

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	037 - PRJ013014	Issued on Date	09/10/2024
Assessment Reference	037	Prop Type Ref	B
Property	33 Deeble Way, Netley Abbey, Netley Abbey, SO31 5JP		

SAP Rating	85 B	DER	14.82	TER	17.90
Environmental	87 B	% DER<TER	17.20		
CO ₂ Emissions (t/year)	1.38	DFEE	50.06	TTEE	58.19
General Requirements Compliance	Pass	% DFEE<TFEE	13.96		

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							4.4800					
Infiltration rate							0.4031	(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) =	0.4031 (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	0.4937	0.4635	0.4534	0.4232	0.4232	0.4131	0.4131	0.4031	0.4031	0.4333	0.4333	0.4434 (22b)
Effective ac	0.6219	0.6074	0.6028	0.5896	0.5896	0.5853	0.5853	0.5812	0.5812	0.5939	0.5939	0.5983 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	57.3069	55.9737	55.5480	54.3269	54.3269	53.9387	53.9387	53.5597	53.5597	54.7246	54.7246	55.1316	(38)
Heat transfer coeff	146.7310	145.3977	144.9720	143.7510	143.7510	143.3627	143.3627	142.9838	142.9838	144.1486	144.1486	144.5556	(39)
Average = Sum(39)m / 12 =												144.1790	(39)
HLP	1.3110	1.2991	1.2953	1.2844	1.2844	1.2809	1.2809	1.2776	1.2776	1.2880	1.2880	1.2916	(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)	
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)	
								Total per year (kWh/year) = Sum(64)m =					1600.8370	(64)
RHI water heating demand												1601	(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			
East				9.2460	25.1733	0.7300	0.7200	0.7700	84.7777 (76)			
West				8.1710	25.1733	0.7300	0.7200	0.7700	74.9209 (80)			
Solar gains	159.6987	265.7504	444.1435	650.7261	750.4148	847.5852	699.0455	543.6524	344.2675	198.4736	129.0885 (83)	
Total gains	821.2382	922.0689	1074.3119	1240.2894	1298.0931	1358.0990	1269.2085	1197.6063	1065.8480	907.3009	806.8193	771.9997 (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	13.5934	13.7180	13.7583	13.8752	13.8752	13.9128	13.9128	13.9496	13.9496	13.8369	13.8369	13.7980		
alpha	1.9062	1.9145	1.9172	1.9250	1.9250	1.9275	1.9275	1.9300	1.9300	1.9225	1.9225	1.9199		
util living area	0.9014	0.8779	0.8237	0.7316	0.6133	0.4483	0.3358	0.3429	0.5554	0.7574	0.8652	0.9086	(86)	
MIT	18.1517	18.4178	19.0114	19.7368	20.3498	20.7654	20.9100	20.9098	20.6264	19.9157	18.9716	18.1439	(87)	
Th 2	19.8322	19.8415	19.8445	19.8531	19.8531	19.8558	19.8558	19.8585	19.8585	19.8503	19.8503	19.8474	(88)	
util rest of house	0.8892	0.8631	0.8019	0.6976	0.5596	0.3686	0.2312	0.2332	0.4759	0.7157	0.8454	0.8971	(89)	
MIT 2	16.1693	16.5445	17.3740	18.3701	19.1779	19.6717	19.8126	19.8168	19.5371	18.6396	17.3384	16.1639	(90)	
Living area fraction									fLA = Living area / (4) =			0.1892	(91)	

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Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

