

# PREDICTED ENERGY ASSESSMENT



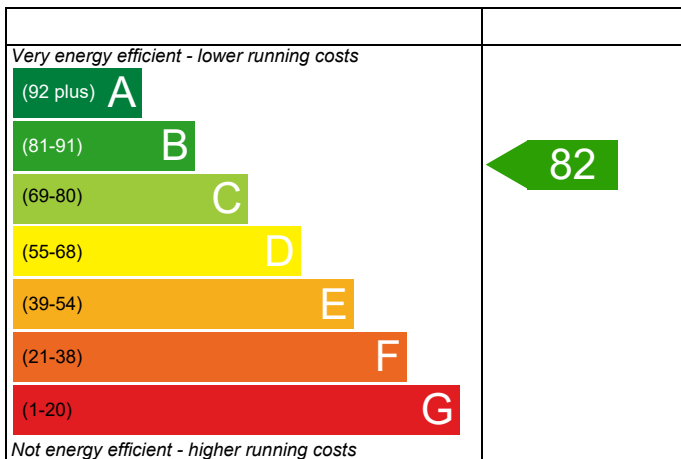
Plot 667

Dwelling type: Flat, End-Terrace  
 Date of assessment: 26/02/2021  
 Produced by: Michael Juckes  
 Total floor area: 44.01 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.

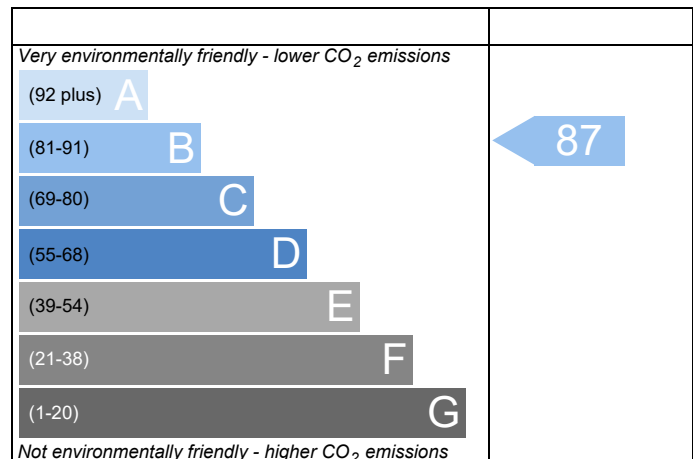
## Energy Efficiency Rating



**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	667 - PRJ009149		Issued on Date	26/02/2021	
Assessment Reference	667	Prop Type Ref	Block B		
Property	Plot 667				
SAP Rating	82 B	DER	22.50	TER	23.00
Environmental	87 B	% DER<TER	2.17		
CO <sub>2</sub> Emissions (t/year)	0.81	DFEE	58.95	TFEE	61.21
General Requirements Compliance	Pass	% DFEE<TFEE	3.69		
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)	23.00	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	22.50	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-0.50 (-2.2%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	61.21	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	58.95	kWh/m <sup>2</sup> /yr	
	-2.3 (-3.8%)	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	0.27 (max. 0.30)	0.28 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	Pass
Openings	1.36 (max. 2.00)	1.40 (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

Continuous extract system (decentralised)

Specific fan power

0.1900 0.1800

Maximum

0.7

Pass

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

### 9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North East

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

Windows facing North West

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

Air change rate

4.21 ach

Blinds/curtains

Dark-coloured curtain or roller blind, closed 100% of daylight hours

## Criterion 4 – Building performance consistent with DER and DFEE rate

### Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/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

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# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



Property Reference	667 - PRJ009149	Issued on Date	26/02/2021
Assessment Reference	667	Prop Type Ref	Block B
Property	Plot 667		

SAP Rating	82 B	DER	22.50	TER	23.00
Environmental	87 B	% DER<TER	2.17		
CO <sub>2</sub> Emissions (t/year)	0.81	DFEE	58.95	TTEE	61.21
General Requirements Compliance	Pass	% DFEE<TTEE	3.69		

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	44.0100		110.4651
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0100		
Dwelling volume			110.4651

