PREDICTED ENERGY ASSESSMENT

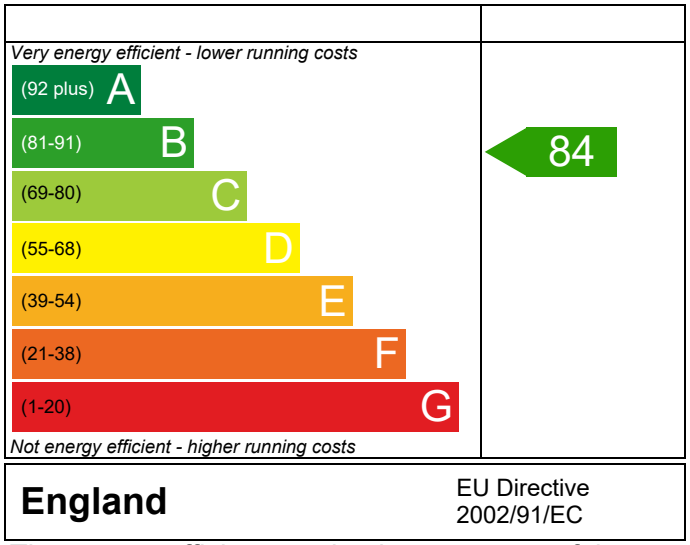
Plot 13

Dwelling type:	House, Semi-Detached
Date of assessment:	28/04/2021
Produced by:	Michael Juckes
Total floor area:	89.822 m²

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO_2) emissions.

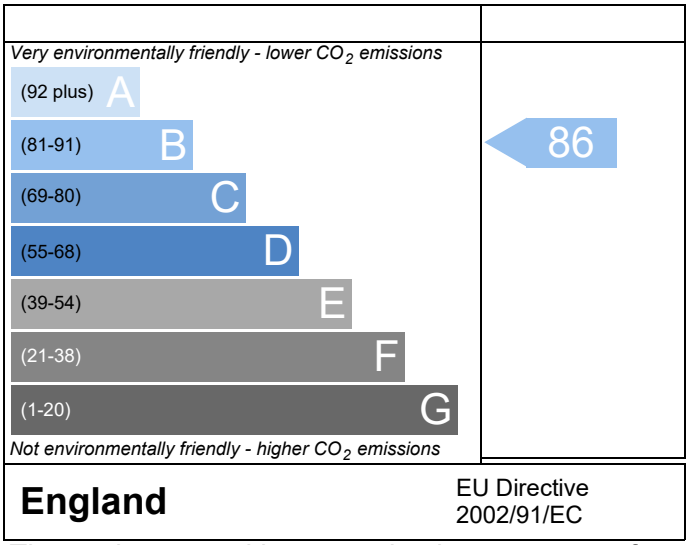
Energy Efficiency Rating



England EU Directive 2002/91/EC

The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



England EU Directive 2002/91/EC

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

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

BUILDING REGULATION COMPLIANCE
Calculation Type: New Build (As Designed)

Briary Energy

Property Reference	013 - PRJ011682	**Issued on Date**	28/04/2021
Assessment Reference	013 S	**Prop Type Ref**	Raine
Property	Plot 13		

SAP Rating	84 B	**DER**	17.35	**TER**	18.23
Environmental	86 B	**% DER<TER**	4.83		
CO_2 Emissions (t/year)	1.37	**DFEE**	45.04	**TFEE**	53.32
General Requirements Compliance	Pass	**% DFEE<TFEE**	15.54		

Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	**Assessor ID**	T850-0001
Client			

SUMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	18.23	$kgCO_2/m^2$	
Dwelling Carbon Dioxide Emission Rate (DER)	17.35	$kgCO_2/m^2$	Pass
	-0.88 (-4.8%)	$kgCO_2/m^2$	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.32	$kWh/m^2/yr$	
Dwelling Fabric Energy Efficiency (DFEE)	45.04	$kWh/m^2/yr$	
	-8.3 (-15.6%)	$kWh/m^2/yr$	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.23 (max. 0.25)	0.23 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.29 (max. 2.00)	1.30 (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	5.01 (design value)	$m^3/(h.m^2)$ @ 50 Pa	
Maximum	10.0	$m^3/(h.m^2)$ @ 50 Pa	Pass

Limiting System Efficiencies

4 Heating efficiency

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Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal LOGIC COMBI ESP1 30 Combi boiler Efficiency: 89.6% SEDBUK2009 Minimum: 88.0%		Pass
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 (Midlands)	Not significant		Pass

Based on:

Overshading	Average		
Windows facing North Windows facing East Windows facing West	4.32 m², No overhang 3.72 m², No overhang 4.74 m², No overhang		
Air change rate	4.21 ach		
Blinds/curtains	Dark-coloured curtain or roller blind, closed 100% of daylight hours		

