

PREDICTED ENERGY ASSESSMENT



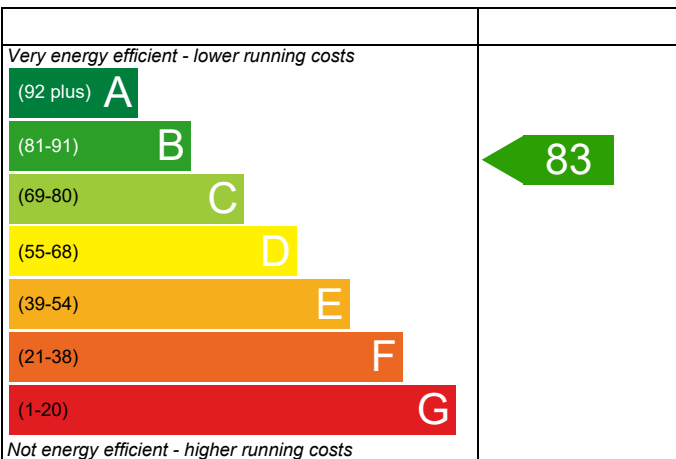
Plot 94

Dwelling type: House, Semi-Detached
 Date of assessment: 02/08/2021
 Produced by: Michael Juckes
 Total floor area: 69.3 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 (CO₂) emissions.

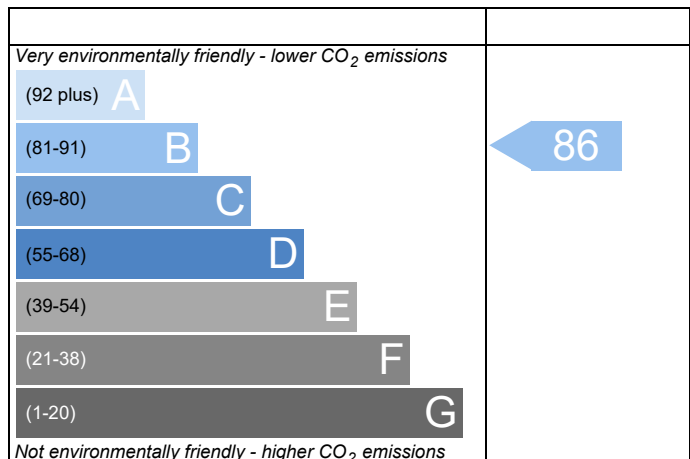
Energy Efficiency Rating



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 (CO₂) 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 (CO₂) 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)



Property Reference	094 - PRJ011855	Issued on Date	02/08/2021
Assessment Reference	094 E	Prop Type Ref	Sinclair
Property	Plot 94		

SAP Rating	83 B	DER	18.79	TER	19.37
Environmental	86 B	% DER<TER	3.02		
CO ₂ Emissions (t/year)	1.12	DFEE	43.71	TFEE	51.38
General Requirements Compliance	Pass	% DFEE<TFEE	14.92		

Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	Assessor ID	T850-0001
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Client	
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SUMMARY 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)	19.37	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	18.79	kgCO ₂ /m ²	Pass
	-0.58 (-3.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.38	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	43.71	kWh/m ² /yr	
	-7.7 (-15.0%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.22 (max. 0.25)	0.22 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.28 (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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BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)



Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Ideal LOGIC COMBI ESP1 35
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 (East Anglia)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

3.36 m², No overhang

Windows facing South

3.44 m², No overhang

Air change rate

4.00 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 γ -value

0.027

W/m²K

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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	094 - PRJ011855	Issued on Date	02/08/2021
Assessment Reference	094 E	Prop Type Ref	Sinclair
Property	Plot 94		

SAP Rating	83 B	DER	18.79	TER	19.37
Environmental	86 B	% DER<TER	3.02		
CO ₂ Emissions (t/year)	1.12	DFEE	43.71	TTEE	51.38
General Requirements Compliance	Pass	% DFEE<TTEE	14.92		

Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	Assessor ID	T850-0001
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Client	
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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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	34.6500 (1b)	x 2.3300 (2b)	= 80.7345 (1b) - (3b)
First floor	34.6500 (1c)	x 2.5300 (2c)	= 87.6645 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.3990 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)				40.0000 / (5) =	0.2375 (8)							
Pressure test				Yes								
Measured/design AP50					5.0100							
Infiltration rate					0.4880 (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) =		0.4514 (21)							
Wind speed	Jan 4.9000	Feb 4.8000	Mar 4.7000	Apr 4.2000	May 4.2000	Jun 3.7000	Jul 3.8000	Aug 3.8000	Sep 4.0000	Oct 4.2000	Nov 4.3000	Dec 4.5000 (22)
Wind factor	1.2250	1.2000	1.1750	1.0500	1.0500	0.9250	0.9500	0.9500	1.0000	1.0500	1.0750	1.1250 (22a)
Adj infiltr rate	0.5530	0.5417	0.5304	0.4740	0.4740	0.4176	0.4289	0.4289	0.4514	0.4740	0.4853	0.5079 (22b)
Effective ac	0.6529	0.6467	0.6407	0.6123	0.6123	0.5872	0.5920	0.5920	0.6019	0.6123	0.6178	0.6290 (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
Half Glazed Door			1.9600	1.3000	2.5480		(26a)
Solid Door			2.1000	1.2000	2.5200		(26)
Windows (Uw = 1.30)			6.8000	1.2357	8.4030		(27)
Ground Floor			34.6500	0.2200	7.6230	75.6000	2619.5400 (28a)
Brick Wall	80.9300	10.8600	70.0700	0.2400	16.8168	39.3600	2757.9552 (29a)
Ins Joist	34.6500		34.6500	0.1000	3.4650	5.8200	201.6630 (30)
Total net area of external elements Aum(A, m ²)			150.2300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.3758		(33)
Party Wall			39.6200	0.0000	0.0000	54.0300	2140.6686 (32)
Ground Floor Stud			49.9300			5.8200	290.5926 (32c)
1st Floor Stud			81.0000			5.8200	471.4200 (32c)
Internal Floor			34.6500			18.0000	623.7000 (32d)
Internal Ceiling			34.6500			5.8200	201.6630 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	9307.2024 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							134.3031 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.0593 (36)
Total fabric heat loss						(33) + (36) =	45.4351 (37)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF HEAT DEMAND 09 Jan 2014

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)m \times (5)$

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	36.2830	35.9397	35.6035	34.0287	34.0287	32.6307	32.8962	32.8962	33.4483	34.0287	34.3295	34.9523 (38)
Average = Sum(39)m / 12 =	81.7181	81.3749	81.0387	79.4638	79.4638	78.0659	78.3313	78.3313	78.8834	79.4638	79.7646	80.3875 (39)
HLP	1.1792	1.1742	1.1694	1.1467	1.1467	1.1265	1.1303	1.1303	1.1383	1.1467	1.1510	1.1600 (40)
HLP (average)												1.1499 (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 2.2290 (42)
Average daily hot water use (litres/day) 87.1390 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy cont	95.8529	92.3674	88.8818	85.3962	81.9107	78.4251	78.4251	81.9107	85.3962	88.8818	92.3674	95.8529 (44)
Energy content (annual)	142.1471	124.3228	128.2900	111.8463	107.3192	92.6083	85.8152	98.4742	99.6503	116.1328	126.7680	137.6619 (45)
Distribution loss (46)m = $0.15 \times (45)m$	21.3221	18.6484	19.2435	16.7769	16.0979	13.8912	12.8723	14.7711	14.9475	17.4199	19.0152	20.6493 (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	14.0836	12.7009	14.0302	13.5420	13.9675	13.4871	13.9181	13.9501	13.5170	14.0043	13.5938	14.0732 (61)
Total heat required for water heating calculated for each month	156.2307	137.0236	142.3202	125.3883	121.2867	106.0954	99.7333	112.4243	113.1673	130.1371	140.3619	151.7351 (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	156.2307	137.0236	142.3202	125.3883	121.2867	106.0954	99.7333	112.4243	113.1673	130.1371	140.3619	151.7351 (64)
Total per year (kWh/year) = Sum(64)m =												1535.9039 (64)
RHI water heating demand												1536 (64)
Heat gains from water heating, kWh/month	50.7848	44.5125	46.1640	40.5744	39.1755	34.1640	32.0131	36.2302	36.5130	42.1152	45.5488	49.2909 (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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	50.5549	44.9024	36.5171	27.6458	20.6655	17.4467	18.8518	24.5043	32.8896	41.7609	48.7411	51.9599 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	292.0266	295.0569	287.4206	271.1638	250.6425	231.3554	218.4704	215.4401	223.0764	239.3332	259.8545	279.1416 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031 (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)	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604 (71)
Water heating gains (Table 5)	68.2591	66.2389	62.0483	56.3533	52.6553	47.4500	43.0283	48.6965	50.7125	56.6065	63.2623	66.2512 (72)
Total internal gains	509.0239	504.3815	484.1693	453.3462	422.1466	394.4354	378.5338	386.8241	404.8617	435.8838	470.0411	495.5360 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	3.3600	12.0539	0.4700	0.0000	0.7700	14.6574 (74)						
South	3.4400	51.7504	0.4700	0.0000	0.7700	64.4259 (78)						
Solar gains	79.0833	124.3748	166.7366	220.4390	244.0525	255.8964	242.8283	219.3938	192.0857	143.2348	96.7397	67.2500 (83)
Total gains	588.1072	628.7563	650.9059	673.7852	666.1991	650.3319	621.3621	606.2179	596.9474	579.1186	566.7809	562.7860 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)

tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	31.6372	31.7707	31.9025	32.5347	32.5347	33.1173	33.0051	33.0051	32.7741	32.5347	32.4120	32.1609
util living area	3.1091	3.1180	3.1268	3.1690	3.1690	3.2078	3.2003	3.2003	3.1849	3.1690	3.1608	3.1441
util rest of house	0.9545	0.9420	0.9166	0.8610	0.7653	0.5963	0.4119	0.4210	0.6667	0.8527	0.9307	0.9587 (86)
MIT	19.3667	19.5284	19.8567	20.2861	20.6458	20.8938	20.9776	20.9762	20.8385	20.4245	19.8605	19.3576 (87)
Th 2	19.9367	19.9407	19.9446	19.9629	19.9629	19.9793	19.9761	19.9761	19.9697	19.9629	19.9594	19.9521 (88)
util rest of house	0.9463	0.9317	0.9008	0.8332	0.7142	0.5102	0.2951	0.3021	0.5854	0.8175	0.9164	0.9513 (89)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF HEAT DEMAND 09 Jan 2014

MIT 2	18.4774	18.6382	18.9613	19.3852	19.7122	19.9240	19.9702	19.9698	19.8784	19.5200	18.9799	18.4803 (90)
Living area fraction									fLA = Living area / (4) =			0.2127 (91)
MIT	18.6665	18.8276	19.1518	19.5769	19.9108	20.1303	20.1845	20.1838	20.0826	19.7124	19.1672	18.6669 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.5165	18.6776	19.0018	19.4269	19.7608	19.9803	20.0345	20.0338	19.9326	19.5624	19.0172	18.5169 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9323	0.9162	0.8836	0.8163	0.7030	0.5103	0.3020	0.3091	0.5821	0.8013	0.9001	0.9381 (94)
Useful gains	548.2926	576.0887	575.1339	549.9967	468.3110	331.8621	187.6589	187.3959	347.4974	464.0527	510.1779	527.9584 (95)
Ext temp.	4.7000	5.2000	7.0000	9.5000	12.5000	15.4000	17.6000	17.6000	15.0000	11.4000	7.7000	4.7000 (96)
Heat loss rate W												
1129.0614	1096.7356	972.6072	788.8257	576.9673	357.5632	190.6956	190.6450	389.0979	648.6177	902.7099	1110.7050 (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												
432.0919	349.8747	295.7202	171.9569	80.8403	0.0000	0.0000	0.0000	0.0000	137.3164	282.6231	433.5634 (98)	
Space heating												2183.9868 (98)
RHI space heating demand												2184 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	34.6500 (1b)	x 2.3300 (2b)	= 80.7345 (1b) - (3b)
First floor	34.6500 (1c)	x 2.5300 (2c)	= 87.6645 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.3990 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)				40.0000 / (5) =	0.2375 (8)
Pressure test				Yes	
Measured/design AP50				5.0100	
Infiltration rate				0.4880 (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) =		0.4514 (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												
Effective ac	0.5756	0.5643	0.5530	0.4966	0.4853	0.4289	0.4289	0.4176	0.4514	0.4853	0.5079	0.5304 (22b)
	0.6656	0.6592	0.6529	0.6233	0.6178	0.5920	0.5920	0.5872	0.6019	0.6178	0.6290	0.6407 (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
Half Glazed Door			1.9600	1.3000	2.5480		(26a)
Solid Door			2.1000	1.2000	2.5200		(26)
Windows (Uw = 1.30)			6.8000	1.2357	8.4030		(27)
Ground Floor			34.6500	0.2200	7.6230	75.6000	2619.5400 (28a)
Brick Wall	80.9300	10.8600	70.0700	0.2400	16.8168	39.3600	2757.9552 (29a)
Ins Joist	34.6500		34.6500	0.1000	3.4650	5.8200	201.6630 (30)
