

# PREDICTED ENERGY ASSESSMENT



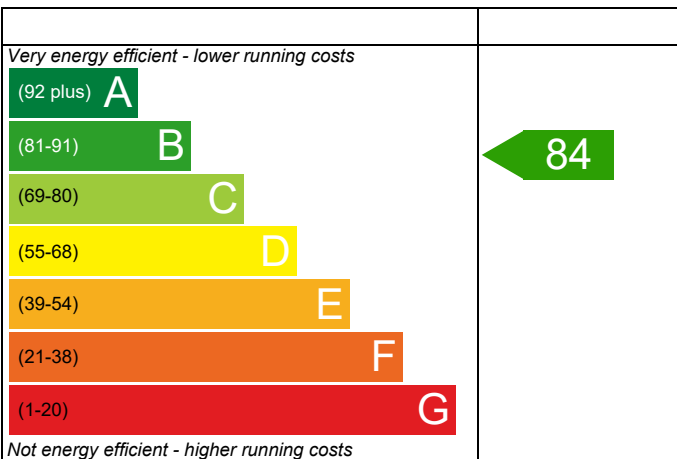
Plot 156

Dwelling type: House, Semi-Detached  
 Date of assessment: 02/08/2021  
 Produced by: Michael Juckes  
 Total floor area: 82.22 m<sup>2</sup>

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

The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO<sub>2</sub>) emissions.

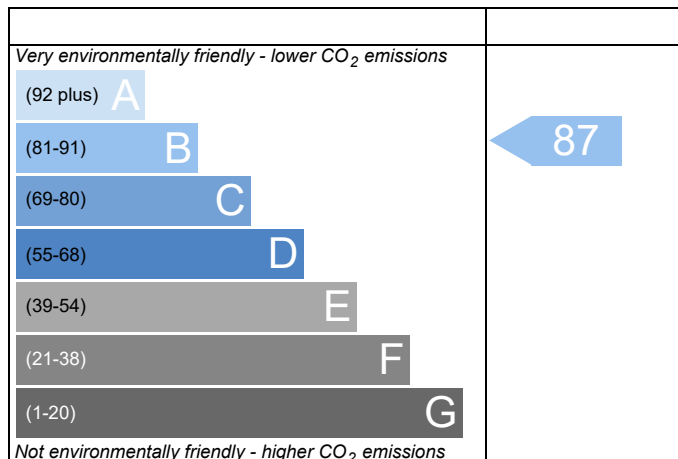
## Energy Efficiency Rating



**England** EU Directive 2002/91/EC

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

## Environmental Impact (CO<sub>2</sub>) Rating



**England** EU Directive 2002/91/EC

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO<sub>2</sub>) emissions. The higher the rating the less impact it has on the environment.

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# BUILDING REGULATION COMPLIANCE

## Calculation Type: New Build (As Designed)



Property Reference	156 - PRJ011855		Issued on Date	02/08/2021	
Assessment Reference	156 S	Prop Type Ref	Storer		
Property	Plot 156				
SAP Rating	84 B	DER	16.75	TER	18.01
Environmental	87 B	% DER<TER	6.99		
CO <sub>2</sub> Emissions (t/year)	1.19	DFEE	42.34	TREE	50.28
General Requirements Compliance	Pass	% DFEE<TFEE	15.79		
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 TFE rate

##### 1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	18.01	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	16.75	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-1.26 (-7.0%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFE and DFEE

Target Fabric Energy Efficiency (TFEE)	50.28	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	42.34	kWh/m <sup>2</sup> /yr	
	-8.0 (-15.9%)	kWh/m <sup>2</sup> /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	1.29 (max. 2.00)	1.30 (max. 3.30)	Pass

##### 2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

##### 3 Air permeability

Air permeability at 50 pascals	5.01 (design value)	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa	
Maximum	10.0	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 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 30  
Combi boiler  
Efficiency: 89.6% SEDBUK2009  
Minimum: 88.0%

Pass

Secondary heating system

None

### 5 Cylinder insulation

Hot water storage

No cylinder

### 6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

### 7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

### 8 Mechanical ventilation

Not applicable

## Criterion 3 – Limiting the effects of heat gains in summer

### 9 Summertime temperature

Overheating risk (East Anglia)

Slight

Pass

Based on:

Overshading

Average

Windows facing South East

3.06 m<sup>2</sup>, No overhang

Windows facing South West

6.63 m<sup>2</sup>, No overhang

Windows facing North West

2.70 m<sup>2</sup>, No overhang

Air change rate

4.55 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/m<sup>2</sup>K

Pass

### Air permeability and pressure testing

#### 3 Air permeability

Air permeability at 50 pascals

5.01 (design value) m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Maximum

