

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	046 - PRJ013014	Issued on Date	09/05/2024
Assessment Reference	046	Prop Type Ref	3B
Property	5 Rashleigh Drive, Netley Abbey, Southampton, SO31 5JY		

SAP Rating	86 B	DER	13.26	TER	16.27
Environmental	89 B	% DER<TER	18.52		
CO ₂ Emissions (t/year)	1.04	DFEE	38.62	TTEE	43.62
General Requirements Compliance	Pass	% DFEE<TFEE	11.48		

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	47.1500 (1b)	x 2.3700 (2b)	= 111.7455 (1b) - (3b)
First floor	47.1500 (1c)	x 2.6200 (2c)	= 123.5330 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 235.2785 (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) =	0.1275 (8)				
Pressure test							Yes					
Measured/design AP50							4.7300					
Infiltration rate							0.3640	(18)				
Number of sides sheltered							2	(19)				
Shelter factor							(20) = 1 - [0.075 x (19)] =	0.8500 (20)				
Infiltration rate adjusted to include shelter factor							(21) = (18) x (20) =	0.3094 (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	0.3790	0.3558	0.3481	0.3249	0.3249	0.3171	0.3171	0.3094	0.3094	0.3326	0.3326	0.3403 (22b)
Effective ac	0.5718	0.5633	0.5606	0.5528	0.5528	0.5503	0.5503	0.5479	0.5479	0.5553	0.5553	0.5579 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.2600	1.3258	14.9413		(27)
Fir - Ground			47.1500	0.1600	7.5440	75.6000	3564.5400 (28a)
Wl - Brick (Timber Frame)	50.8990	13.3520	37.5470	0.2100	7.8849	7.4000	277.8478 (29a)
Rf - Ins Joist	47.1480		47.1480	0.0800	3.7718	7.4000	348.8952 (30)
Total net area of external elements Aum(A, m ²)			145.2050				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6500		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			76.8070			7.4000	568.3715 (32c)
Internal Floor			47.1480			7.4000	348.8952 (32d)
Internal Ceiling			47.1480			7.4000	348.8952 (32e)
Heat capacity Cm = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 6141.2641 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							65.1248 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							15.6843 (36)
Total fabric heat loss							(33) + (36) = 52.3343 (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

(38)m	Jan 44.3979	Feb 43.7359	Mar 43.5246	Apr 42.9183	May 42.9183	Jun 42.7255	Jul 42.7255	Aug 42.5374	Sep 42.5374	Oct 43.1158	Nov 43.1158	Dec 43.3178 (38)
Heat transfer coeff	96.7322	96.0702	95.8589	95.2526	95.2526	95.0598	95.0598	94.8717	94.8717	95.4501	95.4501	95.6521 (39)
Average = Sum(39)m / 12 =												95.4652 (39)
HLP	Jan 1.0258	Feb 1.0188	Mar 1.0165	Apr 1.0101	May 1.0101	Jun 1.0081	Jul 1.0081	Aug 1.0061	Sep 1.0061	Oct 1.0122	Nov 1.0122	Dec 1.0143 (40)
HLP (average)												1.0124 (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												2.6801 (42)
Average daily hot water use (litres/day)												97.8530 (43)
Daily hot water use	Jan 107.6383	Feb 103.7242	Mar 99.8100	Apr 95.8959	May 91.9818	Jun 88.0677	Jul 88.0677	Aug 91.9818	Sep 95.8959	Oct 99.8100	Nov 103.7242	Dec 107.6383 (44)
Energy conte	159.6245	139.6086	144.0635	125.5981	120.5144	103.9947	96.3664	110.5819	111.9025	130.4116	142.3545	154.5878 (45)
Energy content (annual)										Total = Sum(45)m =		1539.6084 (45)
Distribution loss (46)m = 0.15 x (45)m	23.9437	20.9413	21.6095	18.8397	18.0772	15.5992	14.4550	16.5873	16.7854	19.5617	21.3532	23.1882 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6708	0.6086	0.6471	0.5420	0.4988	0.4121	0.3819	0.4577	0.4829	0.5857	0.6205	0.6497 (61)
Total heat required for water heating calculated for each month	160.2953	140.2171	144.7106	126.1401	121.0132	104.4069	96.7483	111.0396	112.3854	130.9974	142.9750	155.2374 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Solar input (sum of months) = Sum(63)m =												0.0000 (63)
Output from w/h	160.2953	140.2171	144.7106	126.1401	121.0132	104.4069	96.7483	111.0396	112.3854	130.9974	142.9750	155.2374 (64)
RHI water heating demand										Total per year (kWh/year) = Sum(64)m =		1546.1663 (64)
Heat gains from water heating, kWh/month	53.2428	46.5720	48.0629	41.8969	40.1957	34.6813	32.1373	36.8829	37.3283	43.5083	47.4880	51.5628 (65)

