

PREDICTED ENERGY ASSESSMENT



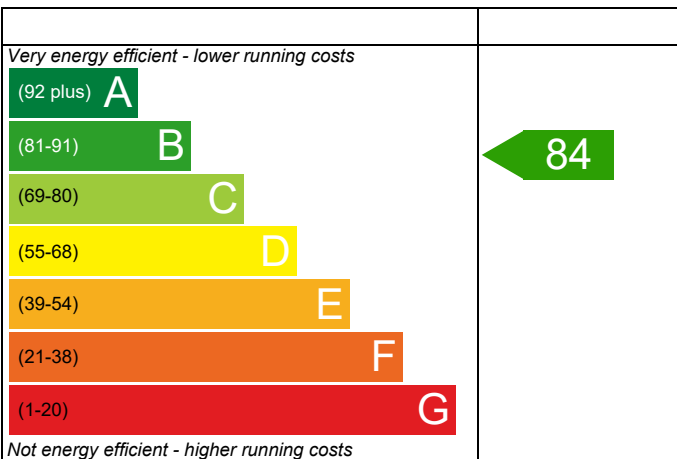
Plot 90

Dwelling type: House, Mid-Terrace
 Date of assessment: 27/04/2021
 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.

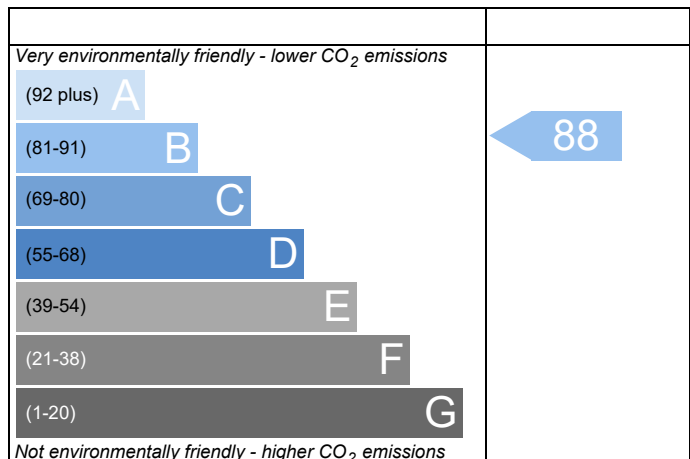
Energy Efficiency Rating



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	090 - PRJ011661		Issued on Date	27/04/2021	
Assessment Reference	090 M	Prop Type Ref	Sinclair		
Property	Plot 90				
SAP Rating	84 B	DER	16.79	TER	17.84
Environmental	88 B	% DER<TER	5.87		
CO ₂ Emissions (t/year)	1.01	DFEE	35.67	TFEE	43.28
General Requirements Compliance	Pass	% DFEE<TFEE	17.59		
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)	17.84	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.79	kgCO ₂ /m ²	Pass
	-1.05 (-5.9%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	43.28	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	35.67	kWh/m ² /yr	
	-7.6 (-17.6%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.19 (max. 0.25)	0.19 (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 (Midlands)

Not significant

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

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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	090 - PRJ011661	Issued on Date	27/04/2021
Assessment Reference	090 M	Prop Type Ref	Sinclair
Property	Plot 90		

SAP Rating	84 B	DER	16.79	TER	17.84
Environmental	88 B	% DER<TER	5.87		
CO ₂ Emissions (t/year)	1.01	DFEE	35.67	TTEE	43.28
General Requirements Compliance	Pass	% DFEE<TTEE	17.59		