10.0 m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Pass

### 10 Key features

Party wall U-value

0.00 W/m<sup>2</sup>K

Roof U-value

0.10 W/m<sup>2</sup>K

Thermal bridging  $\gamma$ -value

0.027 W/m<sup>2</sup>K

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# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



Property Reference	156 - PRJ011855	Issued on Date	02/08/2021
Assessment Reference	156 S	Prop Type Ref	Storer
Property	Plot 156		

SAP Rating	84 B	DER	16.75	TER	18.01
Environmental	87 B	% DER<TER	6.99		
CO <sub>2</sub> Emissions (t/year)	1.19	DFEE	42.34	TTEE	50.28
General Requirements Compliance	Pass	% DFEE<TTEE	15.79		

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 <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	41.1100 (1b)	x 2.3300 (2b)	= 95.7863 (1b) - (3b)
First floor	41.1100 (1c)	x 2.5300 (2c)	= 104.0083 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.2200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 199.7946 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m <sup>3</sup> 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				3 * 10 =	30.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)				30.0000 / (5) =	0.1502 (8)
Pressure test				Yes	
Measured/design AP50				5.0100	
Infiltration rate				0.4007 (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) =		0.3706 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.8000	4.7000	4.2000	4.2000	3.7000	3.8000	3.8000	4.0000	4.2000	4.3000	4.5000 (22)
Wind factor	1.2250	1.2000	1.1750	1.0500	1.0500	0.9250	0.9500	0.9500	1.0000	1.0500	1.0750	1.1250 (22a)
Adj infiltr rate	0.4540	0.4447	0.4355	0.3891	0.3891	0.3428	0.3521	0.3521	0.3706	0.3891	0.3984	0.4169 (22b)
Effective ac	0.6031	0.5989	0.5948	0.5757	0.5757	0.5588	0.5620	0.5620	0.5687	0.5757	0.5794	0.5869 (25)

#### 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K
Windows (Uw = 1.30)			12.3900	1.2357	15.3108		(27)
Solid Door			2.1000	1.2000	2.5200		(26)
Half Glazed Door			1.9600	1.3000	2.5480		(26a)
F1r - Ground			41.1060	0.2200	9.0433	75.6000	3107.6136 (28a)
W1 - Brick	88.2260	16.4510	71.7750	0.2400	17.2260	39.3600	2825.0640 (29a)
Rf - Ins Joist	41.1060		41.1060	0.1000	4.1106	7.6200	313.2277 (30)
Total net area of external elements Aum(A, m <sup>2</sup> )			170.4370				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	50.7588		(33)
Party Wall			42.0580	0.0000	0.0000	54.0300	2272.3937 (32)
Ground Floor Stud			70.1568			5.8200	408.3126 (32c)
1st Floor Stud			102.8297			5.8200	598.4690 (32c)
Internal Floor			41.1000			18.0000	739.8000 (32d)
Internal Ceiling			41.1000			5.8200	239.2020 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10504.0827 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							127.7558 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6684 (36)
Total fabric heat loss						(33) + (36) =	55.4272 (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	39.7607	39.4862	39.2174	37.9580	37.9580	36.8402	37.0525	37.0525	37.4939	37.9580	38.1986	38.6966 (38)
Heat transfer coeff	95.1879	94.9134	94.6445	93.3852	93.3852	92.2674	92.4796	92.4796	92.9211	93.3852	93.6258	94.1238 (39)
Average = Sum(39)m / 12 =												93.5666 (39)
HLP	1.1577	1.1544	1.1511	1.1358	1.1358	1.1222	1.1248	1.1248	1.1302	1.1358	1.1387	1.1448 (40)
HLP (average)												1.1380 (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												2.5036 (42)
Average daily hot water use (litres/day)												93.6613 (43)
Daily hot water use	103.0275	99.2810	95.5346	91.7881	88.0417	84.2952	84.2952	88.0417	91.7881	95.5346	99.2810	103.0275 (44)
Energy conte	152.7868	133.6283	137.8924	120.2179	115.3520	99.5400	92.2384	105.8449	107.1091	124.8253	136.2566	147.9658 (45)
Energy content (annual)												Total = Sum(45)m = 1473.6575 (45)
Distribution loss (46)m = $0.15 \times (45)m$	22.9180	20.0442	20.6839	18.0327	17.3028	14.9310	13.8358	15.8767	16.0664	18.7238	20.4385	22.1949 (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	14.6753	13.2391	14.6121	14.0893	14.5216	14.0100	14.4502	14.4965	14.0532	14.5747	14.1641	14.6608 (61)
Total heat required for water heating calculated for each month	167.4620	146.8674	152.5045	134.3073	129.8736	113.5500	106.6886	120.3414	121.1623	139.4000	150.4207	162.6266 (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	167.4620	146.8674	152.5045	134.3073	129.8736	113.5500	106.6886	120.3414	121.1623	139.4000	150.4207	162.6266 (64)
Total per year (kWh/year) = Sum(64)m =												1645.2043 (64)
RHI water heating demand												1645 (64)
Heat gains from water heating, kWh/month	54.4704	47.7412	49.5023	43.4948	41.9849	36.5996	34.2818	38.8176	39.1271	45.1481	48.8463	52.8638 (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	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	52.7264	46.8311	38.0856	28.8333	21.5532	18.1961	19.6616	25.5568	34.3023	43.5547	50.8348	54.1918 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	334.3547	337.8243	329.0811	310.4679	286.9721	264.8894	250.1368	246.6672	255.4104	274.0236	297.5194	319.6021 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254 (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)	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454 (71)
Water heating gains (Table 5)	73.2129	71.0434	66.5353	60.4094	56.4314	50.8327	46.0777	52.1741	54.3432	60.6829	67.8421	71.0535 (72)
Total internal gains	565.8922	561.2969	539.3001	505.3088	470.5548	439.5164	421.4742	429.9964	449.6540	483.8593	521.7944	550.4456 (73)