Total net area of external elements Aum(A, m ²)			150.2300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.3758		(33)
Party Wall			39.6200	0.0000	0.0000	54.0300	2140.6686 (32)
Ground Floor Stud			49.9300			5.8200	290.5926 (32c)
1st Floor Stud			81.0000			5.8200	471.4200 (32c)
Internal Floor			34.6500			18.0000	623.7000 (32d)
Internal Ceiling			34.6500			5.8200	201.6630 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	9307.2024 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							134.3031 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.0593 (36)
Total fabric heat loss						(33) + (36) =	45.4351 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	36.9908	36.6334	36.2830	34.6374	34.3295	32.8962	32.8962	32.6307	33.4483	34.3295	34.9523	35.6035 (38)
Average = Sum(39)m / 12 =	82.4259	82.0685	81.7181	80.0725	79.7646	78.3313	78.3313	78.0659	78.8834	79.7646	80.3875	81.0387 (39)
												80.0710 (39)
HLP	1.1894	1.1842	1.1792	1.1554	1.1510	1.1303	1.1303	1.1265	1.1383	1.1510	1.1600	1.1694 (40)
HLP (average)												1.1554 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2290 (42)
Average daily hot water use (litres/day)												87.1390 (43)
Daily hot water use	95.8529	92.3674	88.8818	85.3962	81.9107	78.4251	78.4251	81.9107	85.3962	88.8818	92.3674	95.8529 (44)
Energy conte	142.1471	124.3228	128.2900	111.8463	107.3192	92.6083	85.8152	98.4742	99.6503	116.1328	126.7680	137.6619 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

Energy content (annual)												Total = Sum(45)m =	1371.0359 (45)
Distribution loss (46)m = 0.15 x (45)m													
	21.3221	18.6484	19.2435	16.7769	16.0979	13.8912	12.8723	14.7711	14.9475	17.4199	19.0152	20.6493	(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	14.0836	12.7009	14.0302	13.5420	13.9675	13.4871	13.9181	13.9501	13.5170	14.0043	13.5938	14.0732	(61)
Total heat required for water heating calculated for each month	156.2307	137.0236	142.3202	125.3883	121.2867	106.0954	99.7333	112.4243	113.1673	130.1371	140.3619	151.7351	(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	156.2307	137.0236	142.3202	125.3883	121.2867	106.0954	99.7333	112.4243	113.1673	130.1371	140.3619	151.7351	(64)
Heat gains from water heating, kWh/month	50.7848	44.5125	46.1640	40.5744	39.1755	34.1640	32.0131	36.2302	36.5130	42.1152	45.5488	49.2909	(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	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	50.5549	44.9024	36.5171	27.6458	20.6655	17.4467	18.8518	24.5043	32.8896	41.7609	48.7411	51.9599	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	292.0266	295.0569	287.4206	271.1638	250.6425	231.3554	218.4704	215.4401	223.0764	239.3332	259.8545	279.1416	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	(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)	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	(71)
Water heating gains (Table 5)	68.2591	66.2389	62.0483	56.3533	52.6553	47.4500	43.0283	48.6965	50.7125	56.6065	63.2623	66.2512	(72)
Total internal gains	509.0239	504.3815	484.1693	453.3462	422.1466	394.4354	378.5338	386.8241	404.8617	435.8838	470.0411	495.5360	(73)