MIT	16.5443	16.8988	17.6837	18.6286	19.3996	19.8786	20.0202	20.0235	19.7432	18.8810	17.6473	16.5384 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.3943	16.7488	17.5337	18.4786	19.2496	19.7286	19.8702	19.8735	19.5932	18.7310	17.4973	16.3884 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8363	0.8076	0.7451	0.6484	0.5274	0.3590	0.2326	0.2348	0.4550	0.6649	0.7891	0.8459 (94)	
Useful gains	686.8399	744.6370	800.4283	804.2358	684.5814	487.5058	295.2378	281.1471	484.9613	603.2359	636.6350	653.0533 (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													
1569.1825	1548.3145	1425.6107	1204.4341	884.0112	548.8770	311.1233	296.4796	585.2541	927.0142	1253.7050	1530.6154 (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													
656.4629	540.0713	465.1357	288.1428	148.3758	0.0000	0.0000	0.0000	0.0000	240.8910	444.2904	652.9062 (98)		
Space heating												3436.2762 (98)	
RHI space heating demand												3436 (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					4.4800
Infiltration rate					0.4031 (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) =	0.4031 (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	0.5139	0.5038	0.4937	0.4434	0.4333	0.3829	0.3829	0.3728	0.4031	0.4333	0.4534	0.4736 (22b)
Effective ac	0.6320	0.6269	0.6219	0.5983	0.5939	0.5733	0.5733	0.5695	0.5812	0.5939	0.6028	0.6121 (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	58.2426	57.7701	57.3069	55.1316	54.7246	52.8299	52.8299	52.4791	53.5597	54.7246	55.5480	56.4087 (38)
Heat transfer coeff	147.6666	147.1941	146.7310	144.5556	144.1486	142.2540	142.2540	141.9031	142.9838	144.1486	144.9720	145.8328 (39)
Average = Sum(39)m / 12 =												144.5537 (39)
HLP	1.3194	1.3152	1.3110	1.2916	1.2880	1.2710	1.2710	1.2679	1.2776	1.2880	1.2953	1.3030 (40)
HLP (average)												1.2916 (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)

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	
East					9.2460	19.6403	0.7300		0.7200			0.7700	66.1439
West					8.1710	19.6403	0.7300		0.7200			0.7700	58.4536
Solar gains	124.5975	243.7391	401.4036	585.4232	717.4581	734.4460	699.2226	600.6219	466.8490	289.2170	155.3584	102.4629	(83)
Total gains	786.1370	900.0576	1031.5721	1174.9865	1265.1364	1244.9598	1188.2961	1099.1827	989.0445	852.2504	763.7041	745.3741	(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	13.5073	13.5506	13.5934	13.7980	13.8369	14.0212	14.0212	14.0559	13.9496	13.8369	13.7583	13.6771
alpha	1.9005	1.9034	1.9062	1.9199	1.9225	1.9347	1.9347	1.9371	1.9300	1.9225	1.9172	1.9118
util living area	0.9195	0.8955	0.8524	0.7774	0.6767	0.5528	0.4417	0.4817	0.6579	0.8197	0.8973	0.9262 (86)
MIT	17.7124	18.0451	18.6370	19.4044	20.0734	20.5718	20.8052	20.7621	20.3546	19.4689	18.4650	17.6571 (87)
Th 2	19.8257	19.8290	19.8322	19.8474	19.8503	19.8636	19.8636	19.8661	19.8585	19.8503	19.8445	19.8385 (88)
util rest of house	0.9100	0.8833	0.8347	0.7497	0.6332	0.4858	0.3494	0.3900	0.5969	0.7908	0.8833	0.9175 (89)
MIT 2	15.5430	16.0129	16.8461	17.9159	18.8196	19.4632	19.7273	19.6900	19.2127	18.0317	16.6213	15.4676 (90)
Living area fraction												0.1892 (91)
MIT	15.9533	16.3973	17.1848	18.1974	19.0567	19.6729	19.9312	19.8928	19.4287	18.3036	16.9700	15.8817 (92)
Temperature adjustment												-0.1500
adjusted MIT	15.8033	16.2473	17.0348	18.0474	18.9067	19.5229	19.7812	19.7428	19.2787	18.1536	16.8200	15.7317 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8609	0.8295	0.7774	0.6956	0.5915	0.4633	0.3421	0.3789	0.5604	0.7346	0.8300	0.8704 (94)
Useful gains	676.7720	746.6304	801.9615	817.2799	748.2735	576.8339	406.5495	416.5087	554.2960	626.1006	633.8697	648.7418 (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	1698.6569	1670.2572	1545.7883	1322.3110	1038.8407	700.3010	452.5329	474.3571	740.4643	1088.8384	1409.1330	1681.7067 (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	760.2823	620.6772	553.4071	363.6224	216.1820	0.0000	0.0000	0.0000	0.0000	344.2769	558.1895	768.5259 (98)
Space heating												4185.1634 (98)
Space heating per m2												37.3942 (99)
										(98) / (4) =		