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					2 (19)							
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)							
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.4148 (21)							
Wind speed	Jan 4.5000	Feb 4.5000	Mar 4.4000	Apr 3.9000	May 3.8000	Jun 3.4000	Jul 3.3000	Aug 3.3000	Sep 3.5000	Oct 3.8000	Nov 3.9000	Dec 4.1000 (22)
Wind factor	1.1250	1.1250	1.1000	0.9750	0.9500	0.8500	0.8250	0.8250	0.8750	0.9500	0.9750	1.0250 (22a)
Adj infilt rate	0.4667	0.4667	0.4563	0.4045	0.3941	0.3526	0.3422	0.3422	0.3630	0.3941	0.4045	0.4252 (22b)
Effective ac	0.6089	0.6089	0.6041	0.5818	0.5777	0.5622	0.5586	0.5586	0.5659	0.5777	0.5818	0.5904 (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	0.1900	6.5835	75.6000	2619.5400 (28a)
Brick Wall	41.3100	10.8600	30.4500	0.2400	7.3080	39.3600	1198.5121 (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)			110.6100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.8275		(33)
Party Wall			79.2500	0.0000	0.0000	54.0300	4281.8775 (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) = 9888.9682 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							142.6980 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.7300 (36)
Total fabric heat loss							(33) + (36) = 35.5575 (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 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	33.8373	33.8373	33.5713	32.3312	32.1011	31.2404	31.0402	31.0402	31.4466	32.1011	32.3312	32.8093 (38)
Heat transfer coeff	69.3949	69.3949	69.1289	67.8887	67.6586	66.7979	66.5977	66.5977	67.0041	67.6586	67.8887	68.3668 (39)
Average = Sum(39)m / 12 =												67.8648 (39)
HLP	1.0014	1.0014	0.9975	0.9796	0.9763	0.9639	0.9610	0.9610	0.9669	0.9763	0.9796	0.9865 (40)
HLP (average)												0.9793 (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)
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)
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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts	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						
North	3.3600	11.3201	0.4700	0.0000	0.7700	13.7651 (74)						
South	3.4400	49.0238	0.4700	0.0000	0.7700	61.0315 (78)						
Solar gains	74.7966	128.1467	175.2276	224.7681	242.7441	263.7505	243.7611	223.2934	196.9614	144.9979	100.5381	70.9885 (83)
Total gains	583.8205	632.5282	659.3969	678.1143	664.8907	658.1860	622.2949	610.1175	601.8231	580.8817	570.5793	566.5245 (84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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	39.5841	39.5841	39.7364	40.4623	40.5999	41.1231	41.2467	41.2467	40.9965	40.5999	40.4623	40.1794
alpha	3.6389	3.6389	3.6491	3.6975	3.7067	3.7415	3.7498	3.7498	3.7331	3.7067	3.6975	3.6786
util living area	0.9573	0.9420	0.9119	0.8527	0.7608	0.5828	0.4557	0.4732	0.6815	0.8588	0.9321	0.9609 (86)
MIT	19.7167	19.8700	20.1561	20.4912	20.7488	20.9340	20.9795	20.9762	20.8727	20.5442	20.1136	19.7022 (87)
Th 2	20.0822	20.0822	20.0854	20.1003	20.1031	20.1135	20.1160	20.1160	20.1110	20.1031	20.1003	20.0946 (88)
util rest of house	0.9500	0.9323	0.8966	0.8266	0.7168	0.5132	0.3702	0.3873	0.6188	0.8293	0.9191	0.9542 (89)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF HEAT DEMAND 09 Jan 2014

