

PREDICTED ENERGY ASSESSMENT



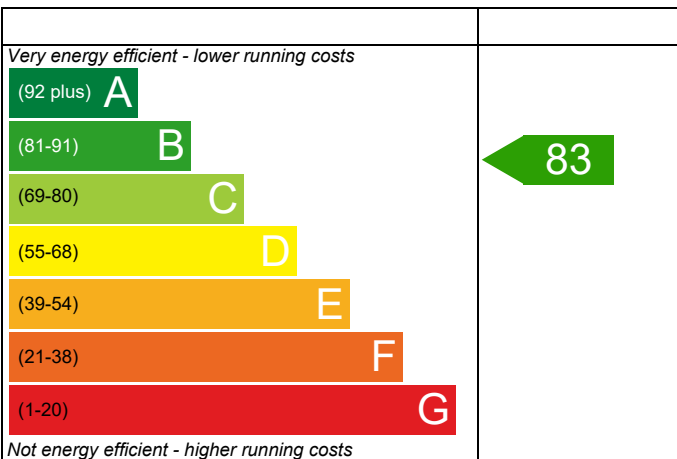
Plot 100

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.

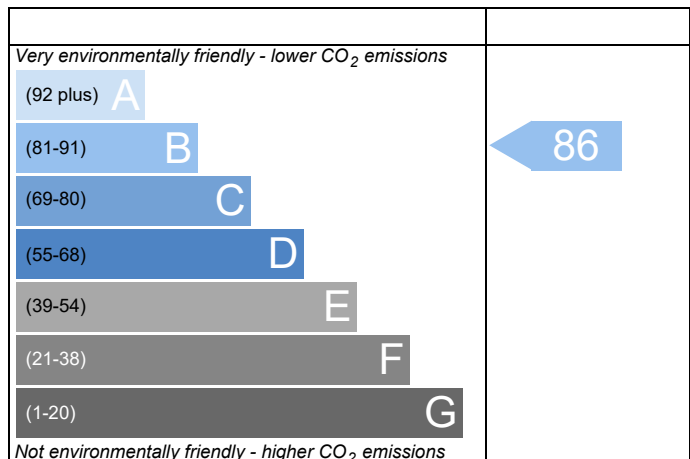
Energy Efficiency Rating



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	100 - PRJ011855		Issued on Date	02/08/2021	
Assessment Reference	100 S	Prop Type Ref	Sinclair		
Property	Plot 100				
SAP Rating	83 B	DER	18.87	TER	19.45
Environmental	86 B	% DER<TER	3.00		
CO ₂ Emissions (t/year)	1.12	DFEE	44.23	TFEE	51.91
General Requirements Compliance	Pass	% DFEE<TFEE	14.79		
Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk			Assessor ID	T850-0001
Client					

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)	19.45	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	18.87	kgCO ₂ /m ²	Pass
	-0.58 (-3.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.91	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.23	kWh/m ² /yr	
	-7.7 (-14.8%)	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 East

3.44 m², No overhang

Windows facing South West

3.36 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 y-value

0.027

W/m²K

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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	100 - PRJ011855	Issued on Date	02/08/2021
Assessment Reference	100 S	Prop Type Ref	Sinclair
Property	Plot 100		

SAP Rating	83 B	DER	18.87	TER	19.45
Environmental	86 B	% DER<TER	3.00		
CO ₂ Emissions (t/year)	1.12	DFEE	44.23	TTEE	51.91
General Requirements Compliance	Pass	% DFEE<TTEE	14.79		

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 = $0.33 \times (25)m \times (5)$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	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)
Heat transfer coeff	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)
Average = Sum(39)m / 12 =												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)

Assumed occupancy 2.2290 (42)
Average daily hot water use (litres/day) 87.1390 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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)
Energy content (annual)										Total = Sum(45)m =		1371.0359 (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

	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 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						
Northeast	3.4400	12.9465	0.4700	0.0000	0.7700	16.1176 (75)						
Southwest	3.3600	40.9830	0.4700	0.0000	0.7700	49.8347 (79)						
Solar gains	65.9523	109.7536	160.8013	232.5469	271.6230	290.2473	273.2779	237.4065	192.4439	130.5436	81.9407	55.2640 (83)
Total gains	574.9762	614.1351	644.9706	685.8931	693.7696	684.6827	651.8117	624.2306	597.3056	566.4274	551.9818	550.8001 (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	0.9569	0.9452	0.9183	0.8560	0.7499	0.5740	0.3945	0.4102	0.6664	0.8590	0.9349	0.9609 (86)
MIT	19.3432	19.5033	19.8475	20.3011	20.6680	20.9050	20.9802	20.9779	20.8387	20.4090	19.8360	19.3357 (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	0.9492	0.9354	0.9028	0.8276	0.6975	0.4889	0.2818	0.2938	0.5851	0.8247	0.9213	0.9538 (89)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF HEAT DEMAND 09 Jan 2014