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type	U-value		
Filled Cavity with Edge Sealing	0.00	W/m²K	Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals	5.01 (design value)	m³/(h.m²) @ 50 Pa	
Maximum	10.0	m³/(h.m²) @ 50 Pa	Pass

10 Key features

Party wall U-value	0.00	W/m²K
Roof U-value	0.10	W/m²K
Thermal bridging y-value	0.026	W/m²K

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FULL SAP CALCULATION PRINTOUT
Calculation Type: New Build (As Designed)

Briary Energy

Property Reference	013 - PRJ011682	**Issued on Date**	28/04/2021
Assessment Reference	013 S	**Prop Type Ref**	Raine
Property	Plot 13		

SAP Rating	84 B	**DER**	17.35	**TER**	18.23
Environmental	86 B	**% DER<TER**	4.83		
CO_2 Emissions (t/year)	1.37	**DFEE**	45.04	**TFEE**	53.32
General Requirements Compliance	Pass	**% DFEE<TFEE**	15.54		

Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	**Assessor ID**	T850-0001
Client			

CALCULATION OF HEAT DEMAND 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	44.9110 (1b)	x	2.3260 (2b)	=	104.4630	(1b) - (3b)
First floor	44.9110 (1c)	x	2.5340 (2c)	=	113.8045	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	89.8220					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	218.2675	(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							4 * 10	=	40.0000	(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) =	40.0000 / (5) =	0.1833	(8)	
Pressure test		Yes		
Measured/design AP50		5.0100		
Infiltration rate		0.4338	(18)	
Number of sides sheltered		1	(19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)	
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.4012	(21)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.5000	4.5000	4.4000	3.9000	3.8000	3.4000	3.3000	3.3000	3.5000	3.8000	3.9000	4.1000	(22)
Wind factor	1.1250	1.1250	1.1000	0.9750	0.9500	0.8500	0.8250	0.8250	0.8750	0.9500	0.9750	1.0250	(22a)
Adj infilt rate	0.4514	0.4514	0.4414	0.3912	0.3812	0.3410	0.3310	0.3310	0.3511	0.3812	0.3912	0.4113	(22b)
Effective ac	0.6019	0.6019	0.5974	0.5765	0.5726	0.5582	0.5548	0.5548	0.5616	0.5726	0.5765	0.5846	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Windows (Uw = 1.30)			12.7800	1.2357	15.7928			(27)
Solid Door			2.1000	1.2000	2.5200			(26)
Half Glazed Door			1.9600	1.3000	2.5480			(26a)
Flr - Ground			44.9110	0.2300	10.3295	75.6000	3395.2716	(28a)
Wl - Brick	92.5050	16.8390	75.6660	0.2400	18.1598	39.3600	2978.2138	(29a)
Rf - Ins Joist	44.9110		44.9110	0.1000	4.4911	5.8200	261.3820	(30)
Total net area of external elements Aum(A, m2)			182.3280					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.8412			(33)
Party Wall			42.0390	0.0000	0.0000	45.0000	1891.7550	(32)
Ground Floor Block			24.1439			54.0300	1304.4938	(32c)
Ground Floor Stud			55.7542			5.8200	324.4896	(32c)
1st Floor Stud			109.1444			5.8200	635.2207	(32c)
Internal Floor			44.9100			18.0000	808.3800	(32d)
Internal Ceiling			44.9100			5.8200	261.3762	(32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 11860.5827	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	132.0454	(35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)	4.7580	(36)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Total fabric heat loss (33) + (36) = 58.5993 (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	43.3519	43.3519	43.0294	41.5256	41.2466	40.2030	39.9602	39.9602	40.4530	41.2466	41.5256	42.1054	(38)

Heat transfer coeff

	101.9512	101.9512	101.6287	100.1249	99.8459	98.8023	98.5595	98.5595	99.0523	99.8459	100.1249	100.7046	(39)

Average = Sum(39)m / 12 = 100.0959 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1350	1.1350	1.1314	1.1147	1.1116	1.1000	1.0973	1.0973	1.1028	1.1116	1.1147	1.1212	(40)
HLP (average)												1.1144	(40)
Days in month													
	31	28	31	30	31	30	31	31	30	31	30	31	(41)

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.6233 (42)