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												4639.8708 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	760.2823	620.6772	553.4071	363.6224	216.1820	0.0000	0.0000	0.0000	0.0000	344.2769	558.1895	768.5259 (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)	842.8851	688.1122	613.5334	403.1291	239.6696	0.0000	0.0000	0.0000	0.0000	381.6817	618.8354	852.0243 (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	88.1728	88.0557	87.7661	87.0806	85.7360	76.4000	76.4000	76.4000	76.4000	86.8087	87.7716	76.4000 (216)
Fuel for water heating, kWh/month	125.7606	109.8333	114.3630	103.2978	102.1203	100.7453	96.6366	108.7349	109.3383	109.4449	115.0309	121.8105 (219)
Water heating fuel used												1317.1166 (219)
Annual totals kWh/year												
Space heating fuel - main system												4639.8708 (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												6482.4850 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4639.8708	3.4800	161.4675 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1317.1166	3.4800	45.8357 (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			396.6163 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.0616 (257)
SAP value		85.1913
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	4639.8708	0.2160	1002.2121 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1317.1166	0.2160	284.4972 (264)
Space and water heating			1286.7093 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	450.4976	0.5190	233.8082 (268)
Total kg/year			1559.4425 (272)
CO2 emissions per m2			13.9300 (273)
EI value			86.6833
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	$3.48 / 0.8377 = 4.154$, stars = 5
Water heating environmental impact	$0.216 / 0.8377 = 0.2578$, 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					4.4800
Infiltration rate					0.4031 (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) =				0.4031 (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	0.4937	0.4635	0.4534	0.4232	0.4232	0.4131	0.4131	0.4031	0.4031	0.4333	0.4333	0.4434 (22b)
Effective ac	0.6219	0.6074	0.6028	0.5896	0.5896	0.5853	0.5853	0.5812	0.5812	0.5939	0.5939	0.5983 (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	57.3069	55.9737	55.5480	54.3269	54.3269	53.9387	53.9387	53.5597	53.5597	54.7246	54.7246	55.1316 (38)
Heat transfer coeff	146.7310	145.3977	144.9720	143.7510	143.7510	143.3627	143.3627	142.9838	142.9838	144.1486	144.1486	144.5556 (39)
Average = Sum(39)m / 12 =												144.1790 (39)
HLP	1.3110	1.2991	1.2953	1.2844	1.2844	1.2809	1.2809	1.2776	1.2776	1.2880	1.2880	1.2916 (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												

