

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	082 - PRJ013014			Issued on Date	03/06/2025
Assessment Reference	082	Prop Type Ref	F2		
Property	3 Erwood Close, Netley Abbey, Southampton, SO31 5TJ				
SAP Rating	81 B	DER	22.51	TER	23.49
Environmental	83 B	% DER<TER	4.18		
CO ₂ Emissions (t/year)	1.34	DFEE	65.35	TFEE	75.35
General Requirements Compliance	Pass	% DFEE<TFEE	13.27		
Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk			Assessor ID	4299-0004
Client					

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REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

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DWELLING AS BUILT

Detached Maisonette, total floor area 72 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Mains gas

Fuel factor:1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 23.49 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 22.51 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)75.3 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE)65.3 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.23 (max. 0.30)	0.26 (max. 0.70)	OK
Floor	0.15 (max. 0.25)	0.20 (max. 0.70)	OK
Roof	0.08 (max. 0.20)	0.08 (max. 0.35)	OK
Openings	1.35 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.74 (measured in this dwelling)	
Maximum	10.0	OK

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% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls: No cylinder

Boiler interlock Yes OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%	
Minimum	75% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Southern England): Slight OK

Based on:

Overshading:

Average

Windows facing East: 4.81 m², No overhang

Windows facing West: 5.97 m², No overhang

Air change rate: 5.09 ach

Blinds/curtains: Dark-coloured curtain or roller blind, closed 100% of daylight hours

10 Key features

Roof U-value 0.08 W/m²K

Air permeability 3.7 m³/m²h

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	5.6600 (1b)	x 2.1200 (2b)	= 11.9992 (1b) - (3b)
First floor	66.0100 (1c)	x 2.3400 (2c)	= 154.4634 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.6700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.4626 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					20.0000 / (5) = 0.1201 (8)
Pressure test					Yes
Measured/design AP50					3.7400
Infiltration rate					0.3071 (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) =	0.3071 (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	0.3916	0.3839	0.3763	0.3379	0.3302	0.2918	0.2918	0.2841	0.3071	0.3302	0.3455	0.3609 (22b)
Effective ac	0.5767	0.5737	0.5708	0.5571	0.5545	0.5426	0.5426	0.5404	0.5472	0.5545	0.5597	0.5651 (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			3.7800	1.2000	4.5480		(26)
Windows (Uw = 1.40)			10.7700	1.3258	14.2917		(27)
Flr - Ground			5.6600	0.2000	1.1320	75.6000	427.8960 (28a)
Flr - Exposed Drive Through			60.3500	0.1400	8.4490	13.2000	796.6200 (28b)
Wl - Brick (Timber Frame)	49.6360	4.8050	44.8310	0.2100	9.4145	7.4000	331.7494 (29a)
Wl - Brick (Cavity)	34.1000	3.7830	30.3170	0.2600	7.8824	104.7000	3174.1899 (29a)
Wl - Clad (Timber Frame)	29.6530	5.9680	23.6850	0.2100	4.9739	7.4000	175.2690 (29a)
Rf - Ins Joist	66.0140		66.0140	0.0800	5.2811	7.4000	488.5036 (30)
Total net area of external elements Aum(A, m ²)			245.4270				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.9726		(33)
Stud			147.2341			7.4000	1089.5325 (32c)
Internal Floor			5.6640			7.4000	41.9136 (32d)
Internal Ceiling			5.6640			7.4000	41.9136 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 6567.5876 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							91.6365 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							24.1151 (36)
Total fabric heat loss							(33) + (36) = 80.0877 (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	31.6786	31.5150	31.3547	30.6016	30.4607	29.8048	29.8048	29.6834	30.0575	30.4607	30.7458	31.0437 (38)
Heat transfer coeff	111.7662	111.6027	111.4423	110.6893	110.5484	109.8925	109.8925	109.7711	110.1452	110.5484	110.8334	111.1314 (39)
Average = Sum(39)m / 12 =												110.6886 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.5595	1.5572	1.5549	1.5444	1.5425	1.5333	1.5333	1.5316	1.5368	1.5425	1.5464	1.5506 (40)
HLP (average)												1.5444 (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												2.2860 (42)
Average daily hot water use (litres/day)												88.4919 (43)
Daily hot water use	97.3411	93.8014	90.2618	86.7221	83.1824	79.6427	79.6427	83.1824	86.7221	90.2618	93.8014	97.3411 (44)
Energy conte	144.3541	126.2530	130.2818	113.5828	108.9854	94.0461	87.1476	100.0031	101.1975	117.9359	128.7362	139.7992 (45)

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Energy content (annual)												Total = Sum (45)m =	1392.3227 (45)
Distribution loss (46)m = 0.15 x (45)m													
21.6531	18.9379	19.5423	17.0374	16.3478	14.1069	13.0721	15.0005	15.1796	17.6904	19.3104	20.9699	(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	0.6323	0.5329	0.5292	0.4433	0.4080	0.3371	0.3123	0.3743	0.3949	0.4790	0.5434	(61)	
Total heat required for water heating calculated for each month													
144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116	(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	(63)	
Solar input (sum of months) = Sum (63)m =												0.0000	(63)
Output from w/h													
144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116	(64)	
Heat gains from water heating, kWh/month													
48.1558	42.1124	43.4510	37.8771	36.3396	31.3546	29.0546	33.3446	33.7469	39.3334	42.9406	46.6363	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
18.8393	16.7329	13.6081	10.3022	7.7010	6.5015	7.0251	9.1316	12.2564	15.5623	18.1634	19.3629	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
201.1629	203.2504	197.9901	186.7915	172.6554	159.3695	150.4936	148.4062	153.6665	164.8650	179.0011	192.2871	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	(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	(70)	
Losses e.g. evaporation (negative values) (Table 5)													
-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	(71)	
Water heating gains (Table 5)													
64.7256	62.6672	58.4019	52.6071	48.8436	43.5481	39.0519	44.8180	46.8707	52.8675	59.6398	62.6832	(72)	
Total internal gains													
345.0174	342.9401	330.2897	309.9905	289.4897	269.7087	256.8603	262.6454	273.0831	293.5844	317.0940	334.6229	(73)	