#### 6. Solar gains

[Jan]	Area m <sup>2</sup>	Solar flux Table 6a W/m <sup>2</sup>	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
Southeast	3.0600	40.9830	0.4700	0.0000	0.7700	45.3852 (77)						
Southwest	6.6320	40.9830	0.4700	0.0000	0.7700	98.3642 (79)						
Northwest	2.7000	12.9465	0.4700	0.0000	0.7700	12.6504 (81)						
Solar gains	156.3998	252.1576	349.5269	473.9478	529.1136	555.1656	526.7765	474.0043	407.5279	294.1799	192.6843	132.0763 (83)
Total gains	722.2920	813.4546	888.8270	979.2565	999.6685	994.6820	948.2507	904.0007	857.1819	778.0392	714.4787	682.5219 (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	30.6531	30.7417	30.8291	31.2448	31.2448	31.6233	31.5507	31.5507	31.4008	31.2448	31.1645	30.9996
alpha	3.0435	3.0494	3.0553	3.0830	3.0830	3.1082	3.1034	3.1034	3.0934	3.0830	3.0776	3.0666
util living area	0.9454	0.9226	0.8788	0.7887	0.6624	0.4845	0.3243	0.3391	0.5778	0.8057	0.9140	0.9519 (86)
MIT	19.3861	19.6070	19.9875	20.4361	20.7539	20.9347	20.9870	20.9853	20.8835	20.4958	19.8936	19.3504 (87)
Th 2	19.9540	19.9567	19.9593	19.9717	19.9717	19.9827	19.9806	19.9806	19.9763	19.9717	19.9693	19.9644 (88)
util rest of house												

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF HEAT DEMAND 09 Jan 2014

MIT 2	0.9362	0.9101	0.8588	0.7546	0.6076	0.4075	0.2303	0.2412	0.4994	0.7657	0.8976	0.9437 (89)
Living area fraction	18.5127	18.7288	19.0971	19.5248	19.8027	19.9498	19.9772	19.9767	19.9120	19.5889	19.0213	18.4862 (90)
MIT	18.7002	18.9173	19.2883	19.7204	20.0069	20.1612	20.1940	20.1932	20.1206	19.7836	19.2085	18.6717 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.5502	18.7673	19.1383	19.5704	19.8569	20.0112	20.0440	20.0432	19.9706	19.6336	19.0585	18.5217 (93)

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9206	0.8925	0.8402	0.7396	0.6010	0.4097	0.2362	0.2474	0.4990	0.7506	0.8798	0.9291 (94)
Useful gains	664.9440	726.0188	746.8110	724.2572	600.7637	407.5371	224.0045	223.6492	427.7004	583.9957	628.5675	634.1315 (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	1318.3732	1287.7188	1148.8210	940.4295	687.0260	425.4660	226.0200	225.9498	461.8713	768.8945	1063.4520	1300.9553 (97)
Space heating kWh	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	486.1514	377.4624	299.0955	155.6440	64.1792	0.0000	0.0000	0.0000	0.0000	137.5647	313.1168	496.1169 (98)
RHI space heating demand												2329.3309 (98)
												2329 (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 <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	41.1100 (1b)	x 2.3300 (2b)	= 95.7863 (1b) - (3b)
First floor	41.1100 (1c)	x 2.5300 (2c)	= 104.0083 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.2200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 199.7946 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m <sup>3</sup> 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				3 * 10 =	30.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)				30.0000 / (5) =	0.1502 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.4007 (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) =		0.3706 (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	0.4725	0.4633	0.4540	0.4077	0.3984	0.3521	0.3521	0.3428	0.3706	0.3984	0.4169	0.4355 (22b)
	0.6116	0.6073	0.6031	0.5831	0.5794	0.5620	0.5620	0.5588	0.5687	0.5794	0.5869	0.5948 (25)