Average daily hot water use (litres/day) 96.5028 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	106.1531	102.2930	98.4329	94.5728	90.7126	86.8525	86.8525	90.7126	94.5728	98.4329	102.2930	106.1531	(44)
Energy conte	157.4220	137.6823	142.0758	123.8651	118.8515	102.5598	95.0367	109.0561	110.3585	128.6122	140.3903	152.4548	(45)
Energy content (annual)										Total = Sum(45)m =		1518.3650	(45)
Distribution loss (46)m = 0.15 x (45)m													
	23.6133	20.6523	21.3114	18.5798	17.8277	15.3840	14.2555	16.3584	16.5538	19.2918	21.0585	22.8682	(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	14.6892	13.2541	14.6365	14.1097	14.5404	14.0255	14.4645	14.5137	14.0714	14.5967	14.1795	14.6743	(61)
Total heat required for water heating calculated for each month													
	172.1111	150.9364	156.7122	137.9748	133.3919	116.5853	109.5013	123.5697	124.4299	143.2089	154.5698	167.1290	(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													
	172.1111	150.9364	156.7122	137.9748	133.3919	116.5853	109.5013	123.5697	124.4299	143.2089	154.5698	167.1290	(64)
								Total per year (kWh/year) = Sum(64)m =				1690.1205	(64)
RHI water heating demand												1690	(64)
Heat gains from water heating, kWh/month													
	56.0151	49.0929	50.8993	44.7126	43.1532	37.6075	35.2159	39.8896	40.2121	46.4127	50.2246	54.3598	(65)

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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	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	56.8867	50.5263	41.0907	31.1083	23.2538	19.6319	21.2129	27.5734	37.0089	46.9913	54.8458	58.4678	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	356.3431	360.0408	350.7227	330.8854	305.8445	282.3095	266.5867	262.8890	272.2071	292.0444	317.0853	340.6203	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	(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)													
	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	(71)
Water heating gains (Table 5)													
	75.2891	73.0549	68.4130	62.1008	58.0016	52.2327	47.3331	53.6150	55.8501	62.3827	69.7564	73.0642	(72)
Total internal gains													
	597.3474	592.4505	569.0549	532.9230	495.9284	463.0025	443.9613	452.9058	473.8946	510.2469	550.5161	580.9808	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	4.3200	11.3201	0.4700	0.0000	0.7700	17.6980	(74)
East	3.7220	21.0039	0.4700	0.0000	0.7700	28.2921	(76)
West	4.7380	21.0039	0.4700	0.0000	0.7700	36.0151	(80)

Solar gains	82.0052	162.1546	269.6857	410.0203	484.0818	541.3004	494.4780	425.4722	326.8395	197.7324	114.8643	74.7442	(83)
Total gains	679.3526	754.6051	838.7406	942.9434	980.0102	1004.3029	938.4392	878.3780	800.7341	707.9793	665.3804	655.7250	(84)

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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	32.3155	32.3155	32.4181	32.9050	32.9969	33.3455	33.4276	33.4276	33.2613	32.9969	32.9050	32.7155	
alpha	3.1544	3.1544	3.1612	3.1937	3.1998	3.2230	3.2285	3.2285	3.2174	3.1998	3.1937	3.1810	
util living area													
	0.9661	0.9523	0.9185	0.8444	0.7367	0.5548	0.4407	0.4758	0.7054	0.8855	0.9482	0.9694	(86)
MIT	19.2477	19.4373	19.8380	20.3172	20.6684	20.9062	20.9660	20.9566	20.7827	20.2893	19.7182	19.2239	(87)
Th 2	19.9723	19.9723	19.9752	19.9888	19.9914	20.0009	20.0031	20.0031	19.9986	19.9914	19.9888	19.9836	(88)