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
East	4.8050				19.6403		0.5000		0.7200		0.7700		23.5438	
West	5.9680				19.6403		0.5000		0.7200		0.7700		29.2423 (80)	
Solar gains	52.7861	103.2608	170.0559	248.0164	303.9534	311.1504	296.2279	254.4553	197.7820	122.5277	65.8181	43.4087	(83)	
Total gains	397.8036	446.2010	500.3456	558.0069	593.4431	580.8591	553.0882	517.1007	470.8652	416.1121	382.9121	378.0316	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	16.3227	16.3466	16.3702	16.4815	16.5025	16.6010	16.6010	16.6194	16.5630	16.5025	16.4601	16.4160	
alpha	2.0882	2.0898	2.0913	2.0988	2.1002	2.1067	2.1067	2.1080	2.1042	2.1002	2.0973	2.0944	
util living area	0.9685	0.9585	0.9389	0.9005	0.8370	0.7403	0.6316	0.6701	0.8205	0.9211	0.9589	0.9717	(86)
MIT	17.6174	17.8711	18.3788	19.0798	19.7799	20.3706	20.6909	20.6350	20.1405	19.2403	18.3092	17.5655	(87)
Th 2	19.6432	19.6449	19.6465	19.6543	19.6558	19.6626	19.6626	19.6639	19.6600	19.6558	19.6528	19.6498	(88)
util rest of house	0.9633	0.9515	0.9278	0.8802	0.7980	0.6634	0.5021	0.5485	0.7616	0.9010	0.9507	0.9669	(89)
MIT 2	16.6021	16.8545	17.3576	18.0499	18.7237	19.2688	19.5271	19.4919	19.0763	18.2181	17.2972	16.5548	(90)
Living area fraction	0.9633	0.9515	0.9278	0.8802	0.7980	0.6634	0.5021	0.5485	0.7616	0.9010	0.9507	0.9669	(91)
MIT	16.9587	17.2115	17.7162	18.4116	19.0946	19.6558	19.9358	19.8934	19.4500	18.5771	17.6526	16.9098	(92)
Temperature adjustment	16.8087	17.0615	17.5662	18.2616	18.9446	19.5058	19.7858	19.7434	19.3000	18.4271	17.5026	16.7598	(93)
adjusted MIT	16.8087	17.0615	17.5662	18.2616	18.9446	19.5058	19.7858	19.7434	19.3000	18.4271	17.5026	16.7598	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9471	0.9322	0.9040	0.8524	0.7720	0.6525	0.5161	0.5572	0.7414	0.8756	0.9316	0.9519	(94)
Useful gains	376.7434	415.9339	452.3188	475.6638	458.1146	379.0129	285.4545	288.1141	349.1157	364.3387	356.7117	359.8382	(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	1398.0475	1357.2565	1233.2475	1036.2280	800.8842	539.1069	350.0992	367.0038	572.7543	865.2689	1152.9567	1395.7872	(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	759.8502	632.5688	581.0110	403.6062	255.0206	0.0000	0.0000	0.0000	0.0000	372.6921	573.2964	770.7460	(98)
Space heating												4348.7913	(98)
Space heating per m2													(98) / (4) = 60.6780 (99)

8c. Space cooling requirement

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 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													4821.2764 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	759.8502	632.5688	581.0110	403.6062	255.0206	0.0000	0.0000	0.0000	0.0000	372.6921	573.2964	770.7460	(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)	842.4060	701.2958	644.1363	447.4570	282.7279	0.0000	0.0000	0.0000	0.0000	413.1841	635.5836	854.4856	(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	144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116	(64)
Efficiency of water heater (217)m	87.6628	87.5593	87.3021	86.7483	85.5607	76.4000	76.4000	76.4000	76.4000	86.4355	87.2985	76.4000	(216)
Fuel for water heating, kWh/month	165.3911	144.8000	149.8371	131.4447	127.8547	123.5382	114.4763	131.3841	132.9743	136.9980	148.0893	160.0000	(219)
Water heating fuel used												1666.7878	(219)
Annual totals kWh/year													
Space heating fuel - main system												4821.2764	(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)												332.7087	(232)
Total delivered energy for all uses												6895.7728	(238)

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	4821.2764	0.2160	1041.3957 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1666.7878	0.2160	360.0262 (264)
Space and water heating			1401.4219 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	332.7087	0.5190	172.6758 (268)
Total CO2, kg/year			1613.0227 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			22.5100 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER			22.5100 ZC1
Total Floor Area	TFA		71.6700
Assumed number of occupants	N		2.2860
CO2 emission factor in Table 12 for electricity displaced from grid	EF		0.5190
CO2 emissions from appliances, equation (L14)			16.6325 ZC2
CO2 emissions from cooking, equation (L16)			2.4259 ZC3
Total CO2 emissions			41.5684 ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year			0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000 ZC7
Net CO2 emissions			41.5684 ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	5.6600 (1b)	x 2.1200 (2b)	= 11.9992 (1b) - (3b)
First floor	66.0100 (1c)	x 2.3400 (2c)	= 154.4634 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.6700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.4626 (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) = 0.1802 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4302 (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) =	0.4302 (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	0.5485	0.5378	0.5270	0.4732	0.4625	0.4087	0.4087	0.3980	0.4302	0.4625	0.4840	0.5055 (22b)
Effective ac	0.6504	0.6446	0.6389	0.6120	0.6069	0.5835	0.5835	0.5792	0.5925	0.6069	0.6171	0.6278 (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
TER Opaque door			3.7800	1.0000	3.7900		(26)
TER Opening Type (Uw = 1.40)			10.7700	1.3258	14.2917		(27)
Flr - Ground			5.6600	0.1300	0.7358		(28a)
Flr - Exposed Drive Through			60.3500	0.1300	7.8455		(28b)
Wl - Brick (Timber Frame)	49.6360	4.8050	44.8310	0.1800	8.0696		(29a)
Wl - Brick (Cavity)	34.1000	3.7830	30.3170	0.1800	5.4571		(29a)
Wl - Clad (Timber Frame)	29.6530	5.9680	23.6850	0.1800	4.2633		(29a)
Rf - Ins Joist	66.0140		66.0140	0.1300	8.5818		(30)
Total net area of external elements Aum(A, m ²)			245.4270				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		53.0347		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.6350 (36)
Total fabric heat loss						(33) + (36) =	71.6697 (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	35.7306	35.4097	35.0951	33.6177	33.3412	32.0544	32.0544	31.8161	32.5501	33.3412	33.9004	34.4851 (38)
Heat transfer coeff	107.4003	107.0794	106.7648	105.2874	105.0110	103.7241	103.7241	103.4858	104.2198	105.0110	105.5702	106.1548 (39)
Average = Sum(39)m / 12 =												105.2861 (39)
HLP	1.4985	1.4941	1.4897	1.4691	1.4652	1.4472	1.4472	1.4439	1.4542	1.4652	1.4730	1.4812 (40)
HLP (average)												1.4690 (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												2.2860 (42)
Average daily hot water use (litres/day)												88.4919 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	97.3411	93.8014	90.2618	86.7221	83.1824	79.6427	79.6427	83.1824	86.7221	90.2618	93.8014	97.3411 (44)
Energy conte	144.3541	126.2530	130.2818	113.5828	108.9854	94.0461	87.1476	100.0031	101.1975	117.9359	128.7362	139.7992 (45)
Energy content (annual)												Total = Sum(45)m = 1392.3227 (45)
Distribution loss (46)m = 0.15 x (45)m												
	21.6531	18.9379	19.5423	17.0374	16.3478	14.1069	13.0721	15.0005	15.1796	17.6904	19.3104	20.9699 (46)
Water storage loss:												