#### 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K
Windows (Uw = 1.30)			12.3900	1.2357	15.3108		(27)
Solid Door			2.1000	1.2000	2.5200		(26)
Half Glazed Door			1.9600	1.3000	2.5480		(26a)
Flr - Ground			41.1060	0.2200	9.0433	75.6000	3107.6136 (28a)
Wl - Brick	88.2260	16.4510	71.7750	0.2400	17.2260	39.3600	2825.0640 (29a)
Rf - Ins Joist	41.1060		41.1060	0.1000	4.1106	7.6200	313.2277 (30)
Total net area of external elements Aum(A, m <sup>2</sup> )			170.4370				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	50.7588		(33)
Party Wall			42.0580	0.0000	0.0000	54.0300	2272.3937 (32)
Ground Floor Stud			70.1568			5.8200	408.3126 (32c)
1st Floor Stud			102.8297			5.8200	598.4690 (32c)
Internal Floor			41.1000			18.0000	739.8000 (32d)
Internal Ceiling			41.1000			5.8200	239.2020 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10504.0827 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							127.7558 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6684 (36)
Total fabric heat loss						(33) + (36) =	55.4272 (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	40.3267	40.0409	39.7607	38.4448	38.1986	37.0525	37.0525	36.8402	37.4939	38.1986	38.6966	39.2174 (38)
Average = Sum(39)m / 12 =	95.7538	95.4680	95.1879	93.8720	93.6258	92.4796	92.4796	92.2674	92.9211	93.6258	94.1238	94.6445 (39)
												93.8708 (39)
HLP	1.1646	1.1611	1.1577	1.1417	1.1387	1.1248	1.1248	1.1222	1.1302	1.1387	1.1448	1.1511 (40)
HLP (average)												1.1417 (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												2.5036 (42)
Average daily hot water use (litres/day)												93.6613 (43)
Daily hot water use	103.0275	99.2810	95.5346	91.7881	88.0417	84.2952	84.2952	88.0417	91.7881	95.5346	99.2810	103.0275 (44)
Energy conte	152.7868	133.6283	137.8924	120.2179	115.3520	99.5400	92.2384	105.8449	107.1091	124.8253	136.2566	147.9658 (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 =	1473.6575 (45)
Distribution loss (46)m = 0.15 x (45)m														
	22.9180	20.0442	20.6839	18.0327	17.3028	14.9310	13.8358	15.8767	16.0664	18.7238	20.4385	22.1949	22.1949	(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	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	0.0000	(57)
Combi loss	14.6753	13.2391	14.6121	14.0893	14.5216	14.0100	14.4502	14.4965	14.0532	14.5747	14.1641	14.6608	14.6608	(61)
Total heat required for water heating calculated for each month	167.4620	146.8674	152.5045	134.3073	129.8736	113.5500	106.6886	120.3414	121.1623	139.4000	150.4207	162.6266	162.6266	(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	0.0000	(63)
Solar input (sum of months) = Sum(63)m =													0.0000 (63)	
Output from w/h	167.4620	146.8674	152.5045	134.3073	129.8736	113.5500	106.6886	120.3414	121.1623	139.4000	150.4207	162.6266	162.6266	(64)
Total per year (kWh/year) = Sum(64)m =													1645.2043 (64)	
Heat gains from water heating, kWh/month	54.4704	47.7412	49.5023	43.4948	41.9849	36.5996	34.2818	38.8176	39.1271	45.1481	48.8463	52.8638	52.8638	(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	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	52.7264	46.8311	38.0856	28.8333	21.5532	18.1961	19.6616	25.5568	34.3023	43.5547	50.8348	54.1918	54.1918	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	334.3547	337.8243	329.0811	310.4679	286.9721	264.8894	250.1368	246.6672	255.4104	274.0236	297.5194	319.6021	319.6021	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	(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	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	(71)
Water heating gains (Table 5)	73.2129	71.0434	66.5353	60.4094	56.4314	50.8327	46.0777	52.1741	54.3432	60.6829	67.8421	71.0535	71.0535	(72)
Total internal gains	565.8922	561.2969	539.3001	505.3088	470.5548	439.5164	421.4742	429.9964	449.6540	483.8593	521.7944	550.4456	550.4456	(73)