CALCULATION OF HEAT DEMAND 09 Jan 2014

util rest of house													
	0.9601	0.9439	0.9039	0.8166	0.6891	0.4810	0.3490	0.3811	0.6396	0.8591	0.9377	0.9640	(89)
MIT 2	18.3887	18.5746	18.9673	19.4325	19.7510	19.9488	19.9897	19.9853	19.8600	19.4189	18.8658	18.3736	(90)
Living area fraction										fLA = Living area / (4) =		0.2259	(91)
MIT	18.5827	18.7695	19.1640	19.6324	19.9582	20.1651	20.2103	20.2047	20.0684	19.6155	19.0584	18.5657	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.4327	18.6195	19.0140	19.4824	19.8082	20.0151	20.0603	20.0547	19.9184	19.4655	18.9084	18.4157	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9484	0.9300	0.8871	0.8006	0.6795	0.4821	0.3545	0.3863	0.6338	0.8425	0.9234	0.9530	(94)
Useful gains	644.3005	701.7610	744.0821	754.9348	665.9646	484.2085	332.6565	339.2921	507.5123	596.4591	614.4154	624.8976	(95)
Ext temp.	4.3000	4.8000	6.6000	9.0000	11.8000	14.8000	16.6000	16.5000	14.0000	10.5000	7.1000	4.2000	(96)
Heat loss rate W													
	1440.8488	1408.9119	1261.6150	1049.5447	799.5861	515.2604	341.0408	350.3516	586.2299	895.1727	1182.3096	1431.5843	(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													
	592.6319	475.2054	385.0445	212.1191	99.4144	0.0000	0.0000	0.0000	0.0000	222.2429	408.8838	600.1749	(98)
Space heating												2995.7170	(98)
RHI space heating demand												2996	(98)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	44.9110 (1b)	x	2.3260 (2b)	=	104.4630	(1b) - (3b)
First floor	44.9110 (1c)	x	2.5340 (2c)	=	113.8045	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	89.8220					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	218.2675	(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							4 * 10	=	40.0000	(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) =	40.0000	/ (5) =	0.1833	(8)
Pressure test			Yes	
Measured/design AP50			5.0100	
Infiltration rate			0.4338	(18)
Number of sides sheltered			1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)]	=	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20)	=	0.4012	(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	0.5116	0.5015	0.4915	0.4414	0.4313	0.3812	0.3812	0.3711	0.4012	0.4313	0.4514	0.4714	(22b)
Effective ac	0.6309	0.6258	0.6208	0.5974	0.5930	0.5726	0.5726	0.5689	0.5805	0.5930	0.6019	0.6111	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Windows (Uw = 1.30)			12.7800	1.2357	15.7928			(27)
Solid Door			2.1000	1.2000	2.5200			(26)
Half Glazed Door			1.9600	1.3000	2.5480			(26a)
Flr - Ground			44.9110	0.2300	10.3295	75.6000	3395.2716	(28a)
Wl - Brick	92.5050	16.8390	75.6660	0.2400	18.1598	39.3600	2978.2138	(29a)
Rf - Ins Joist	44.9110		44.9110	0.1000	4.4911	5.8200	261.3820	(30)
Total net area of external elements Aum(A, m2)			182.3280					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.8412			(33)
Party Wall			42.0390	0.0000	0.0000	45.0000	1891.7550	(32)
Ground Floor Block			24.1439			54.0300	1304.4938	(32c)
Ground Floor Stud			55.7542			5.8200	324.4896	(32c)
1st Floor Stud			109.1444			5.8200	635.2207	(32c)
Internal Floor			44.9100			18.0000	808.3800	(32d)
Internal Ceiling			44.9100			5.8200	261.3762	(32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11860.5827 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		132.0454 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		4.7580 (36)
Total fabric heat loss	(33) + (36) =	58.5993 (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	45.4391	45.0731	44.7144	43.0294	42.7141	41.2466	41.2466	40.9748	41.8119	42.7141	43.3519	44.0186	(38)
Heat transfer coeff	104.0383	103.6724	103.3136	101.6287	101.3134	99.8459	99.8459	99.5741	100.4111	101.3134	101.9512	102.6179	(39)
Average = Sum(39)m / 12 =												101.6272	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1583	1.1542	1.1502	1.1314	1.1279	1.1116	1.1116	1.1086	1.1179	1.1279	1.1350	1.1425	(40)
HLP (average)												1.1314	(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	2.6233	(42)
Average daily hot water use (litres/day)	96.5028	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	106.1531	102.2930	98.4329	94.5728	90.7126	86.8525	86.8525	90.7126	94.5728	98.4329	102.2930	106.1531	(44)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Energy conte	157.4220	137.6823	142.0758	123.8651	118.8515	102.5598	95.0367	109.0561	110.3585	128.6122	140.3903	152.4548	(45)
Energy content (annual)										Total = Sum(45)m =		1518.3650	(45)
Distribution loss (46)m = 0.15 x (45)m													
	23.6133	20.6523	21.3114	18.5798	17.8277	15.3840	14.2555	16.3584	16.5538	19.2918	21.0585	22.8682	(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	14.6892	13.2541	14.6365	14.1097	14.5404	14.0255	14.4645	14.5137	14.0714	14.5967	14.1795	14.6743	(61)
Total heat required for water heating calculated for each month													
	172.1111	150.9364	156.7122	137.9748	133.3919	116.5853	109.5013	123.5697	124.4299	143.2089	154.5698	167.1290	(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													
	172.1111	150.9364	156.7122	137.9748	133.3919	116.5853	109.5013	123.5697	124.4299	143.2089	154.5698	167.1290	(64)
									Total per year (kWh/year) = Sum(64)m =			1690.1205	(64)
Heat gains from water heating, kWh/month													
	56.0151	49.0929	50.8993	44.7126	43.1532	37.6075	35.2159	39.8896	40.2121	46.4127	50.2246	54.3598	(65)

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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	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	56.8867	50.5263	41.0907	31.1083	23.2538	19.6319	21.2129	27.5734	37.0089	46.9913	54.8458	58.4678	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	356.3431	360.0408	350.7227	330.8854	305.8445	282.3095	266.5867	262.8890	272.2071	292.0444	317.0853	340.6203	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	(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)													
	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	(71)
Water heating gains (Table 5)													
	75.2891	73.0549	68.4130	62.1008	58.0016	52.2327	47.3331	53.6150	55.8501	62.3827	69.7564	73.0642	(72)
Total internal gains													
	597.3474	592.4505	569.0549	532.9230	495.9284	463.0025	443.9613	452.9058	473.8946	510.2469	550.5161	580.9808	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	4.3200	10.6334	0.4700	0.0000	0.7700	16.6243	(74)
East	3.7220	19.6403	0.4700	0.0000	0.7700	26.4553	(76)
West	4.7380	19.6403	0.4700	0.0000	0.7700	33.6768	(80)