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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	49.6040	43.1744	45.9964	42.7671	42.3888	39.2759	40.5851	42.3888	42.7671	45.9964	46.2582	49.6040 (61)
Total heat required for water heating calculated for each month	193.9580	169.4274	176.2782	156.3499	151.3743	133.3220	127.7326	142.3919	143.9645	163.9323	174.9945	189.4032 (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)
Output from w/h	193.9580	169.4274	176.2782	156.3499	151.3743	133.3220	127.7326	142.3919	143.9645	163.9323	174.9945	189.4032 (64)
Heat gains from water heating, kWh/month	60.3987	52.7727	54.8178	48.4581	46.8349	41.0893	39.1228	43.8482	44.3399	50.7128	54.3694	58.8842 (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	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988	114.2988 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.9495	16.8308	13.6877	10.3625	7.7461	6.5396	7.0662	9.1849	12.3280	15.6532	18.2696	19.4761 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	201.1629	203.2504	197.9901	186.7915	172.6554	159.3695	150.4936	148.4062	153.6665	164.8650	179.0011	192.2871 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299	34.4299 (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)	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390 (71)
Water heating gains (Table 5)	81.1811	78.5308	73.6798	67.3028	62.9501	57.0685	52.5845	58.9358	61.5832	68.1623	75.5130	79.1455 (72)
Total internal gains	361.5831	358.9016	345.6472	324.7465	303.6412	283.2671	270.4339	276.8166	287.8673	308.9702	333.0734	351.1983 (73)

6. Solar gains

[Jan				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
East				4.8050	19.6403		0.6300		0.7000		0.7700		28.8411 (76)
West				5.9680	19.6403		0.6300		0.7000		0.7700		35.8218 (80)

Solar gains	64.6630	126.4945	208.3185	303.8201	372.3429	381.1592	362.8791	311.7078	242.2830	150.0964	80.6272	53.1757	(83)
Total gains	426.2461	485.3961	553.9657	628.5666	675.9841	664.4263	633.3130	588.5244	530.1503	459.0666	413.7005	404.3740	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	46.3414	46.4803	46.6173	47.2714	47.3959	47.9839	47.9839	48.0943	47.7556	47.3959	47.1448	46.8852
alpha	4.0894	4.0987	4.1078	4.1514	4.1597	4.1989	4.1989	4.2063	4.1837	4.1597	4.1430	4.1257
util living area	0.9979	0.9960	0.9905	0.9723	0.9216	0.8073	0.6584	0.7141	0.9076	0.9841	0.9962	0.9983 (86)
MIT	19.3141	19.4703	19.7667	20.1791	20.5618	20.8416	20.9510	20.9306	20.7045	20.2064	19.6940	19.2949 (87)
Th 2	19.6886	19.6920	19.6953	19.7108	19.7137	19.7273	19.7273	19.7298	19.7221	19.7137	19.7078	19.7017 (88)
util rest of house	0.9971	0.9945	0.9868	0.9601	0.8832	0.7089	0.4967	0.5583	0.8452	0.9749	0.9945	0.9977 (89)
MIT 2	17.4729	17.7032	18.1370	18.7408	19.2699	19.6166	19.7094	19.7006	19.4714	18.7890	18.0410	17.4533 (90)
Living area fraction									fLA = Living area / (4) =			0.3512 (91)
MIT	18.1195	18.3238	18.7093	19.2459	19.7236	20.0468	20.1454	20.1326	19.9044	19.2868	18.6215	18.1000 (92)
Temperature adjustment												0.0000
adjusted MIT	18.1195	18.3238	18.7093	19.2459	19.7236	20.0468	20.1454	20.1326	19.9044	19.2868	18.6215	18.1000 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9957	0.9922	0.9827	0.9542	0.8835	0.7372	0.5543	0.6131	0.8563	0.9706	0.9924	0.9965 (94)
Useful gains	424.3943	481.6255	544.3700	599.7487	597.2648	489.8134	351.0221	360.8485	453.9864	445.5689	410.5570	402.9650 (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	1484.2199	1437.4086	1303.5266	1089.2952	842.5670	564.9663	367.7484	386.2721	604.9384	912.2060	1216.3271	1475.5562 (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	788.5102	642.2862	564.8125	352.4735	182.5048	0.0000	0.0000	0.0000	0.0000	347.1780	580.1545	798.0079 (98)
Space heating												4255.9276 (98)
Space heating per m2										(98) / (4) =		59.3823 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													4556.6676 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	788.5102	642.2862	564.8125	352.4735	182.5048	0.0000	0.0000	0.0000	0.0000	347.1780	580.1545	798.0079	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	844.2293	687.6726	604.7243	377.3806	195.4013	0.0000	0.0000	0.0000	0.0000	371.7110	621.1504	854.3981	(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	193.9580	169.4274	176.2782	156.3499	151.3743	133.3220	127.7326	142.3919	143.9645	163.9323	174.9945	189.4032	(64)
Efficiency of water heater (217)m	88.2097	88.0874	87.7740	87.0362	85.5230	80.3000	80.3000	80.3000	80.3000	86.8945	87.8397	80.3000	(216)
Fuel for water heating, kWh/month	219.8830	192.3401	200.8320	179.6378	176.9983	166.0299	159.0693	177.3250	179.2833	188.6567	199.2202	214.5717	(219)
Water heating fuel used												2253.8472	(219)
Annual totals kWh/year													
Space heating fuel - main system												4556.6676	(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)												334.6537	(232)
Total delivered energy for all uses												7220.1686	(238)