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

Metabolic gains (Table 5), Watts	Jan 160.8075	Feb 160.8075	Mar 160.8075	Apr 160.8075	May 160.8075	Jun 160.8075	Jul 160.8075	Aug 160.8075	Sep 160.8075	Oct 160.8075	Nov 160.8075	Dec 160.8075 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.7305	53.9403	43.8672	33.2103	24.8251	20.9584	22.6463	29.4365	39.5096	50.1665	58.5517	62.4184 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	368.3136	372.1356	362.5044	342.0008	316.1186	291.7931	275.5421	271.7202	281.3513	301.8550	327.7371	352.0627 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050 (71)
Water heating gains (Table 5)	71.5630	69.3036	64.6007	58.1901	54.0265	48.1684	43.1953	49.5738	51.8449	58.4789	65.9556	69.3049 (72)
Total internal gains	610.9705	605.7429	581.3357	543.7646	505.3336	471.2833	451.7471	461.0938	483.0692	520.8637	562.6078	594.1494 (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												7.7170	13.4684	0.7300		0.7200		0.7700		37.8576 (74)
South												3.5460	56.5862	0.7300		0.7200		0.7700		73.0866 (78)
Solar gains	110.9443	163.8369	240.5391	328.3741	375.0389	425.8368	390.8111	349.8360	283.6464	200.9973	132.9688					93.0712 (83)				
Total gains	721.9148	769.5797	821.8748	872.1387	880.3726	897.1200	842.5581	810.9298	766.7156	721.8610	695.5766					687.2205 (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 17.6353	Feb 17.7569	Mar 17.7960	Apr 17.9093	May 17.9093	Jun 17.9456	Jul 17.9456	Aug 17.9812	Sep 17.9812	Oct 17.8722	Nov 17.8722	Dec 17.8345
alpha	2.1757	2.1838	2.1864	2.1940	2.1940	2.1964	2.1964	2.1987	2.1987	2.1915	2.1915	2.1890
util living area	0.8803	0.8616	0.8193	0.7444	0.6316	0.4657	0.3444	0.3462	0.5488	0.7333	0.8387	0.8874 (86)
MIT	18.8587	19.0453	19.4682	20.0063	20.4982	20.8286	20.9400	20.9414	20.7415	20.2317	19.5171	18.8483 (87)
Th 2	20.0619	20.0677	20.0696	20.0749	20.0749	20.0766	20.0766	20.0783	20.0783	20.0732	20.0732	20.0714 (88)
util rest of house	0.8679	0.8474	0.8002	0.7158	0.5863	0.3981	0.2571	0.2557	0.4825	0.6960	0.8192	0.8755 (89)
MIT 2	17.2360	17.5032	18.1039	18.8581	19.5215	19.9276	20.0418	20.0454	19.8372	19.1798	18.1849	17.2268 (90)
Living area fraction									fLA = Living area / (4) =			0.1592 (91)

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MIT	17.4943	17.7487	18.3211	19.0409	19.6770	20.0710	20.1848	20.1880	19.9811	19.3472	18.3969	17.4849 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.3443	17.5987	18.1711	18.8909	19.5270	19.9210	20.0348	20.0380	19.8311	19.1972	18.2469	17.3349 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8197	0.7985	0.7516	0.6728	0.5563	0.3859	0.2529	0.2515	0.4629	0.6545	0.7702	0.8283 (94)	
Useful gains	591.7425	614.5001	617.7008	586.7930	489.7917	346.1952	213.0881	203.9782	354.9041	472.4678	535.7276	569.1985 (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													
	1126.3820	1104.6801	1003.7468	837.3552	612.1845	382.2337	221.9417	212.3255	410.9018	658.3408	901.7104	1103.3393 (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													
	397.7718	329.4009	287.2182	180.4047	91.0602	0.0000	0.0000	0.0000	0.0000	138.2895	263.5076	397.4007 (98)	
Space heating													
RHI space heating demand												2085.0538 (98)	
												2085 (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	47.1500 (1b)	x 2.3700 (2b)	= 111.7455 (1b) - (3b)
First floor	47.1500 (1c)	x 2.6200 (2c)	= 123.5330 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 235.2785 (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) = 0.1275 (8)
Pressure test					Yes
Measured/design AP50					4.7300
Infiltration rate					0.3640 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3094 (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	0.3945	0.3868	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3481	0.3636 (22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5410	0.5479	0.5553	0.5606	0.5661 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.2600	1.3258	14.9413		(27)
Flr - Ground			47.1500	0.1600	7.5440	75.6000	3564.5400 (28a)
Wl - Brick (Timber Frame)	50.8990	13.3520	37.5470	0.2100	7.8849	7.4000	277.8478 (29a)
Rf - Ins Joist	47.1480		47.1480	0.0800	3.7718	7.4000	348.8952 (30)
Total net area of external elements Aum(A, m ²)			145.2050				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6500		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			76.8070			7.4000	568.3715 (32c)
Internal Floor			47.1480			7.4000	348.8952 (32d)
Internal Ceiling			47.1480			7.4000	348.8952 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 6141.2641 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 65.1248 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 15.6843 (36)
Total fabric heat loss (33) + (36) = 52.3343 (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	44.8625	44.6279	44.3979	43.3178	43.1158	42.1750	42.1750	42.0008	42.5374	43.1158	43.5246	43.9520 (38)
Heat transfer coeff	97.1968	96.9622	96.7322	95.6521	95.4501	94.5093	94.5093	94.3351	94.8717	95.4501	95.8589	96.2863 (39)
Average = Sum(39)m / 12 =												95.6512 (39)
HLP	Jan 1.0307	Feb 1.0282	Mar 1.0258	Apr 1.0143	May 1.0122	Jun 1.0022	Jul 1.0022	Aug 1.0004	Sep 1.0061	Oct 1.0122	Nov 1.0165	Dec 1.0211 (40)
HLP (average)												1.0143 (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												2.6801 (42)
Average daily hot water use (litres/day)												97.8530 (43)
Daily hot water use	Jan 107.6383	Feb 103.7242	Mar 99.8100	Apr 95.8959	May 91.9818	Jun 88.0677	Jul 88.0677	Aug 91.9818	Sep 95.8959	Oct 99.8100	Nov 103.7242	Dec 107.6383 (44)
Energy conte	159.6245	139.6086	144.0635	125.5981	120.5144	103.9947	96.3664	110.5819	111.9025	130.4116	142.3545	154.5878 (45)
Energy content (annual)												Total = Sum(45)m = 1539.6084 (45)
Distribution loss (46)m = 0.15 x (45)m												