MIT 2	18.4545	18.6141	18.9526	19.3986	19.7295	19.9304	19.9709	19.9703	19.8785	19.5066	18.9567	18.4590 (90)
Living area fraction									fLA = Living area / (4) =			0.2127 (91)
MIT	18.6435	18.8032	19.1430	19.5906	19.9291	20.1377	20.1856	20.1846	20.0827	19.6985	19.1437	18.6454 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.4935	18.6532	18.9930	19.4406	19.7791	19.9877	20.0356	20.0346	19.9327	19.5485	18.9937	18.4954 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9355	0.9202	0.8856	0.8108	0.6871	0.4897	0.2886	0.3007	0.5819	0.8083	0.9053	0.9410 (94)
Useful gains	537.9052	565.1449	571.1942	556.1251	476.7218	335.2797	188.1244	187.7062	347.5580	457.8455	499.7207	518.3028 (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												
Month fracti	1127.1818	1094.7542	971.8936	789.9144	578.4283	358.1408	190.7852	190.7047	389.1083	647.5128	900.8370	1108.9801 (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												
Space heating	438.4218	355.8975	298.1203	168.3283	75.6696	0.0000	0.0000	0.0000	0.0000	141.1124	288.8037	439.4639 (98)
RHI space heating demand												2205.8176 (98)
												2206 (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 (m2)	Storey height (m)	Volume (m3)
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	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	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 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	36.9908	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			
Northeast		3.4400	11.2829	0.4700	0.0000	0.0000	0.7700	14.0465 (75)				
Southwest		3.3600	36.7938	0.4700	0.0000	0.0000	0.7700	44.7407 (79)				
Solar gains	58.7873	104.8021	155.7878	213.8010	258.4350	264.9061	251.9271	217.3530	175.6770	119.1701	71.2632	49.7598 (83)
Total gains	567.8111	609.1836	639.9571	667.1472	680.5816	659.3415	630.4608	604.1772	580.5388	555.0540	541.3044	545.2959 (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	0.9609	0.9490	0.9264	0.8781	0.7913	0.6494	0.5077	0.5432	0.7360	0.8856	0.9444	0.9649	(86)
MIT	19.2442	19.4272	19.7453	20.1826	20.5657	20.8428	20.9472	20.9335	20.7490	20.2779	19.7083	19.2248	(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	0.9539	0.9399	0.9126	0.8538	0.7472	0.5739	0.4040	0.4407	0.6692	0.8582	0.9330	0.9586	(89)
MIT 2	18.3510	18.5335	18.8474	19.2824	19.6383	19.8843	19.9551	19.9509	19.8099	19.3821	18.8268	18.3439	(90)
Living area fraction												fLA = Living area / (4) = 0.2127 (91)	
MIT	18.5409	18.7236	19.0384	19.4738	19.8356	20.0882	20.1662	20.1599	20.0096	19.5726	19.0143	18.5313	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.3909	18.5736	18.8884	19.3238	19.6856	19.9382	20.0162	20.0099	19.8596	19.4226	18.8643	18.3813	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9409	0.9251	0.8958	0.8364	0.7339	0.5708	0.4083	0.4440	0.6611	0.8410	0.9179	0.9465	(94)
Useful gains	534.2434	563.5476	573.2631	558.0230	499.5025	376.3631	257.3944	268.2403	383.8084	466.7914	496.8465	516.0995	(95)
Ext temp.	4.3000	4.9000	6.5000	8.0000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1161.4593	1122.1703	1012.3561	834.6626	636.9653	418.1462	267.5915	281.8109	454.3399	703.7324	945.7012	1149.2304	(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	466.6487	375.3945	326.6852	199.1806	102.2723	0.0000	0.0000	0.0000	0.0000	176.2841	323.1753	471.0494	(98)
Space heating												2440.6901 (98)	
Space heating per m ²												(98) / (4) = 35.2192 (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													2696.8951 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	466.6487	375.3945	326.6852	199.1806	102.2723	0.0000	0.0000	0.0000	0.0000	176.2841	323.1753	471.0494	(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)	515.6339	414.8005	360.9781	220.0890	113.0081	0.0000	0.0000	0.0000	0.0000	194.7891	357.0998	520.4966	(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	89.6755	89.6215	89.5044	89.2363	88.7354	87.3000	87.3000	87.3000	87.3000	89.1127	89.5065	87.3000	(216)
Fuel for water heating, kWh/month	174.2177	152.8914	159.0091	140.5126	136.6836	121.5297	114.2420	128.7793	129.6304	146.0365	156.8174	169.1605	(219)
Water heating fuel used													1729.5101 (219)
Annual totals kWh/year													
Space heating fuel - main system													2696.8951 (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													4858.5311 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2696.8951	3.4800	93.8520 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1729.5101	3.4800	60.1870 (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			331.0363 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2164 (257)
SAP value		83.0311
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	2696.8951	0.2160	582.5293 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1729.5101	0.2160	373.5742 (264)
Space and water heating			956.1035 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	357.1259	0.5190	185.3483 (268)
Total kg/year			1180.3769 (272)
CO2 emissions per m2			17.0300 (273)
EI value			86.1618
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)	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	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)							