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	4556.6676	0.2160	984.2402 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2253.8472	0.2160	486.8310 (264)
Space and water heating			1471.0712 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	334.6537	0.5190	173.6853 (268)
Total CO2, kg/m2/year			1683.6815 (272)
Emissions per m2 for space and water heating			20.5256 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4234 (272b)
Emissions per m2 for pumps and fans			0.5431 (272c)
Target Carbon Dioxide Emission Rate (TER) = (20.5256 * 1.00) + 2.4234 + 0.5431, rounded to 2 d.p.			23.4900 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	082 - PRJ013014			Issued on Date	03/06/2025
Assessment Reference	082	Prop Type Ref	F2		
Property	3 Erwood Close, Netley Abbey, Southampton, SO31 5TJ				
SAP Rating	81 B	DER	22.51	TER	23.49
Environmental	83 B	% DER<TER	4.18		
CO ₂ Emissions (t/year)	1.34	DFEE	65.35	TFEE	75.35
General Requirements Compliance	Pass	% DFEE<TFEE	13.27		
Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk			Assessor ID	4299-0004
Client					

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	5.6600 (1b)	x 2.1200 (2b)	= 11.9992 (1b) - (3b)
First floor	66.0100 (1c)	x 2.3400 (2c)	= 154.4634 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.6700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.4626 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					20.0000 / (5) = 0.1201 (8)
Pressure test					Yes
Measured/design AP50					3.7400
Infiltration rate					0.3071 (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) =	0.3071 (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	0.3763	0.3532	0.3455	0.3225	0.3225	0.3148	0.3148	0.3071	0.3071	0.3302	0.3302	0.3379 (22b)
Effective ac	0.5708	0.5624	0.5597	0.5520	0.5520	0.5496	0.5496	0.5472	0.5472	0.5545	0.5545	0.5571 (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			3.7800	1.2000	4.5480		(26)
Windows (Uw = 1.40)			10.7700	1.3258	14.2917		(27)
Floor - Ground			5.6600	0.2000	1.1320	75.6000	427.8960 (28a)
Floor - Exposed Drive Through			60.3500	0.1400	8.4490	13.2000	796.6200 (28b)
W1 - Brick (Timber Frame)	49.6360	4.8050	44.8310	0.2100	9.4145	7.4000	331.7494 (29a)
W1 - Brick (Cavity)	34.1000	3.7830	30.3170	0.2600	7.8824	104.7000	3174.1899 (29a)
W1 - Clad (Timber Frame)	29.6530	5.9680	23.6850	0.2100	4.9739	7.4000	175.2690 (29a)
RF - Ins Joist	66.0140		66.0140	0.0800	5.2811	7.4000	488.5036 (30)
Total net area of external elements Aum(A, m ²)			245.4270				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.9726		(33)
Stud			147.2341			7.4000	1089.5325 (32c)
Internal Floor			5.6640			7.4000	41.9136 (32d)
Internal Ceiling			5.6640			7.4000	41.9136 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6567.5876 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							91.6365 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							24.1151 (36)
Total fabric heat loss						(33) + (36) =	80.0877 (37)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF HEAT DEMAND 09 Jan 2014

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	31.3547	30.8931	30.7458	30.3231	30.3231	30.1887	30.1887	30.0575	30.0575	30.4607	30.4607	30.6016	(38)
Heat transfer coeff	111.4423	110.9808	110.8334	110.4107	110.4107	110.2763	110.2763	110.1452	110.1452	110.5484	110.5484	110.6893	(39)
Average = Sum(39)m / 12 =												110.5589	(39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.5549	1.5485	1.5464	1.5405	1.5405	1.5387	1.5387	1.5368	1.5368	1.5425	1.5425	1.5444	(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													2.2860	(42)
Average daily hot water use (litres/day)													88.4919	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	97.3411	93.8014	90.2618	86.7221	83.1824	79.6427	79.6427	83.1824	86.7221	90.2618	93.8014	97.3411	(44)	
Energy conte	144.3541	126.2530	130.2818	113.5828	108.9854	94.0461	87.1476	100.0031	101.1975	117.9359	128.7362	139.7992	(45)	
Energy content (annual)										Total = Sum(45)m =		1392.3227	(45)	
Distribution loss (46)m = 0.15 x (45)m	21.6531	18.9379	19.5423	17.0374	16.3478	14.1069	13.0721	15.0005	15.1796	17.6904	19.3104	20.9699	(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	0.6323	0.5329	0.5292	0.4433	0.4080	0.3371	0.3123	0.3743	0.3949	0.4790	0.5434	0.6124	(61)	
Total heat required for water heating calculated for each month	144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116	(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	144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116	(64)	
RHI water heating demand										Total per year (kWh/year) = Sum(64)m =		1397.9217	(64)	
Heat gains from water heating, kWh/month	48.1558	42.1124	43.4510	37.8771	36.3396	31.3546	29.0546	33.3446	33.7469	39.3334	42.9406	46.6363	(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	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	47.0984	41.8323	34.0203	25.7556	19.2526	16.2539	17.5629	22.8289	30.6409	38.9056	45.4086	48.4074	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	300.2432	303.3587	295.5076	278.7933	257.6947	237.8649	224.6173	221.5017	229.3529	246.0671	267.1658	286.9956	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	(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)	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	(71)	
Water heating gains (Table 5)	64.7256	62.6672	58.4019	52.6071	48.8436	43.5481	39.0519	44.8180	46.8707	52.8675	59.6398	62.6832	(72)	
Total internal gains	511.7884	507.5796	487.6511	456.8774	425.5122	397.3881	380.9535	388.8700	406.5858	437.5616	471.9356	497.8076	(73)	