#### 6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W								
Southeast	3.0600	36.7938	0.4700	0.0000	0.7700	40.7460 (77)								
Southwest	6.6320	36.7938	0.4700	0.0000	0.7700	88.3096 (79)								
Northwest	2.7000	11.2829	0.4700	0.0000	0.7700	11.0249 (81)								
Solar gains	140.0805	242.2710	341.2128	439.0831	506.6912	509.5729	488.5586	437.1192	374.9491	270.3837	168.4511	119.4482	119.4482	(83)
Total gains	705.9727	803.5680	880.5129	944.3919	977.2460	949.0893	910.0328	867.1155	824.6031	754.2430	690.2455	669.8938	669.8938	(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	30.4719	30.5631	30.6531	31.0828	31.1645	31.5507	31.5507	31.6233	31.4008	31.1645	30.9996	30.8291	30.8291	
alpha	3.0315	3.0375	3.0435	3.0722	3.0776	3.1034	3.1034	3.1082	3.0934	3.0776	3.0666	3.0553	3.0553	
util living area	0.9514	0.9282	0.8899	0.8191	0.7096	0.5603	0.4260	0.4608	0.6540	0.8413	0.9282	0.9575	0.9575	(86)
MIT	19.2805	19.5317	19.8916	20.3237	20.6689	20.8872	20.9640	20.9534	20.8092	20.3663	19.7549	19.2342	19.2342	(87)
Th 2	19.9484	19.9512	19.9540	19.9669	19.9693	19.9806	19.9806	19.9827	19.9763	19.9693	19.9644	19.9593	19.9593	(88)
util rest of house	0.9433	0.9166	0.8719	0.7891	0.6611	0.4881	0.3353	0.3692	0.5855	0.8085	0.9146	0.9503	0.9503	(89)
MIT 2	18.4050	18.6514	19.0011	19.4188	19.7300	19.9162	19.9665	19.9632	19.8578	19.4697	18.8836	18.3679	18.3679	(90)
Living area fraction													fLA = Living area / (4) =	
MIT	18.5929	18.8404	19.1923	19.6131	19.9315	20.1247	20.1806	20.1758	20.0621	19.6622	19.0706	18.5539	18.5539	(92)
Temperature adjustment													-0.1500	
adjusted MIT	18.4429	18.6904	19.0423	19.4631	19.7815	19.9747	20.0306	20.0258	19.9121	19.5122	18.9206	18.4039	18.4039	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	655.4088	722.6575	751.2862	729.5450	636.6450	462.8347	309.3038	323.6783	478.9270	596.9472	619.4859	627.3544	627.3544	(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	4.2000	(96)
Heat loss rate W	1354.2410	1316.5410	1193.8724	991.5771	756.6386	497.0472	317.2619	334.5392	540.0644	834.4097	1112.6044	1344.3219	1344.3219	(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	1.0000	(97a)
Space heating kWh	519.9312	399.0897	329.2842	188.6631	89.2752	0.0000	0.0000	0.0000	0.0000	176.6721	355.0454	533.4238	533.4238	(98)
Space heating													2591.3847 (98)	
Space heating per m2													(98) / (4) =	
													31.5177 (99)	



# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS 09 Jan 2014

8c. Space cooling requirement

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													2863.4085 (211)
Space heating requirement	519.9312	399.0897	329.2842	188.6631	89.2752	0.0000	0.0000	0.0000	0.0000	176.6721	355.0454	533.4238	(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)	574.5096	440.9831	363.8499	208.4675	98.6466	0.0000	0.0000	0.0000	0.0000	195.2178	392.3153	589.4185	(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	167.4620	146.8674	152.5045	134.3073	129.8736	113.5500	106.6886	120.3414	121.1623	139.4000	150.4207	162.6266	(64)
Efficiency of water heater (217)m	89.6990	89.6163	89.4620	89.1412	88.5759	87.3000	87.3000	87.3000	87.3000	89.0602	89.5235	89.7315	(217)
Fuel for water heating, kWh/month	186.6933	163.8846	170.4685	150.6680	146.6241	130.0687	122.2092	137.8481	138.7884	156.5233	168.0238	181.2369	(219)
Water heating fuel used													1853.0369 (219)
Annual totals kWh/year													
Space heating fuel - main system													2863.4085 (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)													372.4659 (232)
Total delivered energy for all uses													5163.9112 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2863.4085	3.4800	99.6466	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	1853.0369	3.4800	64.4857	(247)
Pumps and fans for heating	75.0000	13.1900	9.8925	(249)
Energy for lighting	372.4659	13.1900	49.1283	(250)
Additional standing charges			120.0000	(251)
Total energy cost			343.1530	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.1329	(257)
SAP value		84.1964	
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	2863.4085	0.2160	618.4962	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1853.0369	0.2160	400.2560	(264)
Space and water heating			1018.7522	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	372.4659	0.5190	193.3098	(268)
Total kg/year			1250.9870	(272)
CO2 emissions per m2			15.2200	(273)
EI value			86.8234	
EI rating			87	(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	$3.48 / 0.8867 = 3.925$ , stars = 4
Water heating environmental impact	$0.216 / 0.8867 = 0.2436$ , 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 (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	41.1100 (1b)	x 2.3300 (2b)	= 95.7863 (1b) - (3b)
First floor	41.1100 (1c)	x 2.5300 (2c)	= 104.0083 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.2200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 199.7946 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m <sup>3</sup> per hour							
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)							
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)							
Number of intermittent fans					3 * 10 = 30.0000 (7a)							
Number of passive vents					0 * 10 = 0.0000 (7b)							
Number of flueless gas fires					0 * 40 = 0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					30.0000 / (5) = 0.1502 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.4007 (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) =	0.3706 (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	0.4540	0.4447	0.4355	0.3891	0.3891	0.3428	0.3521	0.3521	0.3706	0.3891	0.3984	0.4169 (22b)
Effective ac	0.6031	0.5989	0.5948	0.5757	0.5757	0.5588	0.5620	0.5620	0.5687	0.5757	0.5794	0.5869 (25)

#### 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K
Windows (Uw = 1.30)			12.3900	1.2357	15.3108		(27)
Solid Door			2.1000	1.2000	2.5200		(26)
Half Glazed Door			1.9600	1.3000	2.5480		(26a)
Flr - Ground			41.1060	0.2200	9.0433	75.6000	3107.6136 (28a)
Wl - Brick	88.2260	16.4510	71.7750	0.2400	17.2260	39.3600	2825.0640 (29a)
Rf - Ins Joist	41.1060		41.1060	0.1000	4.1106	7.6200	313.2277 (30)
Total net area of external elements Aum(A, m <sup>2</sup> )			170.4370				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	50.7588		(33)
Party Wall			42.0580	0.0000	0.0000	54.0300	2272.3937 (32)
Ground Floor Stud			70.1568			5.8200	408.3126 (32c)
1st Floor Stud			102.8297			5.8200	598.4690 (32c)
Internal Floor			41.1000			18.0000	739.8000 (32d)
Internal Ceiling			41.1000			5.8200	239.2020 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10504.0827 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							127.7558 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6684 (36)
Total fabric heat loss						(33) + (36) =	55.4272 (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	39.7607	39.4862	39.2174	37.9580	37.9580	36.8402	37.0525	37.0525	37.4939	37.9580	38.1986	38.6966 (38)
Average = Sum(39)m / 12 =	95.1879	94.9134	94.6445	93.3852	93.3852	92.2674	92.4796	92.4796	92.9211	93.3852	93.6258	94.1238 (39)
HLP	1.1577	1.1544	1.1511	1.1358	1.1358	1.1222	1.1248	1.1248	1.1302	1.1358	1.1387	1.1448 (40)
HLP (average)												1.1380 (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												2.5036 (42)
Average daily hot water use (litres/day)												93.6613 (43)
Daily hot water use	103.0275	99.2810	95.5346	91.7881	88.0417	84.2952	84.2952	88.0417	91.7881	95.5346	99.2810	103.0275 (44)
Energy conte	152.7868	133.6283	137.8924	120.2179	115.3520	99.5400	92.2384	105.8449	107.1091	124.8253	136.2566	147.9658 (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 =	1473.6575 (45)
Distribution loss (46)m = 0.15 x (45)m														
	22.9180	20.0442	20.6839	18.0327	17.3028	14.9310	13.8358	15.8767	16.0664	18.7238	20.4385	22.1949	(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	14.6753	13.2391	14.6121	14.0893	14.5216	14.0100	14.4502	14.4965	14.0532	14.5747	14.1641	14.6608	(61)	
Total heat required for water heating calculated for each month	167.4620	146.8674	152.5045	134.3073	129.8736	113.5500	106.6886	120.3414	121.1623	139.4000	150.4207	162.6266	(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	167.4620	146.8674	152.5045	134.3073	129.8736	113.5500	106.6886	120.3414	121.1623	139.4000	150.4207	162.6266	(64)	
Total per year (kWh/year) = Sum(64)m =													1645.2043 (64)	
Heat gains from water heating, kWh/month	54.4704	47.7412	49.5023	43.4948	41.9849	36.5996	34.2818	38.8176	39.1271	45.1481	48.8463	52.8638	(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	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	150.2181	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	52.7264	46.8311	38.0856	28.8333	21.5532	18.1961	19.6616	25.5568	34.3023	43.5547	50.8348	54.1918	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	334.3547	337.8243	329.0811	310.4679	286.9721	264.8894	250.1368	246.6672	255.4104	274.0236	297.5194	319.6021	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	52.5254	(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)	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	-100.1454	(71)
Water heating gains (Table 5)	73.2129	71.0434	66.5353	60.4094	56.4314	50.8327	46.0777	52.1741	54.3432	60.6829	67.8421	71.0535	(72)
Total internal gains	565.8922	561.2969	539.3001	505.3088	470.5548	439.5164	421.4742	429.9964	449.6540	483.8593	521.7944	550.4456	(73)