	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 (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	Specific data		Specific data	factor		W
						W/m2	or Table 6b		or Table 6c	Table 6d		
East					9.2460	25.1733	0.7300		0.7200	0.7700		84.7777 (76)
West					8.1710	25.1733	0.7300		0.7200	0.7700		74.9209 (80)
Solar gains	159.6987	265.7504	444.1435	650.7261	750.4148	847.5852	780.1350	699.0455	543.6524	344.2675	198.4736	129.0885 (83)
Total gains	821.2382	922.0689	1074.3119	1240.2894	1298.0931	1358.0990	1269.2085	1197.6063	1065.8480	907.3009	806.8193	771.9997 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nll,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	13.5934	13.7180	13.7583	13.8752	13.8752	13.9128	13.9128	13.9496	13.9496	13.8369	13.8369	13.7980
alpha	1.9062	1.9145	1.9172	1.9250	1.9250	1.9275	1.9275	1.9300	1.9300	1.9225	1.9225	1.9199
util living area	0.9014	0.8779	0.8237	0.7316	0.6133	0.4483	0.3358	0.3429	0.5554	0.7574	0.8652	0.9086 (86)
MIT	18.1517	18.4178	19.0114	19.7368	20.3498	20.7654	20.9100	20.9098	20.6264	19.9157	18.9716	18.1439 (87)
Th 2	19.8322	19.8415	19.8445	19.8531	19.8531	19.8558	19.8558	19.8585	19.8585	19.8503	19.8503	19.8474 (88)
util rest of house	0.8892	0.8631	0.8019	0.6976	0.5596	0.3686	0.2312	0.2332	0.4759	0.7157	0.8454	0.8971 (89)
MIT 2	16.1693	16.5445	17.3740	18.3701	19.1779	19.6717	19.8126	19.8168	19.5371	18.6396	17.3384	16.1639 (90)
Living area fraction									fLA = Living area / (4) =			0.1892 (91)
MIT	16.5443	16.8988	17.6837	18.6286	19.3996	19.8786	20.0202	20.0235	19.7432	18.8810	17.6473	16.5384 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.3943	16.7488	17.5337	18.4786	19.2496	19.7286	19.8702	19.8735	19.5932	18.7310	17.4973	16.3884 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8363	0.8076	0.7451	0.6484	0.5274	0.3590	0.2326	0.2348	0.4550	0.6649	0.7891	0.8459 (94)
Useful gains	686.8399	744.6370	800.4283	804.2358	684.5814	487.5058	295.2378	281.1471	484.9613	603.2359	636.6350	653.0533 (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	1569.1825	1548.3145	1425.6107	1204.4341	884.0112	548.8770	311.1233	296.4796	585.2541	927.0142	1253.7050	1530.6154 (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	656.4629	540.0713	465.1357	288.1428	148.3758	0.0000	0.0000	0.0000	0.0000	240.8910	444.2904	652.9062 (98)
Space heating												3436.2762 (99)
Space heating per m2												30.7030 (99)
										(98) / (4) =		

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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Not applicable

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3809.6188 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	656.4629	540.0713	465.1357	288.1428	148.3758	0.0000	0.0000	0.0000	0.0000	240.8910	444.2904	652.9062	(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)	727.7860	598.7487	515.6715	319.4488	164.4964	0.0000	0.0000	0.0000	0.0000	267.0632	492.5614	723.8428	(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	87.9055	87.7916	87.3980	86.4835	84.5336	76.4000	76.4000	76.4000	76.4000	85.8157	87.2807	76.4000	(216)
Fuel for water heating, kWh/month	126.1431	110.1638	114.8447	104.0110	103.5728	100.7453	96.6366	108.7349	109.3383	110.7114	115.6778	122.2121	(219)
Water heating fuel used												1322.7919	(219)
Annual totals kWh/year													
Space heating fuel - main system												3809.6188	(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												5657.9083	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3809.6188	7.6100	289.9120 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1322.7919	7.6100	100.6645 (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			658.9011 (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	3809.6188	0.2160	822.8777 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1322.7919	0.2160	285.7230 (264)
Space and water heating			1108.6007 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	450.4976	0.5190	233.8082 (268)
Total kg/year			1381.3340 (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	3809.6188	1.2200	4647.7350 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1322.7919	1.2200	1613.8061 (264)
Space and water heating			6261.5411 (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			7874.8187 (272)
Primary energy kWh/m2/year			70.3611 (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 (73.1%)

Measures omitted - SAP change or cost saving too small:

N Solar water heating	+ 0.8	-£ 47	-151 kg (10.9%)
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Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar photovoltaic panels	£605	9.03 kg/m²	A 94
Total Savings	£605	9.03 kg/m²	A 94
Potential energy efficiency rating:		A 94	
Potential environmental impact rating:			A 94