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
East					4.8050	25.1733	0.5000	0.7200	0.7700		30.1765	
West					5.9680	25.1733	0.5000	0.7200	0.7700		37.4804 (76)	
Solar gains	67.6569	112.5860	188.1628	275.6822	317.9156	359.0822	330.5066	296.1528	230.3201	145.8500	84.0840	54.6888 (83)
Total gains	579.4453	620.1656	675.8139	732.5596	743.4278	756.4703	711.4601	685.0228	636.9059	583.4116	556.0196	552.4963 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	16.3702	16.4382	16.4601	16.5231	16.5231	16.5433	16.5433	16.5630	16.5630	16.5025	16.5025	16.4815		
alpha	2.0913	2.0959	2.0973	2.1015	2.1015	2.1029	2.1029	2.1042	2.1042	2.1002	2.1002	2.0988		
util living area	0.9284	0.9160	0.8841	0.8245	0.7299	0.5734	0.4418	0.4438	0.6607	0.8252	0.9023	0.9330	(86)	
MIT	18.3308	18.5122	18.9899	19.6227	20.2427	20.7043	20.8860	20.8886	20.5745	19.8971	19.0553	18.3222	(87)	
Th 2	19.6465	19.6513	19.6528	19.6572	19.6572	19.6586	19.6586	19.6600	19.6600	19.6558	19.6558	19.6543	(88)	
util rest of house	0.9164	0.9019	0.8636	0.7904	0.6686	0.4652	0.2859	0.2821	0.5617	0.7811	0.8825	0.9216	(89)	

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MIT 2	17.3064	17.4866	17.9534	18.5632	19.1358	19.5148	19.6297	19.6333	19.4290	18.8351	18.0270	17.3039 (90)
Living area fraction									fLA = Living area / (4) =			0.3512 (91)
MIT	17.6662	17.8468	18.3174	18.9353	19.5245	19.9326	20.0709	20.0742	19.8313	19.2081	18.3881	17.6615 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.5162	17.6968	18.1674	18.7853	19.3745	19.7826	19.9209	19.9242	19.6813	19.0581	18.2381	17.5115 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8908	0.8748	0.8346	0.7632	0.6534	0.4765	0.3194	0.3172	0.5636	0.7566	0.8548	0.8969 (94)	
Useful gains	516.1543	542.4977	564.0128	559.1253	485.7442	360.4330	227.2117	217.3045	358.9435	441.3971	475.3006	495.5072 (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	1316.8238	1287.0220	1160.1372	958.9503	692.7759	428.1556	244.9128	233.9659	460.5488	747.0926	1043.3692	1296.3364 (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	595.6981	500.3203	443.5166	287.8740	154.0316	0.0000	0.0000	0.0000	0.0000	227.4375	409.0094	595.8169 (98)	
Space heating												3213.7044 (98)	
RHI space heating demand												3214 (98)	

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CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	5.6600 (1b)	x 2.1200 (2b)	= 11.9992 (1b) - (3b)
First floor	66.0100 (1c)	x 2.3400 (2c)	= 154.4634 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.6700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.4626 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					20.0000 / (5) = 0.1201 (8)
Pressure test					Yes
Measured/design AP50					3.7400
Infiltration rate					0.3071 (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)	=	0.3071 (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	0.3916	0.3839	0.3763	0.3379	0.3302	0.2918	0.2918	0.2841	0.3071	0.3302	0.3455	0.3609 (22b)
Effective ac	0.5767	0.5737	0.5708	0.5571	0.5545	0.5426	0.5426	0.5404	0.5472	0.5545	0.5597	0.5651 (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			3.7800	1.2000	4.5480		(26)
Windows (Uw = 1.40)			10.7700	1.3258	14.2917		(27)
Flr - Ground			5.6600	0.2000	1.1320	75.6000	427.8960 (28a)
Flr - Exposed Drive Through			60.3500	0.1400	8.4490	13.2000	796.6200 (28b)
Wl - Brick (Timber Frame)	49.6360	4.8050	44.8310	0.2100	9.4145	7.4000	331.7494 (29a)
Wl - Brick (Cavity)	34.1000	3.7830	30.3170	0.2600	7.8824	104.7000	3174.1899 (29a)
Wl - Clad (Timber Frame)	29.6530	5.9680	23.6850	0.2100	4.9739	7.4000	175.2690 (29a)
Rf - Ins Joist	66.0140		66.0140	0.0800	5.2811	7.4000	488.5036 (30)
Total net area of external elements Aum(A, m ²)			245.4270				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.9726		(33)
Stud			147.2341			7.4000	1089.5325 (32c)
Internal Floor			5.6640			7.4000	41.9136 (32d)
Internal Ceiling			5.6640			7.4000	41.9136 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6567.5876 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							91.6365 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							24.1151 (36)
Total fabric heat loss						(33) + (36) =	80.0877 (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	31.6786	31.5150	31.3547	30.6016	30.4607	29.8048	29.8048	29.6834	30.0575	30.4607	30.7458	31.0437 (38)
Heat transfer coeff	111.7662	111.6027	111.4423	110.6893	110.5484	109.8925	109.8925	109.7711	110.1452	110.5484	110.8334	111.1314 (39)
Average = Sum(39)m / 12 =												110.6886 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.5595	1.5572	1.5549	1.5444	1.5425	1.5333	1.5333	1.5316	1.5368	1.5425	1.5464	1.5506 (40)
HLP (average)												1.5444 (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												2.2860 (42)
Average daily hot water use (litres/day)												88.4919 (43)
Daily hot water use	97.3411	93.8014	90.2618	86.7221	83.1824	79.6427	79.6427	83.1824	86.7221	90.2618	93.8014	97.3411 (44)
Energy conte	144.3541	126.2530	130.2818	113.5828	108.9854	94.0461	87.1476	100.0031	101.1975	117.9359	128.7362	139.7992 (45)