	23.9437	20.9413	21.6095	18.8397	18.0772	15.5992	14.4550	16.5873	16.7854	19.5617	21.3532	23.1882 (46)	
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Combi loss	0.6708	0.6086	0.6471	0.5420	0.4988	0.4121	0.3819	0.4577	0.4829	0.5857	0.6205	0.6497 (61)	
Total heat required for water heating calculated for each month	160.2953	140.2171	144.7106	126.1401	121.0132	104.4069	96.7483	111.0396	112.3854	130.9974	142.9750	155.2374 (62)	
WWHRS	-52.5899	-46.2724	-47.2270	-38.8566	-36.0790	-29.7633	-25.1894	-30.4986	-31.3885	-38.8026	-44.9478	-50.8306 eq. (G10)	
Total of WWHRS savings												-472.4457	
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)
	107.7054	93.9447	97.4836	87.2835	84.9342	74.6436	71.5589	80.5409	80.9970	92.1948	98.0272	104.4068 (64)	
								Total per year (kWh/year) = Sum(64)m =					1073.7206 (64)
Heat gains from water heating, kWh/month													
	53.2428	46.5720	48.0629	41.8969	40.1957	34.6813	32.1373	36.8829	37.3283	43.5083	47.4880	51.5628 (65)	

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.7305	53.9403	43.8672	33.2103	24.8251	20.9584	22.6463	29.4365	39.5096	50.1665	58.5517	62.4184 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	368.3136	372.1356	362.5044	342.0008	316.1186	291.7931	275.5421	271.7202	281.3513	301.8550	327.7371	352.0627 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050 (71)
Water heating gains (Table 5)	71.5630	69.3036	64.6007	58.1901	54.0265	48.1684	43.1953	49.5738	51.8449	58.4789	65.9556	69.3049 (72)
Total internal gains	610.9705	605.7429	581.3357	543.7646	505.3336	471.2833	451.7471	461.0938	483.0692	520.8637	562.6078	594.1494 (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					7.7170	10.6334	0.7300		0.7200	0.7700		29.8888
South					3.5460	46.7521	0.7300		0.7200	0.7700		60.3849 (78)
Solar gains	90.2737	156.0139	223.0338	298.2806	358.3816	367.6099	349.4124	302.0139	248.2920	174.6602	108.4484	77.0949 (83)
Total gains	701.2442	761.7568	804.3695	842.0452	863.7153	838.8932	801.1594	763.1077	731.3612	695.5239	671.0561	671.2443 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, n1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	17.5511	17.5935	17.6353	17.8345	17.8722	18.0501	18.0501	18.0835	17.9812	17.8722	17.7960	17.7170
alpha	2.1701	2.1729	2.1757	2.1890	2.1915	2.2033	2.2033	2.2056	2.1987	2.1915	2.1864	2.1811
util living area	0.9012	0.8800	0.8465	0.7869	0.6960	0.5703	0.4520	0.4842	0.6485	0.7977	0.8752	0.9085 (86)
MIT	18.4923	18.7439	19.1700	19.7388	20.2689	20.6759	20.8623	20.8346	20.5386	19.8828	19.1024	18.4391 (87)
Th 2	20.0578	20.0599	20.0619	20.0714	20.0732	20.0815	20.0815	20.0830	20.0783	20.0732	20.0696	20.0658 (88)
util rest of house	0.8914	0.8681	0.8307	0.7636	0.6596	0.5137	0.3745	0.4077	0.5967	0.7710	0.8610	0.8994 (89)
MIT 2	16.7074	17.0677	17.6772	18.4855	19.2172	19.7550	19.9729	19.9469	19.5889	18.7007	17.5927	16.6346 (90)
Living area fraction										fLA = Living area / (4) =		0.1592 (91)
MIT	16.9915	17.3345	17.9149	18.6850	19.3846	19.9016	20.1145	20.0882	19.7401	18.8889	17.8330	16.9218 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.8415	17.1845	17.7649	18.5350	19.2346	19.7516	19.9645	19.9382	19.5901	18.7389	17.6830	16.7718 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8452	0.8199	0.7814	0.7168	0.6219	0.4914	0.3639	0.3947	0.5654	0.7237	0.8127	0.8546 (94)
Useful gains	592.7199	624.5961	628.5080	603.5830	537.1503	412.1914	291.5715	301.1636	413.5458	503.3644	545.3380	573.6563 (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	1218.9968	1191.1305	1089.6751	921.6059	719.1781	486.8696	317.9728	333.7749	520.8510	776.8565	1014.4714	1210.4959 (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	465.9500	380.7111	343.1084	228.9765	135.4287	0.0000	0.0000	0.0000	0.0000	203.4781	337.7761	473.8087 (98)
Space heating												2569.2375 (98)
Space heating per m2										(98) / (4) =		27.2454 (99)