#### 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				0 * 10 =	0.0000 (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) =				0.0000 / (5) =	0.0000 (8)							
Pressure test				Yes								
Measured/design AP50				5.0100								
Infiltration rate				0.2505	(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) =		0.2317 (21)							
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	4.7000	4.6000	4.3000	4.3000	4.0000	4.0000	3.9000	4.0000	4.5000	4.4000	4.7000
Adj infilt rate	1.2750	1.1750	1.1500	1.0750	1.0750	1.0000	1.0000	0.9750	1.0000	1.1250	1.1000	1.1750
Mechanical extract ventilation - decentralised	0.2954	0.2723	0.2665	0.2491	0.2491	0.2317	0.2317	0.2259	0.2317	0.2607	0.2549	0.2723
If mechanical ventilation:												0.5000
Effective ac	0.5454	0.5223	0.5165	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5107	0.5049	0.5223

#### 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 = 1.40)			8.8300	1.3258	11.7064		(27)
Solid Door			2.1200	1.2000	2.5440		(26)
Fir - Ground			44.0060	0.1500	6.6009	70.5600	3105.0634 (28a)
Wl - Brick	35.6680	8.8270	26.8410	0.2800	7.5155	104.1000	2794.1481 (29a)
Wl - To Corridor	13.6300	2.1170	11.5130	0.2499	2.8772	106.6200	1227.5161 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			93.3100				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.2440	(33)
Party Wall			18.6400	0.0000	0.0000	54.0300	1007.1192 (32)
Party Ceiling			44.0060			70.0000	3080.4200 (32b)
Ground Floor Stud			89.8680			5.8200	523.0320 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		11737.2987 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							266.6962 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.1504 (36)
Total fabric heat loss					(33) + (36) =		39.3944 (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	19.8829	19.0383	18.8271	18.2267	18.2267	18.2267	18.2267	18.2267	18.2267	18.6159	18.4048	19.0383 (38)
Heat transfer coeff	59.2774	58.4327	58.2215	57.6211	57.6211	57.6211	57.6211	57.6211	57.6211	58.0103	57.7992	58.4327 (39)
Average = Sum(39)m / 12 =												57.9917 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3469	1.3277	1.3229	1.3093	1.3093	1.3093	1.3093	1.3093	1.3093	1.3181	1.3133	1.3277 (40)
HLP (average)												1.3177 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

#### 4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.5165 (42)  
 Average daily hot water use (litres/day) 70.2174 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	77.2391	74.4304	71.6217	68.8130	66.0043	63.1956	63.1956	66.0043	68.8130	71.6217	74.4304	77.2391 (44)
Energy content (annual)	114.5434	100.1804	103.3772	90.1267	86.4787	74.6246	69.1506	79.3514	80.2991	93.5808	102.1508	110.9291 (45)
Distribution loss (46)m = 0.15 x (45)m	17.1815	15.0271	15.5066	13.5190	12.9718	11.1937	10.3726	11.9027	12.0449	14.0371	15.3226	16.6394 (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												
Combi loss	14.4823	13.0648	14.4390	13.9444	14.3881	13.8998	14.3480	14.3740	13.9241	14.4180	13.9864	14.4740 (61)
Total heat required for water heating calculated for each month	129.0257	113.2451	117.8162	104.0711	100.8669	88.5244	83.4986	93.7254	94.2231	107.9988	116.1372	125.4031 (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	129.0257	113.2451	117.8162	104.0711	100.8669	88.5244	83.4986	93.7254	94.2231	107.9988	116.1372	125.4031 (64)
RHI water heating demand												1274.5357 (64)
Heat gains from water heating, kWh/month	41.7063	36.5762	37.9827	33.4532	32.3512	28.2876	26.5796	29.9778	30.1805	34.7201	37.4617	40.5024 (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	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	29.5586	26.2537	21.3509	16.1640	12.0828	10.2008	11.0223	14.3272	19.2300	24.4169	28.4981	30.3801 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	196.6178	198.6581	193.5166	182.5711	168.7544	155.7686	147.0933	145.0530	150.1945	161.1400	174.9567	187.9425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156 (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)	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609 (71)
Water heating gains (Table 5)	56.0568	54.4288	51.0520	46.4628	43.4828	39.2884	35.7253	40.2928	41.9173	46.6668	52.0302	54.4388 (72)
Total internal gains	361.1792	358.2866	344.8656	324.1440	303.2661	284.2038	272.7870	278.6191	290.2878	311.1698	334.4311	351.7074 (73)