Solar gains	76.7564	149.4011	247.7066	369.2451	463.0642	479.5014	454.2023	382.4928	290.2137	177.3972	95.4859	63.3086	(83)
Total gains	674.1038	741.8515	816.7615	902.1682	958.9926	942.5039	898.1636	835.3986	764.1083	687.6441	646.0020	644.2893	(84)

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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	31.6672	31.7790	31.8894	32.4181	32.5190	32.9969	32.9969	33.0870	32.8112	32.5190	32.3155	32.1056	
alpha	3.1111	3.1186	3.1260	3.1612	3.1679	3.1998	3.1998	3.2058	3.1874	3.1679	3.1544	3.1404	
util living area													
	0.9672	0.9541	0.9256	0.8619	0.7533	0.5997	0.4625	0.5091	0.7227	0.8919	0.9525	0.9710	(86)
MIT	19.1942	19.3988	19.7627	20.2419	20.6311	20.8756	20.9596	20.9447	20.7633	20.2609	19.6571	19.1644	(87)
Th 2	19.9535	19.9568	19.9600	19.9752	19.9781	19.9914	19.9914	19.9938	19.9862	19.9781	19.9723	19.9663	(88)
util rest of house													
	0.9613	0.9459	0.9120	0.8361	0.7069	0.5261	0.3665	0.4117	0.6562	0.8660	0.9427	0.9658	(89)
MIT 2	18.3223	18.5257	18.8834	19.3528	19.7083	19.9197	19.9754	19.9704	19.8354	19.3829	18.7943	18.3024	(90)
Living area fraction									fLA = Living area / (4) =			0.2259	(91)
MIT	18.5193	18.7229	19.0820	19.5536	19.9168	20.1356	20.1977	20.1905	20.0450	19.5812	18.9892	18.4971	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.3693	18.5729	18.9320	19.4036	19.7668	19.9856	20.0477	20.0405	19.8950	19.4312	18.8392	18.3471	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9496	0.9320	0.8954	0.8193	0.6962	0.5256	0.3721	0.4165	0.6495	0.8491	0.9287	0.9551	(94)
Useful gains	640.1138	691.4071	731.3342	739.1430	667.6836	495.3818	334.1944	347.9440	496.3043	583.8810	599.9376	615.3390	(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													
	1463.7427	1417.5052	1284.3936	1067.4707	817.2704	537.7332	344.2424	362.4971	581.8831	894.7210	1196.8254	1451.7480	(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													
	612.7799	487.9379	411.4761	236.3959	111.2926	0.0000	0.0000	0.0000	0.0000	231.2649	429.7592	622.2882	(98)
Space heating												3143.1949	(98)
Space heating per m2											(98) / (4) =	34.9936	(99)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

8c. Space cooling requirement

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 %)												90.5000	(206)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement												3473.1435	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	612.7799	487.9379	411.4761	236.3959	111.2926	0.0000	0.0000	0.0000	0.0000	231.2649	429.7592	622.2882	(98)
Space heating efficiency (main heating system 1)													
	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)
Space heating fuel (main heating system)													
	677.1049	539.1579	454.6698	261.2110	122.9753	0.0000	0.0000	0.0000	0.0000	255.5413	474.8721	687.6113	(211)
Water heating requirement													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	172.1111	150.9364	156.7122	137.9748	133.3919	116.5853	109.5013	123.5697	124.4299	143.2089	154.5698	167.1290	(64)
Efficiency of water heater												87.3000	(216)
(217)m	89.7784	89.7230	89.5942	89.2937	88.7270	87.3000	87.3000	87.3000	87.3000	89.2489	89.6309	89.8031	(217)
Fuel for water heating, kWh/month													
	191.7067	168.2248	174.9133	154.5180	150.3397	133.5456	125.4310	141.5461	142.5314	160.4601	172.4514	186.1061	(219)
Water heating fuel used												1901.7743	(219)
Annual totals kWh/year													
Space heating fuel - main system												3473.1435	(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)												401.8550	(232)
Total delivered energy for all uses												5851.7728	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3473.1435	3.4800	120.8654	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	1901.7743	3.4800	66.1817	(247)
Pumps and fans for heating	75.0000	13.1900	9.8925	(249)
Energy for lighting	401.8550	13.1900	53.0047	(250)
Additional standing charges			120.0000	(251)
Total energy cost			369.9443	(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] =	1.1525	(257)
SAP value		83.9232	
SAP rating (Section 12)		84	(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	3473.1435	0.2160	750.1990	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1901.7743	0.2160	410.7833	(264)
Space and water heating			1160.9822	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	401.8550	0.5190	208.5628	(268)
Total kg/year			1408.4700	(272)
CO2 emissions per m2			15.6800	(273)
EI value			86.0012	
EI rating			86	(274)
EI band			B	