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	£496	£496	£0
Space heating	£418	£418	£0
Water heating	£101	£101	£0
Lighting	£140	£140	£0
Generated (PV)	-£0	-£605	£605
Total cost of fuels	£659	£54	£605
Total cost of uses	£659	£54	£605
Delivered energy	51 kWh/m²	33 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	17 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					4.4800
Infiltration rate					0.4031 (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) =	0.4031 (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	0.5139	0.5038	0.4937	0.4434	0.4333	0.3829	0.3829	0.3728	0.4031	0.4333	0.4534	0.4736 (22b)
Effective ac	0.6320	0.6269	0.6219	0.5983	0.5939	0.5733	0.5733	0.5695	0.5812	0.5939	0.6028	0.6121 (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	58.2426	57.7701	57.3069	55.1316	54.7246	52.8299	52.8299	52.4791	53.5597	54.7246	55.5480	56.4087 (38)
Heat transfer coeff	147.6666	147.1941	146.7310	144.5556	144.1486	142.2540	142.2540	141.9031	142.9838	144.1486	144.9720	145.8328 (39)
Average = Sum(39)m / 12 =												144.5537 (39)
HLP	1.3194	1.3152	1.3110	1.2916	1.2880	1.2710	1.2710	1.2679	1.2776	1.2880	1.2953	1.3030 (40)
HLP (average)												1.2916 (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												

[illegible]

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 m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
East				9.2460	19.6403	0.7300	0.7200	0.7700	66.1439 (76)			
West				8.1710	19.6403	0.7300	0.7200	0.7700	58.4536 (80)			
Solar gains	124.5975	243.7391	401.4036	585.4232	717.4581	734.4460	699.2226	600.6219	466.8490	289.2170	155.3584	102.4629 (83)
Total gains	786.1370	900.0576	1031.5721	1174.9865	1265.1364	1244.9598	1188.2961	1099.1827	989.0445	852.2504	763.7041	745.3741 (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	13.5073	13.5506	13.5934	13.7980	13.8369	14.0212	14.0212	14.0559	13.9496	13.8369	13.7583	13.6771
alpha	1.9005	1.9034	1.9062	1.9199	1.9225	1.9347	1.9347	1.9371	1.9300	1.9225	1.9172	1.9118
util living area	0.9195	0.8955	0.8524	0.7774	0.6767	0.5528	0.4417	0.4817	0.6579	0.8197	0.8973	0.9262 (86)
MIT	17.7124	18.0451	18.6370	19.4044	20.0734	20.5718	20.8052	20.7621	20.3546	19.4689	18.4650	17.6571 (87)
Th 2	19.8257	19.8290	19.8322	19.8474	19.8503	19.8636	19.8636	19.8661	19.8585	19.8503	19.8445	19.8385 (88)
util rest of house	0.9100	0.8833	0.8347	0.7497	0.6332	0.4858	0.3494	0.3900	0.5969	0.7908	0.8833	0.9175 (89)
MIT 2	15.5430	16.0129	16.8461	17.9159	18.8196	19.4632	19.7273	19.6900	19.2127	18.0317	16.6213	15.4676 (90)
Living area fraction												0.1892 (91)
MIT	15.9533	16.3973	17.1848	18.1974	19.0567	19.6729	19.9312	19.8928	19.4287	18.3036	16.9700	15.8817 (92)
Temperature adjustment												-0.1500
adjusted MIT	15.8033	16.2473	17.0348	18.0474	18.9067	19.5229	19.7812	19.7428	19.2787	18.1536	16.8200	15.7317 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8609	0.8295	0.7774	0.6956	0.5915	0.4633	0.3421	0.3789	0.5604	0.7346	0.8300	0.8704 (94)
Useful gains	676.7720	746.6304	801.9615	817.2799	748.2735	576.8339	406.5495	416.5087	554.2960	626.1006	633.8697	648.7418 (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	1698.6569	1670.2572	1545.7883	1322.3110	1038.8407	700.3010	452.5329	474.3571	740.4643	1088.8384	1409.1330	1681.7067 (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	760.2823	620.6772	553.4071	363.6224	216.1820	0.0000	0.0000	0.0000	0.0000	344.2769	558.1895	768.5259 (98)
Space heating												4185.1634 (98)
Space heating per m2												37.3942 (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 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													4639.8708 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	760.2823	620.6772	553.4071	363.6224	216.1820	0.0000	0.0000	0.0000	0.0000	344.2769	558.1895	768.5259	(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)	842.8851	688.1122	613.5334	403.1291	239.6696	0.0000	0.0000	0.0000	0.0000	381.6817	618.8354	852.0243	(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	88.1728	88.0557	87.7661	87.0806	85.7360	76.4000	76.4000	76.4000	76.4000	86.8087	87.7716	76.4000	(216)
Fuel for water heating, kWh/month	125.7606	109.8333	114.3630	103.2978	102.1203	100.7453	96.6366	108.7349	109.3383	109.4449	115.0309	121.8105	(219)
Water heating fuel used												1317.1166	(219)
Annual totals kWh/year													
Space heating fuel - main system												4639.8708	(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												4755.2456	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4639.8708	3.4800	161.4675 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1317.1166	3.4800	45.8357 (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			168.7934 (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] =	0.4518 (257)
SAP value		93.6977
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	4639.8708	0.2160	1002.2121 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1317.1166	0.2160	284.4972 (264)
Space and water heating			1286.7093 (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			663.0053 (272)
CO2 emissions per m2			5.9200 (273)
EI value			94.3383
EI rating			94 (274)
EI band			A