6. Solar gains

[Jan]		Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W				
North		3.3600	10.6334	0.4700	0.0000	0.0000	0.7700	12.9300 (74)					
South		3.4400	46.7521	0.4700	0.0000	0.0000	0.7700	58.2033 (78)					
Solar gains	71.1334	120.0320	163.4116	204.6787	233.8603	234.8859	225.2734	202.6296	177.3246	132.2278	84.9417	61.0721	(83)
Total gains	580.1573	624.4135	647.5810	658.0249	656.0068	629.3213	603.8072	589.4537	582.1863	568.1116	554.9828	556.6082	(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	31.3655	31.5021	31.6372	32.2874	32.4120	33.0051	33.0051	33.1173	32.7741	32.4120	32.1609	31.9025	
alpha	3.0910	3.1001	3.1091	3.1525	3.1608	3.2003	3.2003	3.2078	3.1849	3.1608	3.1441	3.1268	
util living area	0.9588	0.9459	0.9244	0.8815	0.8041	0.6694	0.5258	0.5538	0.7348	0.8799	0.9410	0.9630	(86)
MIT	19.2666	19.4537	19.7575	20.1703	20.5421	20.8280	20.9416	20.9297	20.7502	20.2957	19.7318	19.2458	(87)
Th 2	19.9285	19.9326	19.9367	19.9558	19.9594	19.9761	19.9761	19.9793	19.9697	19.9594	19.9521	19.9446	(88)
util rest of house	0.9515	0.9363	0.9103	0.8577	0.7613	0.5941	0.4199	0.4503	0.6680	0.8516	0.9290	0.9565	(89)
MIT 2	18.3728	18.5590	18.8590	19.2712	19.6188	19.8746	19.9527	19.9491	19.8107	19.3980	18.8492	18.3644	(90)
Living area fraction												fLA = Living area / (4) = 0.2127 (91)	
MIT	18.5629	18.7493	19.0501	19.4624	19.8152	20.0774	20.1630	20.1577	20.0106	19.5889	19.0369	18.5518	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.4129	18.5993	18.9001	19.3124	19.6652	19.9274	20.0130	20.0077	19.8606	19.4389	18.8869	18.4018	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9380	0.9211	0.8933	0.8403	0.7474	0.5901	0.4240	0.4534	0.6600	0.8344	0.9135	0.9439	(94)
Useful gains	544.2080	575.1546	578.5146	552.9312	490.2786	371.3693	255.9915	267.2336	384.2325	474.0557	506.9782	525.4004	(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	1163.2699	1124.2821	1013.3125	833.7500	635.3431	417.2988	267.3460	281.6364	454.4133	705.0341	947.5223	1150.8978	(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	460.5820	369.0136	323.4896	202.1895	107.9280	0.0000	0.0000	0.0000	0.0000	171.8479	317.1918	465.3701	(98)
Space heating												2417.6126 (98)	
Space heating per m ²												(98) / (4) = 34.8862 (99)	

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2671.3951 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	460.5820	369.0136	323.4896	202.1895	107.9280	0.0000	0.0000	0.0000	0.0000	171.8479	317.1918	465.3701	(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)	508.9304	407.7499	357.4471	223.4138	119.2574	0.0000	0.0000	0.0000	0.0000	189.8872	350.4882	514.2211	(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	156.2307	137.0236	142.3202	125.3883	121.2867	106.0954	99.7333	112.4243	113.1673	130.1371	140.3619	151.7351	(64)
Efficiency of water heater (217)m	89.6675	89.6106	89.4977	89.2478	88.7781	87.3000	87.3000	87.3000	87.3000	89.0927	89.4937	87.3000	(216)
Fuel for water heating, kWh/month	174.2333	152.9101	159.0211	140.4946	136.6179	121.5297	114.2420	128.7793	129.6304	146.0693	156.8400	169.1742	(219)
Water heating fuel used													1729.5418 (219)
Annual totals kWh/year													
Space heating fuel - main system													2671.3951 (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)													357.1259 (232)
Total delivered energy for all uses													4833.0628 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2671.3951	3.4800	92.9645 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1729.5418	3.4800	60.1881 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	357.1259	13.1900	47.1049 (250)
Additional standing charges			120.0000 (251)
Total energy cost			330.1500 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2131 (257)
SAP value		83.0766
SAP rating (Section 12)		83 (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	2671.3951	0.2160	577.0213 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1729.5418	0.2160	373.5810 (264)
Space and water heating			950.6024 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	357.1259	0.5190	185.3483 (268)
Total kg/year			1174.8757 (272)
CO2 emissions per m2			16.9500 (273)
EI value			86.2263
EI rating			86 (274)
EI band			B