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Energy content (annual)												Total = Sum(45)m = 1392.3227 (45)
Distribution loss (46)m = 0.15 x (45)m												
21.6531	18.9379	19.5423	17.0374	16.3478	14.1069	13.0721	15.0005	15.1796	17.6904	19.3104	20.9699	(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	0.6323	0.5329	0.5292	0.4433	0.4080	0.3371	0.3123	0.3743	0.3949	0.4790	0.5434	(61)
Total heat required for water heating calculated for each month												
144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116	(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	(63)
Solar input (sum of months) = Sum(63)m =												0.0000 (63)
Output from w/h												
144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116	(64)
Heat gains from water heating, kWh/month												
48.1558	42.1124	43.4510	37.8771	36.3396	31.3546	29.0546	33.3446	33.7469	39.3334	42.9406	46.6363	(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	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	47.0984	41.8323	34.0203	25.7556	19.2526	16.2539	17.5629	22.8289	30.6409	38.9056	45.4086	48.4074	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	300.2432	303.3587	295.5076	278.7933	257.6947	237.8649	224.6173	221.5017	229.3529	246.0671	267.1658	286.9956	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	(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)	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	(71)
Water heating gains (Table 5)	64.7256	62.6672	58.4019	52.6071	48.8436	43.5481	39.0519	44.8180	46.8707	52.8675	59.6398	62.6832	(72)
Total internal gains	511.7884	507.5796	487.6511	456.8774	425.5122	397.3881	380.9535	388.8700	406.5858	437.5616	471.9356	497.8076	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W		
East					4.8050	19.6403	0.5000	0.7200	0.7700	23.5438 (76)		
West					5.9680	19.6403	0.5000	0.7200	0.7700	29.2423 (80)		
Solar gains	52.7861	103.2608	170.0559	248.0164	303.9534	311.1504	296.2279	254.4553	197.7820	122.5277	65.8181	43.4087 (83)
Total gains	564.5745	610.8405	657.7070	704.8938	729.4656	708.5385	677.1814	643.3254	604.3679	560.0893	537.7537	541.2163 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	16.3227	16.3466	16.3702	16.4815	16.5025	16.6010	16.6010	16.6194	16.5630	16.5025	16.4601	16.4160
alpha	2.0882	2.0898	2.0913	2.0988	2.1002	2.1067	2.1067	2.1080	2.1042	2.1002	2.0973	2.0944
util living area	0.9411	0.9282	0.9035	0.8573	0.7842	0.6756	0.5592	0.5933	0.7516	0.8731	0.9256	0.9457 (86)
MIT	17.9509	18.1894	18.6635	19.3134	19.9529	20.4827	20.7586	20.7160	20.2967	19.4830	18.6086	17.8965 (87)
Th 2	19.6432	19.6449	19.6465	19.6543	19.6558	19.6626	19.6626	19.6639	19.6600	19.6558	19.6528	19.6498 (88)
util rest of house	0.9319	0.9168	0.8873	0.8309	0.7383	0.5934	0.4323	0.4712	0.6823	0.8442	0.9118	0.9372 (89)
MIT 2	16.9285	17.1641	17.6306	18.2667	18.8729	19.3496	19.5617	19.5368	19.1999	18.4428	17.5868	16.8794 (90)
Living area fraction	17.2876	17.5242	17.9933	18.6343	19.2522	19.7476	19.9821	19.9509	19.5851	18.8081	17.9457	17.2366 (91)
MIT	17.2876	17.5242	17.9933	18.6343	19.2522	19.7476	19.9821	19.9509	19.5851	18.8081	17.9457	17.2366 (92)
Temperature adjustment	17.1376	17.3742	17.8433	18.4843	19.1022	19.5976	19.8321	19.8009	19.4351	18.6581	17.7957	-0.1500
adjusted MIT	17.1376	17.3742	17.8433	18.4843	19.1022	19.5976	19.8321	19.8009	19.4351	18.6581	17.7957	17.0866 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9084	0.8911	0.8590	0.8019	0.7155	0.5887	0.4505	0.4855	0.6683	0.8163	0.8860	0.9148	(94)
Useful gains	512.8401	544.3268	564.9389	565.2625	521.9002	417.1322	305.0624	312.3317	403.8925	457.2130	476.4731	495.0796	(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	1434.8056	1392.1535	1264.1284	1060.8809	818.3029	549.1935	355.1817	373.3224	587.6310	890.8107	1185.4360	1432.1046	(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	685.9423	569.7395	520.1970	356.8452	220.5236	0.0000	0.0000	0.0000	0.0000	322.5967	510.4533	697.1466	(98)
Space heating												3883.4443	(98)
Space heating per m2												(98) / (4) =	54.1851 (99)

8c. Space cooling requirement

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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												4305.3706 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	685.9423	569.7395	520.1970	356.8452	220.5236	0.0000	0.0000	0.0000	0.0000	322.5967	510.4533	697.1466 (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)	760.4682	631.6403	576.7151	395.6156	244.4829	0.0000	0.0000	0.0000	0.0000	357.6460	565.9127	772.8898 (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	144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116 (64)
Efficiency of water heater (217)m	87.4440	87.3287	87.0409	86.4199	85.1030	76.4000	76.4000	76.4000	76.4000	86.0277	87.0235	76.4000 (216)
Fuel for water heating, kWh/month	165.8049	145.1824	150.2868	131.9442	128.5424	123.5382	114.4763	131.3841	132.9743	137.6475	148.5572	160.3807 (219)
Water heating fuel used												1670.7190 (219)
Annual totals kWh/year												
Space heating fuel - main system												4305.3706 (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)												332.7087 (232)
Total delivered energy for all uses												6383.7982 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4305.3706	3.4800	149.8269 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1670.7190	3.4800	58.1410 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	332.7087	13.1900	43.8843 (250)
Additional standing charges			120.0000 (251)
Total energy cost			381.7447 (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] =	1.3742 (257)
SAP value		80.8293
SAP rating (Section 12)		81 (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	4305.3706	0.2160	929.9600 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1670.7190	0.2160	360.8753 (264)
Space and water heating			1290.8353 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	332.7087	0.5190	172.6758 (268)
Total kg/year			1502.4361 (272)
CO2 emissions per m2			20.9600 (273)
EI value			82.7439
EI rating			83 (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	$3.48 / 0.8329 = 4.178$, stars = 4
Water heating environmental impact	$0.216 / 0.8329 = 0.2593$, stars = 4