#### 6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b g	Specific data or Table 6c FF	Access factor Table 6d	Gains W
Northeast	5.0400	15.0428	0.5000	0.0000	0.7700	29.1891 (75)
Northwest	3.7870	15.0428	0.5000	0.0000	0.7700	21.9324 (81)

Solar gains	51.1215	89.5378	161.0711	268.4928	342.7283	394.1140	360.4005	295.0203	207.9934	115.9890	63.8799	39.7683 (83)
Total gains	412.3007	447.8244	505.9366	592.6369	645.9944	678.3179	633.1875	573.6395	498.2812	427.1588	398.3110	391.4757 (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	55.0018	55.7969	55.9992	56.5827	56.5827	56.5827	56.5827	56.5827	56.5827	56.2031	56.4084	55.7969
alpha	4.6668	4.7198	4.7333	4.7722	4.7722	4.7722	4.7722	4.7722	4.7722	4.7469	4.7606	4.7198
util living area	0.9871	0.9805	0.9542	0.8664	0.6908	0.4684	0.3355	0.3696	0.6516	0.9039	0.9736	0.9891 (86)
MIT	19.9851	20.1054	20.3804	20.7171	20.9256	20.9902	20.9985	20.9976	20.9585	20.7093	20.3288	19.9804 (87)
Th 2	19.8043	19.8192	19.8229	19.8336	19.8336	19.8336	19.8336	19.8336	19.8336	19.8267	19.8304	19.8192 (88)
util rest of house												
MIT 2	0.9824	0.9736	0.9381	0.8247	0.6145	0.3744	0.2304	0.2542	0.5430	0.8596	0.9622	0.9850 (89)
MIT 2	18.9245	19.0542	19.3221	19.6345	19.7944	19.8306	19.8334	19.8333	19.8179	19.6328	19.2836	18.9321 (90)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF HEAT DEMAND 09 Jan 2014

Living area fraction										FLA = Living area / (4) =	0.4199 (91)	
MIT	19.3699	19.4956	19.7664	20.0891	20.2694	20.3175	20.3226	20.3222	20.2969	20.0848	19.7225	19.3723 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.2199	19.3456	19.6164	19.9391	20.1194	20.1675	20.1726	20.1722	20.1469	19.9348	19.5725	19.2223 (93)

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 8. Space heating requirement  
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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9794	0.9701	0.9347	0.8289	0.6342	0.4017	0.2611	0.2880	0.5739	0.8644	0.9591	0.9824 (94)
Useful gains	403.8140	434.4350	472.8752	491.2443	409.7168	272.5107	165.3195	165.1863	285.9443	369.2506	382.0048	384.5670 (95)
Ext temp.	5.4000	5.7000	7.3000	9.6000	12.6000	15.4000	17.3000	17.3000	15.0000	11.8000	8.4000	5.5000 (96)
Heat loss rate W												
Month fracti	819.2063	797.3497	717.0823	595.7485	433.2756	274.7107	165.5222	165.4990	296.5676	471.9031	645.7606	801.8298 (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	309.0519	243.8787	181.6900	75.2430	17.5278	0.0000	0.0000	0.0000	0.0000	76.3734	189.9041	310.4435 (98)
RHI space heating demand												1404.1125 (98)
												1404 (98)

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# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

#### 1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	44.0100 (1b)	2.5100 (2b)	110.4651 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0100		110.4651 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	110.4651 (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				0 * 10 =	0.0000 (7a)	
Number of passive vents				0 * 10 =	0.0000 (7b)	
Number of flueless gas fires				0 * 40 =	0.0000 (7c)	
Air changes per hour						
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					0.0000 / (5) =	0.0000 (8)
Pressure test					Yes	
Measured/design AP50					5.0100	
Infiltration rate					0.2505	(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) =	0.2317 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2954	0.2896	0.2838	0.2549	0.2491	0.2201	0.2201	0.2143	0.2317	0.2491	0.2607	0.2723 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5454	0.5396	0.5338	0.5049	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5107	0.5223 (25)