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												2848.3786 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	465.9500	380.7111	343.1084	228.9765	135.4287	0.0000	0.0000	0.0000	0.0000	203.4781	337.7761	473.8087 (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)	516.5743	422.0744	380.3862	253.8542	150.1427	0.0000	0.0000	0.0000	0.0000	225.5855	374.4746	525.2868 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	107.7054	93.9447	97.4836	87.2835	84.9342	74.6436	71.5589	80.5409	80.9970	92.1948	98.0272	104.4068 (64)
Efficiency of water heater	87.2413	87.0866	86.7337	85.9170	84.3291	76.4000	76.4000	76.4000	76.4000	85.3906	86.6783	76.4000 (216)
(217)m	87.2413	87.0866	86.7337	85.9170	84.3291	76.4000	76.4000	76.4000	76.4000	85.3906	86.6783	87.3510 (217)
Fuel for water heating, kWh/month	123.4568	107.8750	112.3942	101.5905	100.7176	97.7010	93.6635	105.4201	106.0170	107.9683	113.0931	119.5256 (219)
Water heating fuel used												1289.4227 (219)
Annual totals kWh/year												
Space heating fuel - main system												2848.3786 (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)												429.0080 (232)
Total delivered energy for all uses												4641.8094 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2848.3786	3.4800	99.1236 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1289.4227	3.4800	44.8719 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	429.0080	13.1900	56.5862 (250)
Additional standing charges			120.0000 (251)
Total energy cost			330.4741 (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] = 0.9964 (257)	
SAP value	86.1002	
SAP rating (Section 12)	86 (258)	
SAP band	B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2848.3786	0.2160	615.2498 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1289.4227	0.2160	278.5153 (264)
Space and water heating			893.7651 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	429.0080	0.5190	222.6552 (268)
Total kg/year			1155.3453 (272)
CO2 emissions per m2			12.2500 (273)
EI value			88.8861
EI rating			89 (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	$3.48 / 0.8303 = 4.191$, stars = 5
Water heating environmental impact	$0.216 / 0.8303 = 0.2602$, 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	47.1500 (1b)	x 2.3700 (2b)	= 111.7455 (1b) - (3b)
First floor	47.1500 (1c)	x 2.6200 (2c)	= 123.5330 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 235.2785 (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) = 0.1275 (8)
Pressure test					Yes
Measured/design AP50					4.7300
Infiltration rate					0.3640 (18)
Number of sides sheltered					2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3094 (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	0.3790	0.3558	0.3481	0.3249	0.3249	0.3171	0.3171	0.3094	0.3094	0.3326	0.3326	0.3403 (22b)
Effective ac	0.5718	0.5633	0.5606	0.5528	0.5528	0.5503	0.5503	0.5479	0.5479	0.5553	0.5553	0.5579 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.2600	1.3258	14.9413		(27)
Flr - Ground			47.1500	0.1600	7.5440	75.6000	3564.5400 (28a)
Wl - Brick (Timber Frame)	50.8990	13.3520	37.5470	0.2100	7.8849	7.4000	277.8478 (29a)
Rf - Ins Joist	47.1480		47.1480	0.0800	3.7718	7.4000	348.8952 (30)
Total net area of external elements Aum(A, m ²)			145.2050				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6500		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			76.8070			7.4000	568.3715 (32c)
Internal Floor			47.1480			7.4000	348.8952 (32d)
Internal Ceiling			47.1480			7.4000	348.8952 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 6141.2641 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 65.1248 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 15.6843 (36)
Total fabric heat loss (33) + (36) = 52.3343 (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	44.3979	43.7359	43.5246	42.9183	42.9183	42.7255	42.7255	42.5374	42.5374	43.1158	43.1158	43.3178 (38)
Heat transfer coeff	96.7322	96.0702	95.8589	95.2526	95.2526	95.0598	95.0598	94.8717	94.8717	95.4501	95.4501	95.6521 (39)
Average = Sum(39)m / 12 =												95.4652 (39)
HLP	Jan 1.0258	Feb 1.0188	Mar 1.0165	Apr 1.0101	May 1.0101	Jun 1.0081	Jul 1.0081	Aug 1.0061	Sep 1.0061	Oct 1.0122	Nov 1.0122	Dec 1.0143 (40)
HLP (average)												1.0124 (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												2.6801 (42)
Average daily hot water use (litres/day)												97.8530 (43)
Daily hot water use	Jan 107.6383	Feb 103.7242	Mar 99.8100	Apr 95.8959	May 91.9818	Jun 88.0677	Jul 88.0677	Aug 91.9818	Sep 95.8959	Oct 99.8100	Nov 103.7242	Dec 107.6383 (44)
Energy conte	159.6245	139.6086	144.0635	125.5981	120.5144	103.9947	96.3664	110.5819	111.9025	130.4116	142.3545	154.5878 (45)
Energy content (annual)												Total = Sum(45)m = 1539.6084 (45)
Distribution loss (46)m = 0.15 x (45)m												