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
 CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	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					4.4800
Infiltration rate					0.4031 (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) =	0.4031 (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	0.4937	0.4635	0.4534	0.4232	0.4232	0.4131	0.4131	0.4031	0.4031	0.4333	0.4333	0.4434 (22b)
Effective ac	0.6219	0.6074	0.6028	0.5896	0.5896	0.5853	0.5853	0.5812	0.5812	0.5939	0.5939	0.5983 (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	57.3069	55.9737	55.5480	54.3269	54.3269	53.9387	53.9387	53.5597	53.5597	54.7246	54.7246	55.1316 (38)
Heat transfer coeff	146.7310	145.3977	144.9720	143.7510	143.7510	143.3627	143.3627	142.9838	142.9838	144.1486	144.1486	144.5556 (39)
Average = Sum(39)m / 12 =												144.1790 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3110	1.2991	1.2953	1.2844	1.2844	1.2809	1.2809	1.2776	1.2776	1.2880	1.2880	1.2916 (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)

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		
East					9.2460	25.1733	0.7300		0.7200	0.7700		84.7777 (76)
West					8.1710	25.1733	0.7300		0.7200	0.7700		74.9209 (80)
Solar gains	159.6987	265.7504	444.1435	650.7261	750.4148	847.5852	780.1350	699.0455	543.6524	344.2675	198.4736	129.0885 (83)
Total gains	821.2382	922.0689	1074.3119	1240.2894	1298.0931	1358.0990	1269.2085	1197.6063	1065.8480	907.3009	806.8193	771.9997 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nll,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	13.5934	13.7180	13.7583	13.8752	13.8752	13.9128	13.9128	13.9496	13.9496	13.8369	13.8369	13.7980
alpha	1.9062	1.9145	1.9172	1.9250	1.9250	1.9275	1.9275	1.9300	1.9300	1.9225	1.9225	1.9199
util living area	0.9014	0.8779	0.8237	0.7316	0.6133	0.4483	0.3358	0.3429	0.5554	0.7574	0.8652	0.9086 (86)
MIT	18.1517	18.4178	19.0114	19.7368	20.3498	20.7654	20.9100	20.9098	20.6264	19.9157	18.9716	18.1439 (87)
Th 2	19.8322	19.8415	19.8445	19.8531	19.8531	19.8558	19.8558	19.8585	19.8585	19.8503	19.8503	19.8474 (88)
util rest of house	0.8892	0.8631	0.8019	0.6976	0.5596	0.3686	0.2312	0.2332	0.4759	0.7157	0.8454	0.8971 (89)
MIT 2	16.1693	16.5445	17.3740	18.3701	19.1779	19.6717	19.8126	19.8168	19.5371	18.6396	17.3384	16.1639 (90)
Living area fraction									fLA = Living area / (4) =			0.1892 (91)
MIT	16.5443	16.8988	17.6837	18.6286	19.3996	19.8786	20.0202	20.0235	19.7432	18.8810	17.6473	16.5384 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.3943	16.7488	17.5337	18.4786	19.2496	19.7286	19.8702	19.8735	19.5932	18.7310	17.4973	16.3884 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8363	0.8076	0.7451	0.6484	0.5274	0.3590	0.2326	0.2348	0.4550	0.6649	0.7891	0.8459 (94)
Useful gains	686.8399	744.6370	800.4283	804.2358	684.5814	487.5058	295.2378	281.1471	484.9613	603.2359	636.6350	653.0533 (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	1569.1825	1548.3145	1425.6107	1204.4341	884.0112	548.8770	311.1233	296.4796	585.2541	927.0142	1253.7050	1530.6154 (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	656.4629	540.0713	465.1357	288.1428	148.3758	0.0000	0.0000	0.0000	0.0000	240.8910	444.2904	652.9062 (98)