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

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Windows (Uw = 1.40)			8.8300	1.3258	11.7064		(27)
Solid Door			2.1200	1.2000	2.5440		(26)
Flr - Ground			44.0060	0.1500	6.6009	70.5600	3105.0634 (28a)
Wl - Brick	35.6680	8.8270	26.8410	0.2800	7.5155	104.1000	2794.1481 (29a)
Wl - To Corridor	13.6300	2.1170	11.5130	0.2499	2.8772	106.6200	1227.5161 (29a)
Total net area of external elements Aum(A, m2)			93.3100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2440		(33)
Party Wall			18.6400	0.0000	0.0000	54.0300	1007.1192 (32)
Party Ceiling			44.0060			70.0000	3080.4200 (32b)
Ground Floor Stud			89.8680			5.8200	523.0320 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		11737.2987 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6962 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.1504 (36)
Total fabric heat loss					(33) + (36) =		39.3944 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	19.8829	19.6718	19.4606	18.4048	18.2267	18.2267	18.2267	18.2267	18.2267	18.2267	18.6159	19.0383 (38)
Heat transfer coeff	59.2774	59.0662	58.8550	57.7992	57.6211	57.6211	57.6211	57.6211	57.6211	57.6211	58.0103	58.4327 (39)
Average = Sum(39)m / 12 =												58.0973 (39)
HLP	1.3469	1.3421	1.3373	1.3133	1.3093	1.3093	1.3093	1.3093	1.3093	1.3093	1.3181	1.3277 (40)
HLP (average)												1.3201 (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												1.5165 (42)
Average daily hot water use (litres/day)												70.2174 (43)
Daily hot water use	77.2391	74.4304	71.6217	68.8130	66.0043	63.1956	63.1956	66.0043	68.8130	71.6217	74.4304	77.2391 (44)
Energy conte	114.5434	100.1804	103.3772	90.1267	86.4787	74.6246	69.1506	79.3514	80.2991	93.5808	102.1508	110.9291 (45)
Energy content (annual)												Total = Sum(45)m = 1104.7928 (45)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS 09 Jan 2014

Distribution loss (46)m = 0.15 x (45)m	17.1815	15.0271	15.5066	13.5190	12.9718	11.1937	10.3726	11.9027	12.0449	14.0371	15.3226	16.6394 (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	14.4823	13.0648	14.4390	13.9444	14.3881	13.8998	14.3480	14.3740	13.9241	14.4180	13.9864	14.4740 (61)
Total heat required for water heating calculated for each month	129.0257	113.2451	117.8162	104.0711	100.8669	88.5244	83.4986	93.7254	94.2231	107.9988	116.1372	125.4031 (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	129.0257	113.2451	117.8162	104.0711	100.8669	88.5244	83.4986	93.7254	94.2231	107.9988	116.1372	125.4031 (64)
Heat gains from water heating, kWh/month	41.7063	36.5762	37.9827	33.4532	32.3512	28.2876	26.5796	29.9778	30.1805	34.7201	37.4617	40.5024 (65)
Solar input (sum of months) = Sum(63)m = 0.0000 (63)												
Total per year (kWh/year) = Sum(64)m = 1274.5357 (64)												

#### 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	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	29.5586	26.2537	21.3509	16.1640	12.0828	10.2008	11.0223	14.3272	19.2300	24.4169	28.4981	30.3801 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	196.6178	198.6581	193.5166	182.5711	168.7544	155.7686	147.0933	145.0530	150.1945	161.1400	174.9567	187.9425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156 (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)	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609 (71)
Water heating gains (Table 5)	56.0568	54.4288	51.0520	46.4628	43.4828	39.2884	35.7253	40.2928	41.9173	46.6668	52.0302	54.4388 (72)
Total internal gains	361.1792	358.2866	344.8656	324.1440	303.2661	284.2038	272.7870	278.6191	290.2878	311.1698	334.4311	351.7074 (73)

