technologies			
PV Unit	-1946.4459	31.0800	-604.9554 (252)
Total energy cost			48.1115 (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	3732.8208	0.2160	806.2893 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1322.9245	0.2160	285.7517 (264)
Space and water heating			1092.0410 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	450.4976	0.5190	233.8082 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	0.5190	-1010.2054 (269)
Total kg/year			354.5688 (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	3732.8208	1.2200	4554.0414 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1322.9245	1.2200	1613.9679 (264)
Space and water heating			6168.0093 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	450.4976	3.0700	1383.0276 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	3.0700	-5975.5890 (269)
Primary energy kWh/year			1805.6978 (272)
Primary energy kWh/m2/year			16.1338 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	033 - PRJ013014			Issued on Date	09/10/2024
Assessment Reference	033	Prop Type Ref	B		
Property	41 Deeble Way, Netley Abbey, Southampton, SO31 5JP				
SAP Rating	85 B	DER	14.62	TER	17.64
Environmental	87 B	% DER<TER	17.12		
CO ₂ Emissions (t/year)	1.36	DFEE	48.60	TFEE	56.49
General Requirements Compliance	Pass	% DFEE<TFEE	13.98		
Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk			Assessor ID	U903-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Built)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.64	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.62	kgCO ₂ /m ²	Pass
	-3.02 (-17.1%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	56.49	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	48.60	kWh/m ² /yr	
	-7.9 (-14.0%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.21 (max. 0.70)	Pass
Floor	0.18 (max. 0.25)	0.18 (max. 0.70)	Pass
Roof	0.08 (max. 0.20)	0.08 (max. 0.35)	Pass
Openings	1.38 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.31 (measured in this dwelling)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

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

Calculation Type: New Build (As Built)

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

8.17 m², No overhang

Windows facing South

9.25 m², No overhang

Air change rate

4.70 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

4.31 (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.