Calculation of stars for heating and DHW

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9050 = 3.845$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9050 = 0.2387$, stars = 4
Water heating energy efficiency	$3.48 / 0.8869 = 3.924$, stars = 4
Water heating environmental impact	$0.216 / 0.8869 = 0.2435$, stars = 4

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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	34.6500 (1b)	2.3300 (2b)	80.7345 (1b) - (3b)
First floor	34.6500 (1c)	2.5300 (2c)	87.6645 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.3000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 168.3990 (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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				40.0000 / (5) =	0.2375 (8)
Pressure test				Yes	
Measured/design AP50					5.0100
Infiltration rate					0.4880 (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) =	0.4514 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.8000	4.7000	4.2000	4.2000	3.7000	3.8000	3.8000	4.0000	4.2000	4.3000	4.5000 (22)
Wind factor	1.2250	1.2000	1.1750	1.0500	1.0500	0.9250	0.9500	0.9500	1.0000	1.0500	1.0750	1.1250 (22a)
Adj infiltr rate												
Effective ac	0.5530	0.5417	0.5304	0.4740	0.4740	0.4176	0.4289	0.4289	0.4514	0.4740	0.4853	0.5079 (22b)
	0.6529	0.6467	0.6407	0.6123	0.6123	0.5872	0.5920	0.5920	0.6019	0.6123	0.6178	0.6290 (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
Half Glazed Door			1.9600	1.3000	2.5480		(26a)
Solid Door			2.1000	1.2000	2.5200		(26)
Windows (Uw = 1.30)			6.8000	1.2357	8.4030		(27)
Ground Floor			34.6500	0.2200	7.6230	75.6000	2619.5400 (28a)
Brick Wall	80.9300	10.8600	70.0700	0.2400	16.8168	39.3600	2757.9552 (29a)
Ins Joist	34.6500		34.6500	0.1000	3.4650	5.8200	201.6630 (30)
Total net area of external elements Aum(A, m2)			150.2300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.3758		(33)
Party Wall			39.6200	0.0000	0.0000	54.0300	2140.6686 (32)
Ground Floor Stud			49.9300			5.8200	290.5926 (32c)
1st Floor Stud			81.0000			5.8200	471.4200 (32c)
Internal Floor			34.6500			18.0000	623.7000 (32d)
Internal Ceiling			34.6500			5.8200	201.6630 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	9307.2024 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							134.3031 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.0593 (36)
Total fabric heat loss						(33) + (36) =	45.4351 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	36.2830	35.9397	35.6035	34.0287	34.0287	32.6307	32.8962	32.8962	33.4483	34.0287	34.3295	34.9523 (38)
Average = Sum(39)m / 12 =	81.7181	81.3749	81.0387	79.4638	79.4638	78.0659	78.3313	78.3313	78.8834	79.4638	79.7646	80.3875 (39)
												79.6906 (39)
HLP	1.1792	1.1742	1.1694	1.1467	1.1467	1.1265	1.1303	1.1303	1.1383	1.1467	1.1510	1.1600 (40)
HLP (average)												1.1499 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2290 (42)
Average daily hot water use (litres/day)												87.1390 (43)
Daily hot water use	95.8529	92.3674	88.8818	85.3962	81.9107	78.4251	78.4251	81.9107	85.3962	88.8818	92.3674	95.8529 (44)
Energy conte	142.1471	124.3228	128.2900	111.8463	107.3192	92.6083	85.8152	98.4742	99.6503	116.1328	126.7680	137.6619 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