	23.9437	20.9413	21.6095	18.8397	18.0772	15.5992	14.4550	16.5873	16.7854	19.5617	21.3532	23.1882 (46)	
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Combi loss	0.6708	0.6086	0.6471	0.5420	0.4988	0.4121	0.3819	0.4577	0.4829	0.5857	0.6205	0.6497 (61)	
Total heat required for water heating calculated for each month	160.2953	140.2171	144.7106	126.1401	121.0132	104.4069	96.7483	111.0396	112.3854	130.9974	142.9750	155.2374 (62)	
WWHRS	-52.5899	-46.2724	-47.2270	-38.8566	-36.0790	-29.7633	-25.1894	-30.4986	-31.3885	-38.8026	-44.9478	-50.8306 eq. (G10)	
Total of WWHRS savings												-472.4457	
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)
	107.7054	93.9447	97.4836	87.2835	84.9342	74.6436	71.5589	80.5409	80.9970	92.1948	98.0272	104.4068 (64)	
								Total per year (kWh/year) = Sum(64)m =					1073.7206 (64)
Heat gains from water heating, kWh/month													
	53.2428	46.5720	48.0629	41.8969	40.1957	34.6813	32.1373	36.8829	37.3283	43.5083	47.4880	51.5628 (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													2311.5895 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	397.7718	329.4009	287.2182	180.4047	91.0602	0.0000	0.0000	0.0000	0.0000	138.2895	263.5076	397.4007	(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)	440.9886	365.1895	318.4237	200.0053	100.9537	0.0000	0.0000	0.0000	0.0000	153.3143	292.1371	440.5773	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	107.7054	93.9447	97.4836	87.2835	84.9342	74.6436	71.5589	80.5409	80.9970	92.1948	98.0272	104.4068	(64)
Efficiency of water heater (217)m	86.8571	86.7238	86.2521	85.1830	82.9677	76.4000	76.4000	76.4000	76.4000	84.1220	85.9886	76.4000	(216)
Fuel for water heating, kWh/month	124.0030	108.3263	113.0217	102.4658	102.3702	97.7010	93.6635	105.4201	106.0170	109.5966	114.0002	120.1005	(219)
Water heating fuel used												1296.6858	(219)
Annual totals kWh/year													
Space heating fuel - main system												2311.5895	(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)												429.0080	(232)
Total delivered energy for all uses												4112.2833	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2311.5895	7.6100	175.9120 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1296.6858	7.6100	98.6778 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	429.0080	31.0800	133.3357 (250)
Additional standing charges			105.0000 (251)
Total energy cost			536.2354 (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	2311.5895	0.2160	499.3033 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1296.6858	0.2160	280.0841 (264)
Space and water heating			779.3875 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	429.0080	0.5190	222.6552 (268)
Total kg/year			1040.9676 (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	2311.5895	1.2200	2820.1392 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1296.6858	1.2200	1581.9567 (264)
Space and water heating			4402.0959 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	429.0080	3.0700	1317.0546 (268)
Primary energy kWh/year			5949.4005 (272)
Primary energy kWh/m2/year			63.0901 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 86
Current environmental impact rating: B 89

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	+ 9.6	-£ 605	-1010 kg (97.0%)

Measures omitted - SAP change or cost saving too small:

N Solar water heating	+ 0.9	-£ 46	-149 kg (14.3%)
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Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar photovoltaic panels	£605 10.71 kg/m²	A 96	A 98
Total Savings	£605 10.71 kg/m²		
Potential energy efficiency rating:		A 96	
Potential environmental impact rating:			A 98