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	5.6600 (1b)	x 2.1200 (2b)	= 11.9992 (1b) - (3b)
First floor	66.0100 (1c)	x 2.3400 (2c)	= 154.4634 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.6700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.4626 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					20.0000 / (5) = 0.1201 (8)
Pressure test					Yes
Measured/design AP50					3.7400
Infiltration rate					0.3071 (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)	=	0.3071 (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	0.3763	0.3532	0.3455	0.3225	0.3225	0.3148	0.3148	0.3071	0.3071	0.3302	0.3302	0.3379 (22b)
Effective ac	0.5708	0.5624	0.5597	0.5520	0.5520	0.5496	0.5496	0.5472	0.5472	0.5545	0.5545	0.5571 (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			3.7800	1.2000	4.5480		(26)
Windows (Uw = 1.40)			10.7700	1.3258	14.2917		(27)
Flr - Ground			5.6600	0.2000	1.1320	75.6000	427.8960 (28a)
Flr - Exposed Drive Through			60.3500	0.1400	8.4490	13.2000	796.6200 (28b)
Wl - Brick (Timber Frame)	49.6360	4.8050	44.8310	0.2100	9.4145	7.4000	331.7494 (29a)
Wl - Brick (Cavity)	34.1000	3.7830	30.3170	0.2600	7.8824	104.7000	3174.1899 (29a)
Wl - Clad (Timber Frame)	29.6530	5.9680	23.6850	0.2100	4.9739	7.4000	175.2690 (29a)
Rf - Ins Joist	66.0140		66.0140	0.0800	5.2811	7.4000	488.5036 (30)
Total net area of external elements Aum(A, m ²)			245.4270				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.9726		(33)
Stud			147.2341			7.4000	1089.5325 (32c)
Internal Floor			5.6640			7.4000	41.9136 (32d)
Internal Ceiling			5.6640			7.4000	41.9136 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6567.5876 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							91.6365 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							24.1151 (36)
Total fabric heat loss						(33) + (36) =	80.0877 (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	31.3547	30.8931	30.7458	30.3231	30.3231	30.1887	30.1887	30.0575	30.0575	30.4607	30.4607	30.6016 (38)
Heat transfer coeff	111.4423	110.9808	110.8334	110.4107	110.4107	110.2763	110.2763	110.1452	110.1452	110.5484	110.5484	110.6893 (39)
Average = Sum(39)m / 12 =												110.5589 (39)
HLP	1.5549	1.5485	1.5464	1.5405	1.5405	1.5387	1.5387	1.5368	1.5368	1.5425	1.5425	1.5444 (40)
HLP (average)												1.5426 (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												2.2860 (42)
Average daily hot water use (litres/day)												88.4919 (43)
Daily hot water use	97.3411	93.8014	90.2618	86.7221	83.1824	79.6427	79.6427	83.1824	86.7221	90.2618	93.8014	97.3411 (44)
Energy conte	144.3541	126.2530	130.2818	113.5828	108.9854	94.0461	87.1476	100.0031	101.1975	117.9359	128.7362	139.7992 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Energy content (annual)	Total = Sum(45)m = 1392.3227 (45)										
Distribution loss (46)m = 0.15 x (45)m											
21.6531	18.9379	19.5423	17.0374	16.3478	14.1069	13.0721	15.0005	15.1796	17.6904	19.3104	20.9699 (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	0.6323	0.5329	0.5292	0.4433	0.4080	0.3371	0.3123	0.3743	0.3949	0.4790	0.5434 (61)
Total heat required for water heating calculated for each month											
144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116 (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 (63)
Output from w/h											
144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116 (64)
Heat gains from water heating, kWh/month											
48.1558	42.1124	43.4510	37.8771	36.3396	31.3546	29.0546	33.3446	33.7469	39.3334	42.9406	46.6363 (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	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	137.1586	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	47.0984	41.8323	34.0203	25.7556	19.2526	16.2539	17.5629	22.8289	30.6409	38.9056	45.4086	48.4074	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	300.2432	303.3587	295.5076	278.7933	257.6947	237.8649	224.6173	221.5017	229.3529	246.0671	267.1658	286.9956	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	51.0018	(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)	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	-91.4390	(71)
Water heating gains (Table 5)	64.7256	62.6672	58.4019	52.6071	48.8436	43.5481	39.0519	44.8180	46.8707	52.8675	59.6398	62.6832	(72)
Total internal gains	511.7884	507.5796	487.6511	456.8774	425.5122	397.3881	380.9535	388.8700	406.5858	437.5616	471.9356	497.8076	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
East				4.8050	25.1733	0.5000	0.7200			0.7700			30.1765 (76)
West				5.9680	25.1733	0.5000	0.7200			0.7700			37.4804 (80)
Solar gains	67.6569	112.5860	188.1628	275.6822	317.9156	359.0822	330.5066	296.1528	230.3201	145.8500	84.0840	54.6888	(83)
Total gains	579.4453	620.1656	675.8139	732.5596	743.4278	756.4703	711.4601	685.0228	636.9059	583.4116	556.0196	552.4963	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	16.3702	16.4382	16.4601	16.5231	16.5231	16.5433	16.5433	16.5630	16.5630	16.5025	16.5025	16.4815
alpha	2.0913	2.0959	2.0973	2.1015	2.1015	2.1029	2.1029	2.1042	2.1042	2.1002	2.1002	2.0988
util living area	0.9284	0.9160	0.8841	0.8245	0.7299	0.5734	0.4418	0.4438	0.6607	0.8252	0.9023	0.9330 (86)
MIT	18.3308	18.5122	18.9899	19.6227	20.2427	20.7043	20.8860	20.8886	20.5745	19.8971	19.0553	18.3222 (87)
Th 2	19.6465	19.6513	19.6528	19.6572	19.6572	19.6586	19.6586	19.6600	19.6600	19.6558	19.6558	19.6543 (88)
util rest of house	0.9164	0.9019	0.8636	0.7904	0.6686	0.4652	0.2859	0.2821	0.5617	0.7811	0.8825	0.9216 (89)
MIT 2	17.3064	17.4866	17.9534	18.5632	19.1358	19.5148	19.6297	19.6333	19.4290	18.8351	18.0270	17.3039 (90)
Living area fraction	17.6662	17.8468	18.3174	18.9353	19.5245	19.9326	20.0709	20.0742	fLA = Living area / (4) =	19.8313	19.2081	18.3881
MIT	17.6662	17.8468	18.3174	18.9353	19.5245	19.9326	20.0709	20.0742	19.8313	19.2081	18.3881	17.6615 (92)
Temperature adjustment	17.5162	17.6968	18.1674	18.7853	19.3745	19.7826	19.9209	19.9242	19.6813	19.0581	18.2381	-0.1500
adjusted MIT	17.5162	17.6968	18.1674	18.7853	19.3745	19.7826	19.9209	19.9242	19.6813	19.0581	18.2381	17.5115 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8908	0.8748	0.8346	0.7632	0.6534	0.4765	0.3194	0.3172	0.5636	0.7566	0.8548	0.8969	(94)
Useful gains	516.1543	542.4977	564.0128	559.1253	485.7442	360.4330	227.2117	217.3045	358.9435	441.3971	475.3006	495.5072	(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	1316.8238	1287.0220	1160.1372	958.9503	692.7759	428.1556	244.9128	233.9659	460.5488	747.0926	1043.3692	1296.3364	(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	595.6981	500.3203	443.5166	287.8740	154.0316	0.0000	0.0000	0.0000	0.0000	227.4375	409.0094	595.8169	(98)
Space heating												3213.7044	(98)
Space heating per m2												(98) / (4) =	44.8403 (99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3562.8652 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	595.6981	500.3203	443.5166	287.8740	154.0316	0.0000	0.0000	0.0000	0.0000	227.4375	409.0094	595.8169	(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)	660.4192	554.6789	491.7035	319.1508	170.7668	0.0000	0.0000	0.0000	0.0000	252.1480	453.4473	660.5509	(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	144.9864	126.7859	130.8110	114.0261	109.3934	94.3832	87.4599	100.3774	101.5924	118.4149	129.2796	140.4116	(64)
Efficiency of water heater (217)m	87.1197	87.0221	86.6358	85.8028	83.9062	76.4000	76.4000	76.4000	76.4000	84.9465	86.4497	76.4000	(216)
Fuel for water heating, kWh/month	166.4221	145.6940	150.9896	132.8931	130.3758	123.5382	114.4763	131.3841	132.9743	139.3994	149.5432	161.0295	(219)
Water heating fuel used												1678.7195	(219)
Annual totals kWh/year													
Space heating fuel - main system												3562.8652	(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)												332.7087	(232)
Total delivered energy for all uses												5649.2934	(238)