Energy content (annual)													Total = Sum(45)m =	1371.0359 (45)
Distribution loss (46)m = 0.15 x (45)m														
	21.3221	18.6484	19.2435	16.7769	16.0979	13.8912	12.8723	14.7711	14.9475	17.4199	19.0152	20.6493	(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	14.0836	12.7009	14.0302	13.5420	13.9675	13.4871	13.9181	13.9501	13.5170	14.0043	13.5938	14.0732	(61)	
Total heat required for water heating calculated for each month	156.2307	137.0236	142.3202	125.3883	121.2867	106.0954	99.7333	112.4243	113.1673	130.1371	140.3619	151.7351	(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	156.2307	137.0236	142.3202	125.3883	121.2867	106.0954	99.7333	112.4243	113.1673	130.1371	140.3619	151.7351	(64)	
Total per year (kWh/year) = Sum(64)m =	1535.9039 (64)													
Heat gains from water heating, kWh/month	50.7848	44.5125	46.1640	40.5744	39.1755	34.1640	32.0131	36.2302	36.5130	42.1152	45.5488	49.2909	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	133.7407	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	50.5549	44.9024	36.5171	27.6458	20.6655	17.4467	18.8518	24.5043	32.8896	41.7609	48.7411	51.9599	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	292.0266	295.0569	287.4206	271.1638	250.6425	231.3554	218.4704	215.4401	223.0764	239.3332	259.8545	279.1416	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	50.6031	(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)	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	-89.1604	(71)
Water heating gains (Table 5)	68.2591	66.2389	62.0483	56.3533	52.6553	47.4500	43.0283	48.6965	50.7125	56.6065	63.2623	66.2512	(72)
Total internal gains	509.0239	504.3815	484.1693	453.3462	422.1466	394.4354	378.5338	386.8241	404.8617	435.8838	470.0411	495.5360	(73)

6. Solar gains

[Jan]			Area	Solar flux		g		FF		Access		Gains	
			m ²	Table 6a		Specific data		Specific data		factor		W	
				W/m ²		or Table 6b		or Table 6c		Table 6d			
North			3.3600	12.0539		0.4700		0.0000		0.7700		14.6574 (74)	
South			3.4400	51.7504		0.4700		0.0000		0.7700		64.4259 (78)	
Solar gains	79.0833	124.3748	166.7366	220.4390	244.0525	255.8964	242.8283	219.3938	192.0857	143.2348	96.7397	67.2500	(83)
Total gains	588.1072	628.7563	650.9059	673.7852	666.1991	650.3319	621.3621	606.2179	596.9474	579.1186	566.7809	562.7860	(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	31.6372	31.7707	31.9025	32.5347	32.5347	33.1173	33.0051	33.0051	32.7741	32.5347	32.4120	32.1609	
alpha	3.1091	3.1180	3.1268	3.1690	3.1690	3.2078	3.2003	3.2003	3.1849	3.1690	3.1608	3.1441	
util living area	0.9545	0.9420	0.9166	0.8610	0.7653	0.5963	0.4119	0.4210	0.6667	0.8527	0.9307	0.9587 (86)	
MIT	19.3667	19.5284	19.8567	20.2861	20.6458	20.8938	20.9776	20.9762	20.8385	20.4245	19.8605	19.3576 (87)	
Th 2	19.9367	19.9407	19.9446	19.9629	19.9629	19.9793	19.9761	19.9761	19.9697	19.9629	19.9594	19.9521 (88)	
util rest of house	0.9463	0.9317	0.9008	0.8332	0.7142	0.5102	0.2951	0.3021	0.5854	0.8175	0.9164	0.9513 (89)	
MIT 2	18.4774	18.6382	18.9613	19.3852	19.7122	19.9240	19.9702	19.9698	19.8784	19.5200	18.9799	18.4803 (90)	
Living area fraction	fLA = Living area / (4) = 0.2127 (91)												
MIT	18.6665	18.8276	19.1518	19.5769	19.9108	20.1303	20.1845	20.1838	20.0826	19.7124	19.1672	18.6669 (92)	
Temperature adjustment	-0.1500												
adjusted MIT	18.5165	18.6776	19.0018	19.4269	19.7608	19.9803	20.0345	20.0338	19.9326	19.5624	19.0172	18.5169 (93)	

8. Space heating requirement

Utilisation	0.9323	0.9162	0.8836	0.8163	0.7030	0.5103	0.3020	0.3091	0.5821	0.8013	0.9001	0.9381 (94)
Useful gains	548.2926	576.0887	575.1339	549.9967	468.3110	331.8621	187.6589	187.3959	347.4974	464.0527	510.1779	527.9584 (95)
Ext temp.	4.7000	5.2000	7.0000	9.5000	12.5000	15.4000	17.6000	17.6000	15.0000	11.4000	7.7000	4.7000 (96)
Heat loss rate W	1129.0614	1096.7356	972.6072	788.8257	576.9673	357.5632	190.6956	190.6450	389.0979	648.6177	902.7099	1110.7050 (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	432.0919	349.8747	295.7202	171.9569	80.8403	0.0000	0.0000	0.0000	0.0000	137.3164	282.6231	433.5634 (98)
Space heating	2183.9868 (98)											
Space heating per m2	(98) / (4) = 31.5150 (99)											