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 infilt 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 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)
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)
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			
Northeast		3.4400	12.9465	0.4700	0.0000	0.7700	0.7700	16.1176 (75)				
Southwest		3.3600	40.9830	0.4700	0.0000	0.7700	0.7700	49.8347 (79)				
Solar gains	65.9523	109.7536	160.8013	232.5469	271.6230	290.2473	273.2779	237.4065	192.4439	130.5436	81.9407	55.2640 (83)
Total gains	574.9762	614.1351	644.9706	685.8931	693.7696	684.6827	651.8117	624.2306	597.3056	566.4274	551.9818	550.8001 (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	0.9569	0.9452	0.9183	0.8560	0.7499	0.5740	0.3945	0.4102	0.6664	0.8590	0.9349	0.9609	(86)
MIT	19.3432	19.5033	19.8475	20.3011	20.6680	20.9050	20.9802	20.9779	20.8387	20.4090	19.8360	19.3357	(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	0.9492	0.9354	0.9028	0.8276	0.6975	0.4889	0.2818	0.2938	0.5851	0.8247	0.9213	0.9538	(89)
MIT 2	18.4545	18.6141	18.9526	19.3986	19.7295	19.9304	19.9709	19.9703	19.8785	19.5066	18.9567	18.4590	(90)
Living area fraction												fLA = Living area / (4) = 0.2127 (91)	
MIT	18.6435	18.8032	19.1430	19.5906	19.9291	20.1377	20.1856	20.1846	20.0827	19.6985	19.1437	18.6454	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.4935	18.6532	18.9930	19.4406	19.7791	19.9877	20.0356	20.0346	19.9327	19.5485	18.9937	18.4954	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9355	0.9202	0.8856	0.8108	0.6871	0.4897	0.2886	0.3007	0.5819	0.8083	0.9053	0.9410	(94)
Useful gains	537.9052	565.1449	571.1942	556.1251	476.7218	335.2797	188.1244	187.7062	347.5580	457.8455	499.7207	518.3028	(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	1127.1818	1094.7542	971.8936	789.9144	578.4283	358.1408	190.7852	190.7047	389.1083	647.5128	900.8370	1108.9801	(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	438.4218	355.8975	298.1203	168.3283	75.6696	0.0000	0.0000	0.0000	0.0000	141.1124	288.8037	439.4639	(98)
Space heating												2205.8176 (98)	
Space heating per m ²												(98) / (4) = 31.8300 (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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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													2437.3675 (211)
Space heating requirement	438.4218	355.8975	298.1203	168.3283	75.6696	0.0000	0.0000	0.0000	0.0000	141.1124	288.8037	439.4639	(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)	484.4440	393.2569	329.4147	185.9981	83.6128	0.0000	0.0000	0.0000	0.0000	155.9254	319.1201	485.5955	(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	89.6368	89.5871	89.4406	89.1057	88.5023	87.3000	87.3000	87.3000	87.3000	88.9360	89.4279	87.3000	(216)
Fuel for water heating, kWh/month	174.2930	152.9501	159.1225	140.7187	137.0436	121.5297	114.2420	128.7793	129.6304	146.3267	156.9553	169.2405	(219)
Water heating fuel used													1730.8318 (219)
Annual totals kWh/year													
Space heating fuel - main system													2437.3675 (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													4600.3252 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2437.3675	3.7400	91.1575 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1730.8318	3.7400	64.7331 (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			332.5131 (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	2437.3675	0.2160	526.4714 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1730.8318	0.2160	373.8597 (264)
Space and water heating			900.3311 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	357.1259	0.5190	185.3483 (268)
Total kg/year			1124.6044 (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	2437.3675	1.2200	2973.5883 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1730.8318	1.2200	2111.6148 (264)
Space and water heating			5085.2032 (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			6411.8296 (272)
Primary energy kWh/m2/year			92.5228 (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	£250	£250	£0
Space heating	£199	£199	£0
Water heating	£65	£65	£0
Lighting	£68	£68	£0
Total cost of fuels	£333	£333	£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	93 kWh/m ²	93 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	100 - PRJ011855	Issued on Date	02/08/2021	
Assessment Reference	100 S	Prop Type Ref	Sinclair	
Property	Plot 100			
SAP Rating	83 B	DER	18.87	
		TER	19.45	
Environmental	86 B	% DER<TER	3.00	
CO₂ Emissions (t/year)	1.12	DFEE	44.23	
		TFEE	51.91	
General Requirements Compliance	Pass	% DFEE<TFEE	14.79	
Assessor Details	Mr. Michael Jukes, Michael Jukes, Tel: 02033971373, michael@briaryenergy.co.uk		Assessor ID	T850-0001
Client				

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)	19.45	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	18.87	kgCO ₂ /m ²	Pass
	-0.58 (-3.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.91	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.23	kWh/m ² /yr	
	-7.7 (-14.8%)	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 East

3.44 m², No overhang

Windows facing South West

3.36 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.