MIT 2	18.9260	19.0752	19.3552	19.6848	19.9196	20.0765	20.1078	20.1062	20.0310	19.7411	19.3295	18.9216 (90)
Living area fraction									fLA = Living area / (4) =			0.2127 (91)
MIT	19.0942	19.2443	19.5256	19.8563	20.0960	20.2589	20.2932	20.2912	20.2100	19.9119	19.4963	19.0877 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.9442	19.0943	19.3756	19.7063	19.9460	20.1089	20.1432	20.1412	20.0600	19.7619	19.3463	18.9377 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9387	0.9195	0.8826	0.8135	0.7083	0.5128	0.3729	0.3898	0.6149	0.8163	0.9060	0.9435 (94)
Useful gains	548.0289	581.6398	581.9668	551.6713	470.9490	337.5399	232.0698	237.8466	370.0541	474.1898	516.9270	534.5375 (95)
Ext temp.	4.3000	4.8000	6.6000	9.0000	11.8000	14.8000	16.6000	16.5000	14.0000	10.5000	7.1000	4.2000 (96)
Heat loss rate W												
1016.2290	991.9487	883.1600	726.8356	551.1445	354.6214	235.9691	242.4981	406.0451	626.6499	831.3846	1007.5675 (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												
348.3409	275.7276	224.0878	126.1183	59.6654	0.0000	0.0000	0.0000	0.0000	113.4303	226.4095	351.9344 (98)	
Space heating												1725.7141 (98)
RHI space heating demand												1726 (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					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.4148 (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	0.5289	0.5185	0.5082	0.4563	0.4459	0.3941	0.3941	0.3837	0.4148	0.4459	0.4667	0.4874 (22b)
	0.6399	0.6344	0.6291	0.6041	0.5994	0.5777	0.5777	0.5736	0.5860	0.5994	0.6089	0.6188 (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	0.1900	6.5835	75.6000	2619.5400 (28a)
Brick Wall	41.3100	10.8600	30.4500	0.2400	7.3080	39.3600	1198.5121 (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)			110.6100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.8275		(33)
Party Wall			79.2500	0.0000	0.0000	54.0300	4281.8775 (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) = 9888.9682 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							142.6980 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.7300 (36)
Total fabric heat loss							(33) + (36) = 35.5575 (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	35.5586	35.2568	34.9609	33.5713	33.3114	32.1011	32.1011	31.8769	32.5672	33.3114	33.8373	34.3872 (38)
Average = Sum(39)m / 12 =	71.1162	70.8143	70.5185	69.1289	68.8689	67.6586	67.6586	67.4345	68.1248	68.8689	69.3949	69.9447 (39)
												69.1276 (39)
HLP	1.0262	1.0219	1.0176	0.9975	0.9938	0.9763	0.9763	0.9731	0.9830	0.9938	1.0014	1.0093 (40)
HLP (average)												0.9975 (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	38.6260	38.7907	38.9534	39.7364	39.8864	40.5999	40.5999	40.7349	40.3221	39.8864	39.5841	39.2730	
alpha	3.5751	3.5860	3.5969	3.6491	3.6591	3.7067	3.7067	3.7157	3.6881	3.6591	3.6389	3.6182	
util living area	0.9590	0.9443	0.9192	0.8678	0.7759	0.6232	0.4742	0.5021	0.6958	0.8658	0.9384	0.9636	(86)
MIT	19.6593	19.8295	20.0904	20.4317	20.7181	20.9121	20.9755	20.9693	20.8603	20.5191	20.0509	19.6370	(87)
Th 2	20.0616	20.0652	20.0687	20.0854	20.0885	20.1031	20.1031	20.1058	20.0975	20.0885	20.0822	20.0756	(88)
util rest of house	0.9518	0.9347	0.9048	0.8433	0.7329	0.5539	0.3850	0.4137	0.6318	0.8366	0.9263	0.9573	(89)
MIT 2	18.8538	19.0227	19.2791	19.6179	19.8808	20.0520	20.0933	20.0928	20.0099	19.7066	19.2549	18.8430	(90)
Living area fraction												fLA = Living area / (4) = 0.2127 (91)	
MIT	19.0252	19.1943	19.4516	19.7910	20.0589	20.2349	20.2809	20.2792	20.1908	19.8794	19.4242	19.0119	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.8752	19.0443	19.3016	19.6410	19.9089	20.0849	20.1309	20.1292	20.0408	19.7294	19.2742	18.8619	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9405	0.9219	0.8907	0.8296	0.7235	0.5524	0.3879	0.4161	0.6274	0.8233	0.9133	0.9467	(94)
Useful gains	545.6516	575.6387	576.7953	545.8934	474.6471	347.6529	234.1950	245.2816	365.2704	467.7134	506.8639	526.9547	(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	1036.5305	1001.6181	902.7527	742.5121	565.3368	371.1022	238.8988	251.4793	404.7128	628.7342	844.8277	1025.5218	(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	365.2139	286.2581	242.5123	141.5655	67.4732	0.0000	0.0000	0.0000	0.0000	119.7995	243.3339	370.9340	(98)
Space heating												1837.0905 (98)	
Space heating per m ²												(98) / (4) = 26.5092 (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													2029.9342 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	365.2139	286.2581	242.5123	141.5655	67.4732	0.0000	0.0000	0.0000	0.0000	119.7995	243.3339	370.9340	(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)	403.5513	316.3073	267.9694	156.4260	74.5560	0.0000	0.0000	0.0000	0.0000	132.3751	268.8773	409.8718	(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	89.5169	89.4387	89.2896	88.9682	88.4175	87.3000	87.3000	87.3000	87.3000	88.8051	89.3025	87.3000	(216)
Fuel for water heating, kWh/month	174.5264	153.2039	159.3917	140.9360	137.1750	121.5297	114.2420	128.7793	129.6304	146.5424	157.1757	169.4473	(219)
Water heating fuel used													1732.5797 (219)
Annual totals kWh/year													
Space heating fuel - main system													2029.9342 (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													4194.6398 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2029.9342	3.4800	70.6417 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1732.5797	3.4800	60.2938 (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			307.9329 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.1315 (257)
SAP value		84.2154
SAP rating (Section 12)		84 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2029.9342	0.2160	438.4658 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1732.5797	0.2160	374.2372 (264)
Space and water heating			812.7030 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	357.1259	0.5190	185.3483 (268)
Total kg/year			1036.9763 (272)
CO2 emissions per m2			14.9600 (273)
EI value			87.8430
EI rating			88 (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	$3.48 / 0.8854 = 3.930$, stars = 4