#### 6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
Northeast	5.0400	11.2829	0.5000	0.0000	0.7700	21.8934 (75)						
Northwest	3.7870	11.2829	0.5000	0.0000	0.7700	16.4505 (81)						
Solar gains	38.3439	78.0501	140.6215	230.9408	310.4298	330.9510	309.5979	246.8150	171.3494	95.3834	48.2465	31.3136 (83)
Total gains	399.5231	436.3367	485.4870	555.0848	613.6959	615.1548	582.3848	525.4342	461.6373	406.5532	382.6776	383.0210 (84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (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	55.0018	55.1984	55.3965	56.4084	56.5827	56.5827	56.5827	56.5827	56.5827	56.5827	56.2031	55.7969
alpha	4.6668	4.6799	4.6931	4.7606	4.7722	4.7722	4.7722	4.7722	4.7722	4.7722	4.7469	4.7198
util living area	0.9913	0.9857	0.9682	0.9067	0.7664	0.5774	0.4307	0.4947	0.7599	0.9435	0.9845	0.9928 (86)
MIT	19.8359	19.9782	20.2473	20.6134	20.8707	20.9733	20.9946	20.9899	20.9077	20.5746	20.1538	19.8173 (87)
Th 2	19.8043	19.8080	19.8117	19.8304	19.8336	19.8336	19.8336	19.8336	19.8336	19.8336	19.8267	19.8192 (88)
util rest of house	0.9883	0.9808	0.9569	0.8752	0.7005	0.4818	0.3190	0.3743	0.6674	0.9171	0.9782	0.9903 (89)
MIT 2	18.7768	18.9201	19.1856	19.5427	19.7571	19.8233	19.8325	19.8313	19.7897	19.5196	19.1098	18.7703 (90)
Living area fraction	19.2215	19.3644	19.6315	19.9923	20.2247	20.3062	20.3205	20.3178	20.2591	19.9626	19.5482	19.2100 (91)
Temperature adjustment	19.0715	19.2144	19.4815	19.8423	20.0747	20.1562	20.1705	20.1678	20.1091	19.8126	19.3982	-0.1500 (92)
adjusted MIT												19.0600 (93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9859	0.9776	0.9530	0.8756	0.7152	0.5091	0.3517	0.4096	0.6914	0.9165	0.9752	0.9882 (94)
Ext temp.	393.8772	426.5559	462.6882	486.0404	438.9243	313.1900	204.8046	215.2162	319.1672	372.6245	373.1898	378.4822 (95)
Heat loss rate W	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)
Month fracti	875.6146	845.4962	764.0236	632.4580	482.5605	320.1533	205.7347	217.1043	346.2523	530.8381	713.4239	868.3077 (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 per m2	358.4126	281.5279	224.1935	105.4207	32.4653	0.0000	0.0000	0.0000	0.0000	117.7109	244.9685	364.4302 (98)
(98) / (4) = 39.2895 (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

	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													1910.6405 (211)
Space heating requirement	358.4126	281.5279	224.1935	105.4207	32.4653	0.0000	0.0000	0.0000	0.0000	117.7109	244.9685	364.4302	(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)	396.0360	311.0806	247.7277	116.4869	35.8733	0.0000	0.0000	0.0000	0.0000	130.0673	270.6835	402.6853	(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	129.0257	113.2451	117.8162	104.0711	100.8669	88.5244	83.4986	93.7254	94.2231	107.9988	116.1372	125.4031	(64)
Efficiency of water heater (217)m	89.6303	89.5583	89.3715	88.8815	88.0582	87.3000	87.3000	87.3000	87.3000	88.9401	89.4455	89.6586	(216)
Fuel for water heating, kWh/month	143.9532	126.4485	131.8275	117.0897	114.5458	101.4025	95.6456	107.3601	107.9303	121.4287	129.8412	139.8673	(219)
Water heating fuel used													1437.3404 (219)
Annual totals kWh/year													
Space heating fuel - main system													1910.6405 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans: (MEVDecentralised, Database: total watage = 5.0830, total flow = 21.0000, SFP = 0.2420)													
mechanical ventilation fans (SFP = 0.2420)													32.6201 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													107.6201 (231)
Electricity for lighting (calculated in Appendix L)													208.8055 (232)
Total delivered energy for all uses													3664.4066 (238)

#### 10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1910.6405	3.4800	66.4903 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1437.3404	3.4800	50.0194 (247)
Mechanical ventilation fans	32.6201	13.1900	4.3026 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	208.8055	13.1900	27.5414 (250)
Additional standing charges			120.0000 (251)
Total energy cost			278.2463 (255)