Calculation of stars for heating and DHW

Main heating energy efficiency	3.48 × (1 + 0.29 × 0.00) / 0.9050 = 3.845, stars = 4
Main heating environmental impact	0.216 × (1 + 0.29 × 0.00) / 0.9050 = 0.2387, stars = 4
Water heating energy efficiency	3.48 / 0.8875 = 3.921, stars = 4
Water heating environmental impact	0.216 / 0.8875 = 0.2434, stars = 4

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

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

1. Overall dwelling dimensions

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	44.9110 (1b)	x	2.3260 (2b)	=	104.4630	(1b) - (3b)
First floor	44.9110 (1c)	x	2.5340 (2c)	=	113.8045	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	89.8220					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	218.2675	(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							4 * 10	=	40.0000	(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) =	40.0000 / (5) =	0.1833	(8)
Pressure test		Yes	
Measured/design AP50		5.0100	
Infiltration rate		0.4338	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.4012	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.5000	4.5000	4.4000	3.9000	3.8000	3.4000	3.3000	3.3000	3.5000	3.8000	3.9000	4.1000	(22)
Wind factor	1.1250	1.1250	1.1000	0.9750	0.9500	0.8500	0.8250	0.8250	0.8750	0.9500	0.9750	1.0250	(22a)
Adj infilt rate	0.4514	0.4514	0.4414	0.3912	0.3812	0.3410	0.3310	0.3310	0.3511	0.3812	0.3912	0.4113	(22b)
Effective ac	0.6019	0.6019	0.5974	0.5765	0.5726	0.5582	0.5548	0.5548	0.5616	0.5726	0.5765	0.5846	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Windows (Uw = 1.30)			12.7800	1.2357	15.7928			(27)
Solid Door			2.1000	1.2000	2.5200			(26)
Half Glazed Door			1.9600	1.3000	2.5480			(26a)
Flr - Ground			44.9110	0.2300	10.3295	75.6000	3395.2716	(28a)
Wl - Brick	92.5050	16.8390	75.6660	0.2400	18.1598	39.3600	2978.2138	(29a)
Rf - Ins Joist	44.9110		44.9110	0.1000	4.4911	5.8200	261.3820	(30)
Total net area of external elements Aum(A, m2)			182.3280					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.8412			(33)
Party Wall			42.0390	0.0000	0.0000	45.0000	1891.7550	(32)
Ground Floor Block			24.1439			54.0300	1304.4938	(32c)
Ground Floor Stud			55.7542			5.8200	324.4896	(32c)
1st Floor Stud			109.1444			5.8200	635.2207	(32c)
Internal Floor			44.9100			18.0000	808.3800	(32d)
Internal Ceiling			44.9100			5.8200	261.3762	(32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11860.5827 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		132.0454 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		4.7580 (36)
Total fabric heat loss	(33) + (36) =	58.5993 (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	43.3519	43.3519	43.0294	41.5256	41.2466	40.2030	39.9602	39.9602	40.4530	41.2466	41.5256	42.1054	(38)
Heat transfer coeff	101.9512	101.9512	101.6287	100.1249	99.8459	98.8023	98.5595	98.5595	99.0523	99.8459	100.1249	100.7046	(39)
Average = Sum(39)m / 12 =												100.0959	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1350	1.1350	1.1314	1.1147	1.1116	1.1000	1.0973	1.0973	1.1028	1.1116	1.1147	1.1212	(40)
HLP (average)												1.1144	(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	2.6233 (42)
Average daily hot water use (litres/day)	96.5028 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	106.1531	102.2930	98.4329	94.5728	90.7126	86.8525	86.8525	90.7126	94.5728	98.4329	102.2930	106.1531	(44)

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

Energy conte	157.4220	137.6823	142.0758	123.8651	118.8515	102.5598	95.0367	109.0561	110.3585	128.6122	140.3903	152.4548	(45)
Energy content (annual)										Total = Sum(45)m =		1518.3650	(45)
Distribution loss (46)m = 0.15 x (45)m													
	23.6133	20.6523	21.3114	18.5798	17.8277	15.3840	14.2555	16.3584	16.5538	19.2918	21.0585	22.8682	(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	14.6892	13.2541	14.6365	14.1097	14.5404	14.0255	14.4645	14.5137	14.0714	14.5967	14.1795	14.6743	(61)
Total heat required for water heating calculated for each month													
	172.1111	150.9364	156.7122	137.9748	133.3919	116.5853	109.5013	123.5697	124.4299	143.2089	154.5698	167.1290	(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													
	172.1111	150.9364	156.7122	137.9748	133.3919	116.5853	109.5013	123.5697	124.4299	143.2089	154.5698	167.1290	(64)
									Total per year (kWh/year) = Sum(64)m =			1690.1205	(64)
Heat gains from water heating, kWh/month													
	56.0151	49.0929	50.8993	44.7126	43.1532	37.6075	35.2159	39.8896	40.2121	46.4127	50.2246	54.3598	(65)