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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 %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2413.2451 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	432.0919	349.8747	295.7202	171.9569	80.8403	0.0000	0.0000	0.0000	0.0000	137.3164	282.6231	433.5634	(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)	477.4496	386.6019	326.7626	190.0076	89.3263	0.0000	0.0000	0.0000	0.0000	151.7308	312.2907	479.0756	(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	156.2307	137.0236	142.3202	125.3883	121.2867	106.0954	99.7333	112.4243	113.1673	130.1371	140.3619	151.7351	(64)
Efficiency of water heater (217)m	89.6276	89.5760	89.4349	89.1224	88.5523	87.3000	87.3000	87.3000	87.3000	88.9142	89.4124	87.3000	(216)
Fuel for water heating, kWh/month	174.3109	152.9692	159.1327	140.6922	136.9662	121.5297	114.2420	128.7793	129.6304	146.3626	156.9825	169.2564	(219)
Water heating fuel used													1730.8541 (219)
Annual totals kWh/year													
Space heating fuel - main system													2413.2451 (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)													357.1259 (232)
Total delivered energy for all uses													4576.2251 (238)

10a. Fuel costs - using BEDF prices (479)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2413.2451	3.7400	90.2554 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1730.8541	3.7400	64.7339 (247)
Pumps and fans for heating	75.0000	19.1200	14.3400 (249)
Energy for lighting	357.1259	19.1200	68.2825 (250)
Additional standing charges			94.0000 (251)
Total energy cost			331.6118 (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	2413.2451	0.2160	521.2609 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1730.8541	0.2160	373.8645 (264)
Space and water heating			895.1254 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	357.1259	0.5190	185.3483 (268)
Total kg/year			1119.3988 (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	2413.2451	1.2200	2944.1590 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1730.8541	1.2200	2111.6420 (264)
Space and water heating			5055.8010 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	357.1259	3.0700	1096.3764 (268)
Primary energy kWh/year			6382.4274 (272)
Primary energy kWh/m2/year			92.0985 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 83
 Current environmental impact rating: B 86

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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: (none)	SAP change	Cost change	CO2 change
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Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings £0	0.00 kg/m ²	
Potential energy efficiency rating:		B 83	
Potential environmental impact rating:			B 86

Fuel prices for cost data on this page from database revision number 479 TEST (30 Jun 2021)
 Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£83	£83	£0
Mains gas	£249	£249	£0
Space heating	£199	£199	£0
Water heating	£65	£65	£0
Lighting	£68	£68	£0
Total cost of fuels	£332	£332	£0
Total cost of uses	£332	£332	£0
Delivered energy	66 kWh/m ²	66 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	1.1 tonnes	1.1 tonnes	0.0 tonnes
CO2 emissions per m ²	16 kg/m ²	16 kg/m ²	0 kg/m ²
Primary energy	92 kWh/m ²	92 kWh/m ²	0 kWh/m ²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (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 Designed)



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

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

No improvements selected / applicable

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	094 - PRJ011855	Issued on Date	02/08/2021
Assessment Reference	094 E	Prop Type Ref	Sinclair
Property	Plot 94		

SAP Rating	83 B	DER	18.79	TER	19.37
Environmental	86 B	% DER<TER	3.02		
CO₂ Emissions (t/year)	1.12	DFEE	43.71	TFEE	51.38
General Requirements Compliance	Pass	% DFEE<TFEE	14.92		

Assessor Details	Mr. Michael Jukes, Michael Jukes, Tel: 02033971373, michael@briaryenergy.co.uk	Assessor ID	T850-0001
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Client	
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SUMMARY 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)	19.37	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	18.79	kgCO ₂ /m ²	Pass
	-0.58 (-3.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.38	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	43.71	kWh/m ² /yr	
	-7.7 (-15.0%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.22 (max. 0.25)	0.22 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.28 (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

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Ideal LOGIC COMBI ESP1 35
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 (East Anglia)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

3.36 m², No overhang

Windows facing South

3.44 m², No overhang

Air change rate

4.00 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 γ -value

0.027

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.