#### 11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.3129 (257)
SAP value		81.6847
SAP rating (Section 12)		82 (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	1910.6405	0.2160	412.6984 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1437.3404	0.2160	310.4655 (264)
Space and water heating			723.1639 (265)
Pumps and fans	107.6201	0.5190	55.8548 (267)
Energy for lighting	208.8055	0.5190	108.3701 (268)
Total kg/year			887.3888 (272)
CO2 emissions per m2			20.1600 (273)
EI value			86.6408
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	$3.48 / 0.8856 = 3.929$ , stars = 4
Water heating environmental impact	$0.216 / 0.8856 = 0.2439$ , stars = 4

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

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# 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	44.0100 (1b)	2.5100 (2b)	110.4651 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0100		110.4651 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 110.4651 (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				0 * 10 =	0.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.2505 (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) = 0.2317 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	4.7000	4.6000	4.3000	4.3000	4.0000	4.0000	3.9000	4.0000	4.5000	4.4000	4.7000 (22)
Wind factor	1.2750	1.1750	1.1500	1.0750	1.0750	1.0000	1.0000	0.9750	1.0000	1.1250	1.1000	1.1750 (22a)
Adj infilt rate	0.2954	0.2723	0.2665	0.2491	0.2491	0.2317	0.2317	0.2259	0.2317	0.2607	0.2549	0.2723 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5454	0.5223	0.5165	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5107	0.5049	0.5223 (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 = 1.40)			8.8300	1.3258	11.7064		(27)
Solid Door			2.1200	1.2000	2.5440		(26)
Flr - Ground			44.0060	0.1500	6.6009	70.5600	3105.0634 (28a)
Wl - Brick	35.6680	8.8270	26.8410	0.2800	7.5155	104.1000	2794.1481 (29a)
Wl - To Corridor	13.6300	2.1170	11.5130	0.2499	2.8772	106.6200	1227.5161 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			93.3100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2440		(33)
Party Wall			18.6400	0.0000	0.0000	54.0300	1007.1192 (32)
Party Ceiling			44.0060			70.0000	3080.4200 (32b)
Ground Floor Stud			89.8680			5.8200	523.0320 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		11737.2987 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							266.6962 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.1504 (36)
Total fabric heat loss						(33) + (36) =	39.3944 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	19.8829	19.0383	18.8271	18.2267	18.2267	18.2267	18.2267	18.2267	18.2267	18.6159	18.4048	19.0383 (38)
Heat transfer coeff	59.2774	58.4327	58.2215	57.6211	57.6211	57.6211	57.6211	57.6211	57.6211	58.0103	57.7992	58.4327 (39)
Average = Sum(39)m / 12 =												57.9917 (39)
HLP	1.3469	1.3277	1.3229	1.3093	1.3093	1.3093	1.3093	1.3093	1.3093	1.3181	1.3133	1.3277 (40)
HLP (average)												1.3177 (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												1.5165 (42)
Average daily hot water use (litres/day)												70.2174 (43)
Daily hot water use	77.2391	74.4304	71.6217	68.8130	66.0043	63.1956	63.1956	66.0043	68.8130	71.6217	74.4304	77.2391 (44)
Energy conte	114.5434	100.1804	103.3772	90.1267	86.4787	74.6246	69.1506	79.3514	80.2991	93.5808	102.1508	110.9291 (45)
Energy content (annual)												Total = Sum(45)m = 1104.7928 (45)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

Distribution loss (46)m = 0.15 x (45)m	17.1815	15.0271	15.5066	13.5190	12.9718	11.1937	10.3726	11.9027	12.0449	14.0371	15.3226	16.6394 (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	14.4823	13.0648	14.4390	13.9444	14.3881	13.8998	14.3480	14.3740	13.9241	14.4180	13.9864	14.4740 (61)
Total heat required for water heating calculated for each month	129.0257	113.2451	117.8162	104.0711	100.8669	88.5244	83.4986	93.7254	94.2231	107.9988	116.1372	125.4031 (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	129.0257	113.2451	117.8162	104.0711	100.8669	88.5244	83.4986	93.7254	94.2231	107.9988	116.1372	125.4031 (64)
Heat gains from water heating, kWh/month	41.7063	36.5762	37.9827	33.4532	32.3512	28.2876	26.5796	29.9778	30.1805	34.7201	37.4617	40.5024 (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	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913	90.9913 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	29.5586	26.2537	21.3509	16.1640	12.0828	10.2008	11.0223	14.3272	19.2300	24.4169	28.4981	30.3801 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	196.6178	198.6581	193.5166	182.5711	168.7544	155.7686	147.0933	145.0530	150.1945	161.1400	174.9567	187.9425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156	45.6156 (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)	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609	-60.6609 (71)
Water heating gains (Table 5)	56.0568	54.4288	51.0520	46.4628	43.4828	39.2884	35.7253	40.2928	41.9173	46.6668	52.0302	54.4388 (72)
Total internal gains	361.1792	358.2866	344.8656	324.1440	303.2661	284.2038	272.7870	278.6191	290.2878	311.1698	334.4311	351.7074 (73)