Water heating environmental impact	$0.216 / 0.8854 = 0.2440$, 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					2 (19)							
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)							
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.4148 (21)							
Wind speed	Jan 4.5000	Feb 4.5000	Mar 4.4000	Apr 3.9000	May 3.8000	Jun 3.4000	Jul 3.3000	Aug 3.3000	Sep 3.5000	Oct 3.8000	Nov 3.9000	Dec 4.1000 (22)
Wind factor	1.1250	1.1250	1.1000	0.9750	0.9500	0.8500	0.8250	0.8250	0.8750	0.9500	0.9750	1.0250 (22a)
Adj infilt rate	0.4667	0.4667	0.4563	0.4045	0.3941	0.3526	0.3422	0.3422	0.3630	0.3941	0.4045	0.4252 (22b)
Effective ac	0.6089	0.6089	0.6041	0.5818	0.5777	0.5622	0.5586	0.5586	0.5659	0.5777	0.5818	0.5904 (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	0.1900	6.5835	75.6000	2619.5400 (28a)
Brick Wall	41.3100	10.8600	30.4500	0.2400	7.3080	39.3600	1198.5121 (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)			110.6100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.8275		(33)
Party Wall			79.2500	0.0000	0.0000	54.0300	4281.8775 (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) = 9888.9682 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							142.6980 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.7300 (36)
Total fabric heat loss							(33) + (36) = 35.5575 (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	33.8373	33.8373	33.5713	32.3312	32.1011	31.2404	31.0402	31.0402	31.4466	32.1011	32.3312	32.8093 (38)
Average = Sum(39)m / 12 =	69.3949	69.3949	69.1289	67.8887	67.6586	66.7979	66.5977	66.5977	67.0041	67.6586	67.8887	68.3668 (39)
HLP	1.0014	1.0014	0.9975	0.9796	0.9763	0.9639	0.9610	0.9610	0.9669	0.9763	0.9796	0.9865 (40)
HLP (average)												0.9793 (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	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	Solar flux	Specific data	FF	Access	Gains					
		m ²	Table 6a	g	Specific data	factor	W					
			W/m ²	or Table 6b	or Table 6c	Table 6d						
North		3.3600	11.3201	0.4700	0.0000	0.7700	13.7651 (74)					
South		3.4400	49.0238	0.4700	0.0000	0.7700	61.0315 (78)					
Solar gains	74.7966	128.1467	175.2276	224.7681	242.7441	263.7505	243.7611	223.2934	196.9614	144.9979	100.5381	70.9885 (83)
Total gains	583.8205	632.5282	659.3969	678.1143	664.8907	658.1860	622.2949	610.1175	601.8231	580.8817	570.5793	566.5245 (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	39.5841	39.5841	39.7364	40.4623	40.5999	41.1231	41.2467	41.2467	40.9965	40.5999	40.4623	40.1794	
alpha	3.6389	3.6389	3.6491	3.6975	3.7067	3.7415	3.7498	3.7498	3.7331	3.7067	3.6975	3.6786	
util living area	0.9573	0.9420	0.9119	0.8527	0.7608	0.5828	0.4557	0.4732	0.6815	0.8588	0.9321	0.9609 (86)	
MIT	19.7167	19.8700	20.1561	20.4912	20.7488	20.9340	20.9795	20.9762	20.8727	20.5442	20.1136	19.7022 (87)	
Th 2	20.0822	20.0822	20.0854	20.1003	20.1031	20.1135	20.1160	20.1160	20.1110	20.1031	20.1003	20.0946 (88)	
util rest of house	0.9500	0.9323	0.8966	0.8266	0.7168	0.5132	0.3702	0.3873	0.6188	0.8293	0.9191	0.9542 (89)	
MIT 2	18.9260	19.0752	19.3552	19.6848	19.9196	20.0765	20.1078	20.1062	20.0310	19.7411	19.3295	18.9216 (90)	
Living area fraction												fLA = Living area / (4) = 0.2127 (91)	
MIT	19.0942	19.2443	19.5256	19.8563	20.0960	20.2589	20.2932	20.2912	20.2100	19.9119	19.4963	19.0877 (92)	
Temperature adjustment												-0.1500	
adjusted MIT	18.9442	19.0943	19.3756	19.7063	19.9460	20.1089	20.1432	20.1412	20.0600	19.7619	19.3463	18.9377 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9387	0.9195	0.8826	0.8135	0.7083	0.5128	0.3729	0.3898	0.6149	0.8163	0.9060	0.9435 (94)	
Useful gains	548.0289	581.6398	581.9668	551.6713	470.9490	337.5399	232.0698	237.8466	370.0541	474.1898	516.9270	534.5375 (95)	
Ext temp.	4.3000	4.8000	6.6000	9.0000	11.8000	14.8000	16.6000	16.5000	14.0000	10.5000	7.1000	4.2000 (96)	
Heat loss rate W	1016.2290	991.9487	883.1600	726.8356	551.1445	354.6214	235.9691	242.4981	406.0451	626.6499	831.3846	1007.5675 (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	348.3409	275.7276	224.0878	126.1183	59.6654	0.0000	0.0000	0.0000	0.0000	113.4303	226.4095	351.9344 (98)	
Space heating												1725.7141 (98)	
Space heating per m2												(98) / (4) = 24.9021 (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													1906.8664 (211)
Space heating requirement	348.3409	275.7276	224.0878	126.1183	59.6654	0.0000	0.0000	0.0000	0.0000	113.4303	226.4095	351.9344	(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)	384.9071	304.6713	247.6108	139.3572	65.9286	0.0000	0.0000	0.0000	0.0000	125.3374	250.1762	388.8777	(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	89.4844	89.4120	89.2296	88.8758	88.3298	87.3000	87.3000	87.3000	87.3000	88.7616	89.2480	87.3000	(216)
Fuel for water heating, kWh/month	174.5898	153.2498	159.4989	141.0826	137.3111	121.5297	114.2420	128.7793	129.6304	146.6141	157.2716	169.5146	(219)
Water heating fuel used													1733.3139 (219)
Annual totals kWh/year													
Space heating fuel - main system													1906.8664 (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													4072.3061 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1906.8664	3.8700	73.7957 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1733.3139	3.8700	67.0792 (247)
Pumps and fans for heating	75.0000	18.9000	14.1750 (249)
Energy for lighting	357.1259	18.9000	67.4968 (250)
Additional standing charges			93.0000 (251)
Total energy cost			315.5468 (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	1906.8664	0.2160	411.8831 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1733.3139	0.2160	374.3958 (264)
Space and water heating			786.2789 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	357.1259	0.5190	185.3483 (268)
Total kg/year			1010.5523 (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	1906.8664	1.2200	2326.3770 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1733.3139	1.2200	2114.6429 (264)
Space and water heating			4441.0199 (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			5767.6463 (272)
Primary energy kWh/m2/year			83.2272 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 84
 Current environmental impact rating: B 88