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	£157	£157	£0
Mains gas	£380	£380	£0
Space heating	£304	£304	£0
Water heating	£99	£99	£0
Lighting	£133	£133	£0
Generated (PV)	-£0	-£605	£605
Total cost of fuels	£537	-£68	£605
Total cost of uses	£536	-£69	£605
Delivered energy	44 kWh/m²	23 kWh/m²	21 kWh/m²
Carbon dioxide emissions	1.0 tonnes	0.0 tonnes	1.0 tonnes
CO2 emissions per m²	11 kg/m²	0 kg/m²	11 kg/m²
Primary energy	63 kWh/m²	0 kWh/m²	63 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	47.1500 (1b)	x 2.3700 (2b)	= 111.7455 (1b) - (3b)
First floor	47.1500 (1c)	x 2.6200 (2c)	= 123.5330 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 235.2785 (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) = 0.1275 (8)
Pressure test					Yes
Measured/design AP50					4.7300
Infiltration rate					0.3640 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3094 (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	0.3945	0.3868	0.3790	0.3403	0.3326	0.2939	0.2939	0.2862	0.3094	0.3326	0.3481	0.3636 (22b)
Effective ac	0.5778	0.5748	0.5718	0.5579	0.5553	0.5432	0.5432	0.5410	0.5479	0.5553	0.5606	0.5661 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.2600	1.3258	14.9413		(27)
Flr - Ground			47.1500	0.1600	7.5440	75.6000	3564.5400 (28a)
Wl - Brick (Timber Frame)	50.8990	13.3520	37.5470	0.2100	7.8849	7.4000	277.8478 (29a)
Rf - Ins Joist	47.1480		47.1480	0.0800	3.7718	7.4000	348.8952 (30)
Total net area of external elements Aum(A, m ²)			145.2050				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6500		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			76.8070			7.4000	568.3715 (32c)
Internal Floor			47.1480			7.4000	348.8952 (32d)
Internal Ceiling			47.1480			7.4000	348.8952 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 6141.2641 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							65.1248 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							15.6843 (36)
Total fabric heat loss							(33) + (36) = 52.3343 (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	44.8625	44.6279	44.3979	43.3178	43.1158	42.1750	42.1750	42.0008	42.5374	43.1158	43.5246	43.9520 (38)
Heat transfer coeff	97.1968	96.9622	96.7322	95.6521	95.4501	94.5093	94.5093	94.3351	94.8717	95.4501	95.8589	96.2863 (39)
Average = Sum(39)m / 12 =												95.6512 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0307	1.0282	1.0258	1.0143	1.0122	1.0022	1.0022	1.0004	1.0061	1.0122	1.0165	1.0211 (40)
HLP (average)												1.0143 (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												2.6801 (42)
Average daily hot water use (litres/day)												97.8530 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	107.6383	103.7242	99.8100	95.8959	91.9818	88.0677	88.0677	91.9818	95.8959	99.8100	103.7242	107.6383 (44)
Energy conte	159.6245	139.6086	144.0635	125.5981	120.5144	103.9947	96.3664	110.5819	111.9025	130.4116	142.3545	154.5878 (45)
Energy content (annual)												Total = Sum(45)m = 1539.6084 (45)
Distribution loss (46)m = 0.15 x (45)m												

Water storage loss:	23.9437	20.9413	21.6095	18.8397	18.0772	15.5992	14.4550	16.5873	16.7854	19.5617	21.3532	23.1882 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6708	0.6086	0.6471	0.5420	0.4988	0.4121	0.3819	0.4577	0.4829	0.5857	0.6205	0.6497 (61)
Total heat required for water heating calculated for each month	160.2953	140.2171	144.7106	126.1401	121.0132	104.4069	96.7483	111.0396	112.3854	130.9974	142.9750	155.2374 (62)
WWHRS	-52.5899	-46.2724	-47.2270	-38.8566	-36.0790	-29.7633	-25.1894	-30.4986	-31.3885	-38.8026	-44.9478	-50.8306 eq. (G10)
Total of WWHRS savings												-472.4457
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)
	107.7054	93.9447	97.4836	87.2835	84.9342	74.6436	71.5589	80.5409	80.9970	92.1948	98.0272	104.4068 (64)
								Total per year (kWh/year) = Sum(64)m =				1073.7206 (64)
Heat gains from water heating, kWh/month	53.2428	46.5720	48.0629	41.8969	40.1957	34.6813	32.1373	36.8829	37.3283	43.5083	47.4880	51.5628 (65)