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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	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	157.3966	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	56.8867	50.5263	41.0907	31.1083	23.2538	19.6319	21.2129	27.5734	37.0089	46.9913	54.8458	58.4678	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	356.3431	360.0408	350.7227	330.8854	305.8445	282.3095	266.5867	262.8890	272.2071	292.0444	317.0853	340.6203	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	53.3629	(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)													
	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	-104.9311	(71)
Water heating gains (Table 5)													
	75.2891	73.0549	68.4130	62.1008	58.0016	52.2327	47.3331	53.6150	55.8501	62.3827	69.7564	73.0642	(72)
Total internal gains													
	597.3474	592.4505	569.0549	532.9230	495.9284	463.0025	443.9613	452.9058	473.8946	510.2469	550.5161	580.9808	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	4.3200	11.3201	0.4700	0.0000	0.7700	17.6980	(74)
East	3.7220	21.0039	0.4700	0.0000	0.7700	28.2921	(76)
West	4.7380	21.0039	0.4700	0.0000	0.7700	36.0151	(80)

Solar gains	82.0052	162.1546	269.6857	410.0203	484.0818	541.3004	494.4780	425.4722	326.8395	197.7324	114.8643	74.7442	(83)
Total gains	679.3526	754.6051	838.7406	942.9434	980.0102	1004.3029	938.4392	878.3780	800.7341	707.9793	665.3804	655.7250	(84)

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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	32.3155	32.3155	32.4181	32.9050	32.9969	33.3455	33.4276	33.4276	33.2613	32.9969	32.9050	32.7155	
alpha	3.1544	3.1544	3.1612	3.1937	3.1998	3.2230	3.2285	3.2285	3.2174	3.1998	3.1937	3.1810	
util living area													
	0.9661	0.9523	0.9185	0.8444	0.7367	0.5548	0.4407	0.4758	0.7054	0.8855	0.9482	0.9694	(86)
MIT	19.2477	19.4373	19.8380	20.3172	20.6684	20.9062	20.9660	20.9566	20.7827	20.2893	19.7182	19.2239	(87)
Th 2	19.9723	19.9723	19.9752	19.9888	19.9914	20.0009	20.0031	20.0031	19.9986	19.9914	19.9888	19.9836	(88)
util rest of house													
	0.9601	0.9439	0.9039	0.8166	0.6891	0.4810	0.3490	0.3811	0.6396	0.8591	0.9377	0.9640	(89)
MIT 2	18.3887	18.5746	18.9673	19.4325	19.7510	19.9488	19.9897	19.9853	19.8600	19.4189	18.8658	18.3736	(90)
Living area fraction									fLA = Living area / (4) =			0.2259	(91)
MIT	18.5827	18.7695	19.1640	19.6324	19.9582	20.1651	20.2103	20.2047	20.0684	19.6155	19.0584	18.5657	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.4327	18.6195	19.0140	19.4824	19.8082	20.0151	20.0603	20.0547	19.9184	19.4655	18.9084	18.4157	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9484	0.9300	0.8871	0.8006	0.6795	0.4821	0.3545	0.3863	0.6338	0.8425	0.9234	0.9530	(94)
Useful gains	644.3005	701.7610	744.0821	754.9348	665.9646	484.2085	332.6565	339.2921	507.5123	596.4591	614.4154	624.8976	(95)
Ext temp.	4.3000	4.8000	6.6000	9.0000	11.8000	14.8000	16.6000	16.5000	14.0000	10.5000	7.1000	4.2000	(96)
Heat loss rate W													
	1440.8488	1408.9119	1261.6150	1049.5447	799.5861	515.2604	341.0408	350.3516	586.2299	895.1727	1182.3096	1431.5843	(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													
	592.6319	475.2054	385.0445	212.1191	99.4144	0.0000	0.0000	0.0000	0.0000	222.2429	408.8838	600.1749	(98)
Space heating												2995.7170	(98)
Space heating per m2											(98) / (4) =	33.3517	(99)