#### 6. Solar gains

[Jan]	Area m <sup>2</sup>	Solar flux Table 6a W/m <sup>2</sup>	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W							
Southeast	3.0600	40.9830	0.4700	0.0000	0.7700	45.3852 (77)							
Southwest	6.6320	40.9830	0.4700	0.0000	0.7700	98.3642 (79)							
Northwest	2.7000	12.9465	0.4700	0.0000	0.7700	12.6504 (81)							
Solar gains	156.3998	252.1576	349.5269	473.9478	529.1136	555.1656	526.7765	474.0043	407.5279	294.1799	192.6843	132.0763	(83)
Total gains	722.2920	813.4546	888.8270	979.2565	999.6685	994.6820	948.2507	904.0007	857.1819	778.0392	714.4787	682.5219	(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	30.6531	30.7417	30.8291	31.2448	31.2448	31.6233	31.5507	31.5507	31.4008	31.2448	31.1645	30.9996	
alpha	3.0435	3.0494	3.0553	3.0830	3.0830	3.1082	3.1034	3.1034	3.0934	3.0830	3.0776	3.0666	
util living area	0.9454	0.9226	0.8788	0.7887	0.6624	0.4845	0.3243	0.3391	0.5778	0.8057	0.9140	0.9519	(86)
MIT	19.3861	19.6070	19.9875	20.4361	20.7539	20.9347	20.9870	20.9853	20.8835	20.4958	19.8936	19.3504	(87)
Th 2	19.9540	19.9567	19.9593	19.9717	19.9717	19.9827	19.9806	19.9806	19.9763	19.9717	19.9693	19.9644	(88)
util rest of house	0.9362	0.9101	0.8588	0.7546	0.6076	0.4075	0.2303	0.2412	0.4994	0.7657	0.8976	0.9437	(89)
MIT 2	18.5127	18.7288	19.0971	19.5248	19.8027	19.9498	19.9772	19.9767	19.9120	19.5889	19.0213	18.4862	(90)
Living area fraction	18.7002	18.9173	19.2883	19.7204	20.0069	20.1612	20.1940	20.1932	20.1206	19.7836	19.2085	18.6717	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.5502	18.7673	19.1383	19.5704	19.8569	20.0112	20.0440	20.0432	19.9706	19.6336	19.0585	18.5217	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	664.9440	726.0188	746.8110	724.2572	600.7637	407.5371	224.0045	223.6492	427.7004	583.9957	628.5675	634.1315	(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	1318.3732	1287.7188	1148.8210	940.4295	687.0260	425.4660	226.0200	225.9498	461.8713	768.8945	1063.4520	1300.9553	(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	486.1514	377.4624	299.0955	155.6440	64.1792	0.0000	0.0000	0.0000	0.0000	137.5647	313.1168	496.1169	(98)
Space heating													2329.3309 (98)
Space heating per m <sup>2</sup>													(98) / (4) = 28.3305 (99)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