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												2848.3786	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	465.9500	380.7111	343.1084	228.9765	135.4287	0.0000	0.0000	0.0000	0.0000	203.4781	337.7761	473.8087	(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)	516.5743	422.0744	380.3862	253.8542	150.1427	0.0000	0.0000	0.0000	0.0000	225.5855	374.4746	525.2868	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	107.7054	93.9447	97.4836	87.2835	84.9342	74.6436	71.5589	80.5409	80.9970	92.1948	98.0272	104.4068	(64)
Efficiency of water heater (217)m	87.2413	87.0866	86.7337	85.9170	84.3291	76.4000	76.4000	76.4000	76.4000	85.3906	86.6783	76.4000	(216)
Fuel for water heating, kWh/month	123.4568	107.8750	112.3942	101.5905	100.7176	97.7010	93.6635	105.4201	106.0170	107.9683	113.0931	119.5256	(219)
Water heating fuel used												1289.4227	(219)
Annual totals kWh/year													
Space heating fuel - main system												2848.3786	(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)												429.0080	(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												2914.5700	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2848.3786	3.4800	99.1236 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1289.4227	3.4800	44.8719 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	429.0080	13.1900	56.5862 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-1727.2394	13.1900	-227.8229 (252)
Total energy cost			102.6513 (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] =	0.3095 (257)
SAP value	95.6825	
SAP rating (Section 12)	96	(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	2848.3786	0.2160	615.2498 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1289.4227	0.2160	278.5153 (264)
Space and water heating			893.7651 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	429.0080	0.5190	222.6552 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			258.9080 (272)
CO2 emissions per m2			2.7500 (273)
EI value			97.5094
EI rating			98
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	47.1500 (1b)	x 2.3700 (2b)	= 111.7455 (1b) - (3b)
First floor	47.1500 (1c)	x 2.6200 (2c)	= 123.5330 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 235.2785 (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) = 0.1275 (8)
Pressure test					Yes
Measured/design AP50					4.7300
Infiltration rate					0.3640 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3094 (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	0.3790	0.3558	0.3481	0.3249	0.3249	0.3171	0.3171	0.3094	0.3094	0.3326	0.3326	0.3403 (22b)
Effective ac	0.5718	0.5633	0.5606	0.5528	0.5528	0.5503	0.5503	0.5479	0.5479	0.5553	0.5553	0.5579 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			11.2600	1.3258	14.9413		(27)
Flr - Ground			47.1500	0.1600	7.5440	75.6000	3564.5400 (28a)
Wl - Brick (Timber Frame)	50.8990	13.3520	37.5470	0.2100	7.8849	7.4000	277.8478 (29a)
Rf - Ins Joist	47.1480		47.1480	0.0800	3.7718	7.4000	348.8952 (30)
Total net area of external elements Aum(A, m ²)			145.2050				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.6500		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			76.8070			7.4000	568.3715 (32c)
Internal Floor			47.1480			7.4000	348.8952 (32d)
Internal Ceiling			47.1480			7.4000	348.8952 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 6141.2641 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							65.1248 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							15.6843 (36)
Total fabric heat loss							(33) + (36) = 52.3343 (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	44.3979	43.7359	43.5246	42.9183	42.9183	42.7255	42.7255	42.5374	42.5374	43.1158	43.1158	43.3178 (38)
Heat transfer coeff	96.7322	96.0702	95.8589	95.2526	95.2526	95.0598	95.0598	94.8717	94.8717	95.4501	95.4501	95.6521 (39)
Average = Sum(39)m / 12 =												95.4652 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0258	1.0188	1.0165	1.0101	1.0101	1.0081	1.0081	1.0061	1.0061	1.0122	1.0122	1.0143 (40)
HLP (average)												1.0124 (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												2.6801 (42)
Average daily hot water use (litres/day)												97.8530 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	107.6383	103.7242	99.8100	95.8959	91.9818	88.0677	88.0677	91.9818	95.8959	99.8100	103.7242	107.6383 (44)
Energy conte	159.6245	139.6086	144.0635	125.5981	120.5144	103.9947	96.3664	110.5819	111.9025	130.4116	142.3545	154.5878 (45)
Energy content (annual)												Total = Sum(45)m = 1539.6084 (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	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075	160.8075 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.7305	53.9403	43.8672	33.2103	24.8251	20.9584	22.6463	29.4365	39.5096	50.1665	58.5517	62.4184 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	368.3136	372.1356	362.5044	342.0008	316.1186	291.7931	275.5421	271.7202	281.3513	301.8550	327.7371	352.0627 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609	53.7609 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050	-107.2050 (71)
Water heating gains (Table 5)	71.5630	69.3036	64.6007	58.1901	54.0265	48.1684	43.1953	49.5738	51.8449	58.4789	65.9556	69.3049 (72)
Total internal gains	610.9705	605.7429	581.3357	543.7646	505.3336	471.2833	451.7471	461.0938	483.0692	520.8637	562.6078	594.1494 (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				7.7170	13.4684	0.7300		0.7200	0.7700		73.8576	
South				3.5460	56.5862	0.7300		0.7200	0.7700		37.0866 (78)	
Solar gains	110.9443	163.8369	240.5391	328.3741	375.0389	425.8368	390.8111	349.8360	283.6464	200.9973	132.9688	93.0712 (83)
Total gains	721.9148	769.5797	821.8748	872.1387	880.3726	897.1200	842.5581	810.9298	766.7156	721.8610	695.5766	687.2205 (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	17.6353	17.7569	17.7960	17.9093	17.9093	17.9456	17.9456	17.9812	17.9812	17.8722	17.8722	17.8345
alpha	2.1757	2.1838	2.1864	2.1940	2.1940	2.1964	2.1964	2.1987	2.1987	2.1915	2.1915	2.1890
util living area	0.8803	0.8616	0.8193	0.7444	0.6316	0.4657	0.3444	0.3462	0.5488	0.7333	0.8387	0.8874 (86)
MIT	18.8587	19.0453	19.4682	20.0063	20.4982	20.8286	20.9400	20.9414	20.7415	20.2317	19.5171	18.8483 (87)
Th 2	20.0619	20.0677	20.0696	20.0749	20.0749	20.0766	20.0766	20.0783	20.0783	20.0732	20.0732	20.0714 (88)
util rest of house	0.8679	0.8474	0.8002	0.7158	0.5863	0.3981	0.2571	0.2557	0.4825	0.6960	0.8192	0.8755 (89)
MIT 2	17.2360	17.5032	18.1039	18.8581	19.5215	19.9276	20.0418	20.0454	19.8372	19.1798	18.1849	17.2268 (90)
Living area fraction									fLA = Living area / (4) =			0.1592 (91)
MIT	17.4943	17.7487	18.3211	19.0409	19.6770	20.0710	20.1848	20.1880	19.9811	19.3472	18.3969	17.4849 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.3443	17.5987	18.1711	18.8909	19.5270	19.9210	20.0348	20.0380	19.8311	19.1972	18.2469	17.3349 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8197	0.7985	0.7516	0.6728	0.5563	0.3859	0.2529	0.2515	0.4629	0.6545	0.7702	0.8283 (94)
Useful gains	591.7425	614.5001	617.7008	586.7930	489.7917	346.1952	213.0881	203.9782	354.9041	472.4678	535.7276	569.1985 (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	1126.3820	1104.6801	1003.7468	837.3552	612.1845	382.2337	221.9417	212.3255	410.9018	658.3408	901.7104	1103.3393 (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	397.7718	329.4009	287.2182	180.4047	91.0602	0.0000	0.0000	0.0000	0.0000	138.2895	263.5076	397.4007 (98)
Space heating												2085.0538 (98)
Space heating per m2												(98) / (4) = 22.1109 (99)