10a. Fuel costs - using BEDF prices (572)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3562.8652	5.7300	204.1522 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1678.7195	5.7300	96.1906 (247)
Pumps and fans for heating	75.0000	24.1800	18.1350 (249)
Energy for lighting	332.7087	24.1800	80.4490 (250)
Additional standing charges			114.0000 (251)
Total energy cost			512.9268 (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	3562.8652	0.2160	769.5789 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1678.7195	0.2160	362.6034 (264)
Space and water heating			1132.1823 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	332.7087	0.5190	172.6758 (268)
Total kg/year			1343.7831 (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	3562.8652	1.2200	4346.6955 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1678.7195	1.2200	2048.0378 (264)
Space and water heating			6394.7334 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	332.7087	3.0700	1021.4157 (268)
Primary energy kWh/year			7646.3990 (272)
Primary energy kWh/m2/year			106.6890 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 81
Current environmental impact rating: B 83

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

(For testing purposes):

A		Not considered
B		Not considered
C		Not considered
D		Not considered
E	Low energy lighting	Already installed
F		Not considered
G		Not considered
H		Not considered
I		Not considered
J		Not considered
K		Not considered
M		Not considered
N	Solar water heating	Not applicable
O		Not considered
P		Not considered
R		Not considered
S		Not considered
T		Not considered
U	Solar photovoltaic panels	Not applicable
A2		Not considered
A3		Not considered
T2		Not considered
W		Not considered
X		Not considered
Y		Not considered
J2		Not considered
Q2		Not considered
Z1		Not considered
Z2		Not considered
Z3		Not considered
Z4		Not considered
Z5		Not considered
V2	Wind turbine	Not applicable
L2		Not considered
Q3		Not considered
O3		Not considered

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
	Total Savings £0		0.00 kg/m²
Potential energy efficiency rating:		B 81	
Potential environmental impact rating:			B 83

Fuel prices for cost data on this page from database revision number 572 TEST (30 May 2025)
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	£99	£99	£0
Mains gas	£414	£414	£0
Space heating	£336	£336	£0
Water heating	£96	£96	£0
Lighting	£80	£80	£0
Total cost of fuels	£513	£513	£0
Total cost of uses	£512	£512	£0
Delivered energy	79 kWh/m²	79 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.3 tonnes	1.3 tonnes	0.0 tonnes
CO2 emissions per m²	19 kg/m²	19 kg/m²	0 kg/m²
Primary energy	107 kWh/m²	107 kWh/m²	0 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

No improvements selected / applicable

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

No improvements selected / applicable

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	082 - PRJ013014			Issued on Date	03/06/2025
Assessment Reference	082	Prop Type Ref	F2		
Property	3 Erwood Close, Netley Abbey, Southampton, SO31 5TJ				
SAP Rating	81 B	DER	22.51	TER	23.49
Environmental	83 B	% DER<TER	4.18		
CO ₂ Emissions (t/year)	1.34	DFEE	65.35	TFEE	75.35
General Requirements Compliance	Pass	% DFEE<TFEE	13.27		
Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk			Assessor ID	4299-0004
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Built)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	23.49	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	22.51	kgCO ₂ /m ²	Pass
	-0.98 (-4.2%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	75.35	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	65.35	kWh/m ² /yr	
	-10.0 (-13.3%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.23 (max. 0.30)	0.26 (max. 0.70)	Pass
Floor	0.15 (max. 0.25)	0.20 (max. 0.70)	Pass
Roof	0.08 (max. 0.20)	0.08 (max. 0.35)	Pass
Openings	1.35 (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	3.74 (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

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing East

4.81 m², No overhang

Windows facing West

5.97 m², No overhang

Air change rate

5.09 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

3.74 (measured in this dwelling)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.08

W/m²K

Air permeability

3.7

m³/m²h

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