8c. Space cooling requirement

Not applicable

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

	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													2573.8463 (211)
Space heating requirement	486.1514	377.4624	299.0955	155.6440	64.1792	0.0000	0.0000	0.0000	0.0000	137.5647	313.1168	496.1169	(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)	537.1838	417.0855	330.4922	171.9824	70.9162	0.0000	0.0000	0.0000	0.0000	152.0052	345.9854	548.1955	(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	167.4620	146.8674	152.5045	134.3073	129.8736	113.5500	106.6886	120.3414	121.1623	139.4000	150.4207	162.6266	(64)
Efficiency of water heater (217)m	89.6580	89.5803	89.3935	88.9891	88.3330	87.3000	87.3000	87.3000	87.3000	88.8606	89.4362	89.6884	(217)
Fuel for water heating, kWh/month	186.7787	163.9506	170.5992	150.9256	147.0272	130.0687	122.2092	137.8481	138.7884	156.8749	168.1878	181.3240	(219)
Water heating fuel used													1854.5825 (219)
Annual totals kWh/year													
Space heating fuel - main system													2573.8463 (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)													372.4659 (232)
Total delivered energy for all uses													4875.8947 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2573.8463	3.7400	96.2619 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1854.5825	3.7400	69.3614 (247)
Pumps and fans for heating	75.0000	19.1200	14.3400 (249)
Energy for lighting	372.4659	19.1200	71.2155 (250)
Additional standing charges			94.0000 (251)
Total energy cost			345.1787 (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	2573.8463	0.2160	555.9508 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1854.5825	0.2160	400.5898 (264)
Space and water heating			956.5406 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	372.4659	0.5190	193.3098 (268)
Total kg/year			1188.7754 (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	2573.8463	1.2200	3140.0924 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1854.5825	1.2200	2262.5906 (264)
Space and water heating			5402.6831 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	372.4659	3.0700	1143.4703 (268)
Primary energy kWh/year			6776.4034 (272)
Primary energy kWh/m2/year			82.4179 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 84  
Current environmental impact rating: B 87

# 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:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)	Total Savings £0	0.00 kg/m <sup>2</sup>	

Potential energy efficiency rating: B 84  
 Potential environmental impact rating: B 87

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	£86	£86	£0
Mains gas	£260	£260	£0
Space heating	£205	£205	£0
Water heating	£69	£69	£0
Lighting	£71	£71	£0
Total cost of fuels	£346	£346	£0
Total cost of uses	£345	£345	£0
Delivered energy	59 kWh/m <sup>2</sup>	59 kWh/m <sup>2</sup>	0 kWh/m <sup>2</sup>
Carbon dioxide emissions	1.2 tonnes	1.2 tonnes	0.0 tonnes
CO2 emissions per m <sup>2</sup>	14 kg/m <sup>2</sup>	14 kg/m <sup>2</sup>	0 kg/m <sup>2</sup>
Primary energy	82 kWh/m <sup>2</sup>	82 kWh/m <sup>2</sup>	0 kWh/m <sup>2</sup>

# 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  
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No improvements selected / applicable

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# 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  
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No improvements selected / applicable



# BASIC COMPLIANCE REPORT

## Calculation Type: New Build (As Designed)



<b>Property Reference</b>	156 - PRJ011855	<b>Issued on Date</b>	02/08/2021
<b>Assessment Reference</b>	156 S	<b>Prop Type Ref</b>	Storer
<b>Property</b>	Plot 156		

<b>SAP Rating</b>	84 B	<b>DER</b>	16.75	<b>TER</b>	18.01
<b>Environmental</b>	87 B	<b>% DER&lt;TER</b>	6.99		
<b>CO<sub>2</sub> Emissions (t/year)</b>	1.19	<b>DFEE</b>	42.34	<b>TFEE</b>	50.28
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	15.79		

<b>Assessor Details</b>	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	<b>Assessor ID</b>	T850-0001
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<b>Client</b>	
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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)	18.01	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	16.75	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-1.26 (-7.0%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	50.28	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	42.34	kWh/m <sup>2</sup> /yr	
	-8.0 (-15.9%)	kWh/m <sup>2</sup> /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	1.29 (max. 2.00)	1.30 (max. 3.30)	Pass

##### 2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

##### 3 Air permeability

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

##### Limiting System Efficiencies

##### 4 Heating efficiency

# 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 30  
Combi boiler  
Efficiency: 89.6% SEDBUK2009  
Minimum: 88.0%

Pass

Secondary heating system

None

### 5 Cylinder insulation

Hot water storage

No cylinder

### 6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

### 7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

### 8 Mechanical ventilation

Not applicable

## Criterion 3 – Limiting the effects of heat gains in summer

### 9 Summertime temperature

Overheating risk (East Anglia)

Slight

Pass

Based on:

Overshading

Average

Windows facing South East

3.06 m<sup>2</sup>, No overhang

Windows facing South West

6.63 m<sup>2</sup>, No overhang

Windows facing North West

2.70 m<sup>2</sup>, No overhang

Air change rate

4.55 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/m<sup>2</sup>K

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/m<sup>2</sup>K

Roof U-value

0.10

W/m<sup>2</sup>K

Thermal bridging  $\gamma$ -value

0.027

W/m<sup>2</sup>K

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