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												2311.5895	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	397.7718	329.4009	287.2182	180.4047	91.0602	0.0000	0.0000	0.0000	0.0000	138.2895	263.5076	397.4007	(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)	440.9886	365.1895	318.4237	200.0053	100.9537	0.0000	0.0000	0.0000	0.0000	153.3143	292.1371	440.5773	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	107.7054	93.9447	97.4836	87.2835	84.9342	74.6436	71.5589	80.5409	80.9970	92.1948	98.0272	104.4068	(64)
Efficiency of water heater	86.8571	86.7238	86.2521	85.1830	82.9677	76.4000	76.4000	76.4000	76.4000	84.1220	85.9886	76.4000	(216)
(217)m												86.9329	(217)
Fuel for water heating, kWh/month	124.0030	108.3263	113.0217	102.4658	102.3702	97.7010	93.6635	105.4201	106.0170	109.5966	114.0002	120.1005	(219)
Water heating fuel used												1296.6858	(219)
Annual totals kWh/year													
Space heating fuel - main system												2311.5895	(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)												429.0080	(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												2165.8374	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2311.5895	7.6100	175.9120 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1296.6858	7.6100	98.6778 (247)
Pumps and fans for heating	75.0000	31.0800	23.3100 (249)
Energy for lighting	429.0080	31.0800	133.3357 (250)
Additional standing charges			105.0000 (251)
Energy saving/generation technologies			
PV Unit	-1946.4459	31.0800	-604.9554 (252)
Total energy cost			-68.7200 (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	2311.5895	0.2160	499.3033 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1296.6858	0.2160	280.0841 (264)
Space and water heating			779.3875 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	429.0080	0.5190	222.6552 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	0.5190	-1010.2054 (269)
Total kg/year			30.7622 (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	2311.5895	1.2200	2820.1392 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1296.6858	1.2200	1581.9567 (264)
Space and water heating			4402.0959 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	429.0080	3.0700	1317.0546 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	3.0700	-5975.5890 (269)
Primary energy kWh/year			-26.1885 (272)
Primary energy kWh/m2/year			-0.2777 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	046 - PRJ013014	Issued on Date	09/05/2024
Assessment Reference	046	Prop Type Ref	3B
Property	5 Rashleigh Drive, Netley Abbey, Southampton, SO31 5JY		
SAP Rating	86 B	DER	13.26
Environmental	89 B	TER	16.27
CO ₂ Emissions (t/year)	1.04	% DER<TER	18.52
General Requirements Compliance	Pass	DfEE	38.62
		TfEE	43.62
		% DfEE<TfEE	11.48
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)	16.27	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.26	kgCO ₂ /m ²	Pass
	-3.01 (-18.5%)	kgCO ₂ /m ²	

1b TfEE and DfEE

Target Fabric Energy Efficiency (TfEE)	43.62	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DfEE)	38.62	kWh/m ² /yr	
	-5.0 (-11.5%)	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	0.16 (max. 0.25)	0.16 (max. 0.70)	Pass
Roof	0.08 (max. 0.20)	0.08 (max. 0.35)	Pass
Openings	1.37 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.73 (measured in this dwelling)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Main heating system

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

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

7.72 m², No overhang

Windows facing South

3.55 m², No overhang

Air change rate

4.64 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

4.73 (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