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 84	
Potential environmental impact rating:			B 88

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

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

	Current	Potential	Saving
Electricity	£82	£82	£0
Mains gas	£234	£234	£0
Space heating	£181	£181	£0
Water heating	£67	£67	£0
Lighting	£67	£67	£0
Total cost of fuels	£316	£316	£0
Total cost of uses	£315	£315	£0
Delivered energy	59 kWh/m ²	59 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	1.0 tonnes	1.0 tonnes	0.0 tonnes
CO2 emissions per m ²	15 kg/m ²	15 kg/m ²	0 kg/m ²
Primary energy	83 kWh/m ²	83 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	090 - PRJ011661	Issued on Date	27/04/2021
Assessment Reference	090 M	Prop Type Ref	Sinclair
Property	Plot 90		

SAP Rating	84 B	DER	16.79	TER	17.84
Environmental	88 B	% DER<TER	5.87		
CO₂ Emissions (t/year)	1.01	DFEE	35.67	TFEE	43.28
General Requirements Compliance	Pass	% DFEE<TFEE	17.59		

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)	17.84	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.79	kgCO ₂ /m ²	Pass
	-1.05 (-5.9%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	43.28	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	35.67	kWh/m ² /yr	
	-7.6 (-17.6%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.19 (max. 0.25)	0.19 (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 (Midlands)

Not significant

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

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