Space heating												3436.2762 (99)
Space heating per m2												30.7030 (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													3809.6188 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	656.4629	540.0713	465.1357	288.1428	148.3758	0.0000	0.0000	0.0000	0.0000	240.8910	444.2904	652.9062	(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)	727.7860	598.7487	515.6715	319.4488	164.4964	0.0000	0.0000	0.0000	0.0000	267.0632	492.5614	723.8428	(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	87.9055	87.7916	87.3980	86.4835	84.5336	76.4000	76.4000	76.4000	76.4000	85.8157	87.2807	76.4000	(216)
Fuel for water heating, kWh/month	126.1431	110.1638	114.8447	104.0110	103.5728	100.7453	96.6366	108.7349	109.3383	110.7114	115.6778	122.2121	(219)
Water heating fuel used												1322.7919	(219)
Annual totals kWh/year													
Space heating fuel - main system												3809.6188	(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												3711.4624	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3809.6188	7.6100	289.9120 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1322.7919	7.6100	100.6645 (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			53.9457 (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	3809.6188	0.2160	822.8777 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1322.7919	0.2160	285.7230 (264)
Space and water heating			1108.6007 (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			371.1285 (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	3809.6188	1.2200	4647.7350 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1322.7919	1.2200	1613.8061 (264)
Space and water heating			6261.5411 (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			1899.2296 (272)
Primary energy kWh/m2/year			16.9695 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	037 - PRJ013014	Issued on Date	09/10/2024
Assessment Reference	037	Prop Type Ref	B
Property	33 Deeble Way, Netley Abbey, Netley Abbey, SO31 5JP		
SAP Rating	85 B	DER	14.82
Environmental	87 B	TER	17.90
CO ₂ Emissions (t/year)	1.38	% DER<TER	17.20
General Requirements Compliance	Pass	DFEE	50.06
		TFEE	58.19
		% DFEE<TFEE	13.96
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)	17.90	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.82	kgCO ₂ /m ²	Pass
	-3.08 (-17.2%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	58.19	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	50.06	kWh/m ² /yr	
	-8.1 (-13.9%)	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	4.48 (measured in this dwelling)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

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

Calculation Type: New Build (As Built)

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing East

9.25 m², No overhang

Windows facing West

8.17 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

4.48 (measured in this dwelling)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.08

W/m²K

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