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

8c. Space cooling requirement

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 %)	90.5000	(206)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)
Space heating requirement	3310.1845	(211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	592.6319	475.2054	385.0445	212.1191	99.4144	0.0000	0.0000	0.0000	0.0000	222.2429	408.8838	600.1749	(98)
Space heating efficiency (main heating system 1)													
	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)
Space heating fuel (main heating system)													
	654.8419	525.0888	425.4635	234.3857	109.8502	0.0000	0.0000	0.0000	0.0000	245.5723	451.8053	663.1767	(211)
Water heating requirement													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	172.1111	150.9364	156.7122	137.9748	133.3919	116.5853	109.5013	123.5697	124.4299	143.2089	154.5698	167.1290	(64)
Efficiency of water heater												87.3000	(216)
(217)m	89.7595	89.7073	89.5505	89.2112	88.6384	87.3000	87.3000	87.3000	87.3000	89.2185	89.5990	89.7832	(217)
Fuel for water heating, kWh/month													
	191.7469	168.2542	174.9987	154.6608	150.4900	133.5456	125.4310	141.5461	142.5314	160.5149	172.5128	186.1474	(219)
Water heating fuel used												1902.3799	(219)
Annual totals kWh/year													
Space heating fuel - main system												3310.1845	(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)												401.8550	(232)
Total delivered energy for all uses												5689.4194	(238)

10a. Fuel costs - using BEDF prices (476)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3310.1845	3.8700	128.1041	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	1902.3799	3.8700	73.6221	(247)
Pumps and fans for heating	75.0000	18.9000	14.1750	(249)
Energy for lighting	401.8550	18.9000	75.9506	(250)
Additional standing charges			93.0000	(251)
Total energy cost			384.8518	(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	3310.1845	0.2160	714.9999	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1902.3799	0.2160	410.9141	(264)
Space and water heating			1125.9139	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	401.8550	0.5190	208.5628	(268)
Total kg/year			1373.4017	(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	3310.1845	1.2200	4038.4251	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1902.3799	1.2200	2320.9035	(264)
Space and water heating			6359.3286	(265)
Pumps and fans	75.0000	3.0700	230.2500	(267)
Energy for lighting	401.8550	3.0700	1233.6949	(268)
Primary energy kWh/year			7823.2735	(272)
Primary energy kWh/m2/year			87.0975	(273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating:	B 84
Current environmental impact rating:	B 86

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	Cancelled by user
O		Not considered
P		Not considered
R		Not considered
S		Not considered
T		Not considered
U	Solar photovoltaic panels	Cancelled by user
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 84
Potential environmental impact rating: B 86

Fuel prices for cost data on this page from database revision number 476 TEST (01 Apr 2021)
Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£90	£90	£0
Mains gas	£295	£295	£0
Space heating	£235	£235	£0
Water heating	£74	£74	£0
Lighting	£76	£76	£0
Total cost of fuels	£385	£385	£0
Total cost of uses	£385	£385	£0
Delivered energy	63 kWh/m²	63 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.4 tonnes	1.4 tonnes	0.0 tonnes
CO2 emissions per m²	15 kg/m²	15 kg/m²	0 kg/m²
Primary energy	87 kWh/m²	87 kWh/m²	0 kWh/m²

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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SAP 2012 WORKSHEET FOR New Build (As Designed)   (Version 9.92, January 2014)
CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING      09 Jan 2014
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No improvements selected / applicable



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

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SAP 2012 WORKSHEET FOR New Build (As Designed)   (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING      09 Jan 2014
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No improvements selected / applicable
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BASIC COMPLIANCE REPORT
Calculation Type: New Build (As Designed)

Briary Energy

Property Reference	013 - PRJ011682	**Issued on Date**	28/04/2021
Assessment Reference	013 S	**Prop Type Ref**	Raine
Property	Plot 13		

SAP Rating	84 B	**DER**	17.35	**TER**	18.23
Environmental	86 B	**% DER<TER**	4.83		
CO_2 Emissions (t/year)	1.37	**DFEE**	45.04	**TFEE**	53.32
General Requirements Compliance	Pass	**% DFEE<TFEE**	15.54		

Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	**Assessor ID**	T850-0001
Client			

SUMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	18.23	$kgCO_2/m^2$	
Dwelling Carbon Dioxide Emission Rate (DER)	17.35	$kgCO_2/m^2$	Pass
	-0.88 (-4.8%)	$kgCO_2/m^2$	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.32	$kWh/m^2/yr$	
Dwelling Fabric Energy Efficiency (DFEE)	45.04	$kWh/m^2/yr$	
	-8.3 (-15.6%)	$kWh/m^2/yr$	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.23 (max. 0.25)	0.23 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.29 (max. 2.00)	1.30 (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	5.01 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal LOGIC COMBI ESP1 30 Combi boiler Efficiency: 89.6% SEDBUK2009 Minimum: 88.0%		Pass
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 (Midlands)	Not significant		Pass

Based on:

Overshading	Average		
Windows facing North Windows facing East Windows facing West	4.32 m², No overhang 3.72 m², No overhang 4.74 m², No overhang		
Air change rate	4.21 ach		
Blinds/curtains	Dark-coloured curtain or roller blind, closed 100% of daylight hours		

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type	U-value		
Filled Cavity with Edge Sealing	0.00	W/m²K	Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals	5.01 (design value)		
Maximum	10.0		Pass

10 Key features

Party wall U-value	0.00	W/m²K
Roof U-value	0.10	W/m²K
Thermal bridging y-value	0.026	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.