#### 6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
Northeast	5.0400	15.0428	0.5000	0.0000	0.7700	29.1891 (75)						
Northwest	3.7870	15.0428	0.5000	0.0000	0.7700	21.9324 (81)						
Solar gains	51.1215	89.5378	161.0711	268.4928	342.7283	394.1140	360.4005	295.0203	207.9934	115.9890	63.8799	39.7683 (83)
Total gains	412.3007	447.8244	505.9366	592.6369	645.9944	678.3179	633.1875	573.6395	498.2812	427.1588	398.3110	391.4757 (84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (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	55.0018	55.7969	55.9992	56.5827	56.5827	56.5827	56.5827	56.5827	56.5827	56.2031	56.4084	55.7969
alpha	4.6668	4.7198	4.7333	4.7722	4.7722	4.7722	4.7722	4.7722	4.7722	4.7469	4.7606	4.7198
util living area	0.9871	0.9805	0.9542	0.8664	0.6908	0.4684	0.3355	0.3696	0.6516	0.9039	0.9736	0.9891 (86)
MIT	19.9851	20.1054	20.3804	20.7171	20.9256	20.9902	20.9985	20.9976	20.9585	20.7093	20.3288	19.9804 (87)
Th 2	19.8043	19.8192	19.8229	19.8336	19.8336	19.8336	19.8336	19.8336	19.8336	19.8267	19.8304	19.8192 (88)
util rest of house	0.9824	0.9736	0.9381	0.8247	0.6145	0.3744	0.2304	0.2542	0.5430	0.8596	0.9622	0.9850 (89)
MIT 2	18.9245	19.0542	19.3221	19.6345	19.7944	19.8306	19.8334	19.8333	19.8179	19.6328	19.2836	18.9321 (90)
Living area fraction	19.3699	19.4956	19.7664	20.0891	20.2694	20.3175	20.3226	20.3222	20.2969	20.0848	19.7225	19.3723 (91)
Temperature adjustment	19.2199	19.3456	19.6164	19.9391	20.1194	20.1675	20.1726	20.1722	20.1469	19.9348	19.5725	-0.1500 (92)
adjusted MIT												19.2223 (93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9794	0.9701	0.9347	0.8289	0.6342	0.4017	0.2611	0.2880	0.5739	0.8644	0.9591	0.9824 (94)
Ext temp.	403.8140	434.4350	472.8752	491.2443	409.7168	272.5107	165.3195	165.1863	285.9443	369.2506	382.0048	384.5670 (95)
Heat loss rate W	5.4000	5.7000	7.3000	9.6000	12.6000	15.4000	17.3000	17.3000	15.0000	11.8000	8.4000	5.5000 (96)
Month fracti	819.2063	797.3497	717.0823	595.7485	433.2756	274.7107	165.5222	165.4990	296.5676	471.9031	645.7606	801.8298 (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 per m2	309.0519	243.8787	181.6900	75.2430	17.5278	0.0000	0.0000	0.0000	0.0000	76.3734	189.9041	310.4435 (98)
												1404.1125 (98)
												31.9044 (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													1551.5055 (211)
Space heating requirement	309.0519	243.8787	181.6900	75.2430	17.5278	0.0000	0.0000	0.0000	0.0000	76.3734	189.9041	310.4435	(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)	341.4938	269.4792	200.7625	83.1414	19.3677	0.0000	0.0000	0.0000	0.0000	84.3905	209.8388	343.0315	(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	129.0257	113.2451	117.8162	104.0711	100.8669	88.5244	83.4986	93.7254	94.2231	107.9988	116.1372	125.4031	(64)
Efficiency of water heater (217)m	89.5334	89.4602	89.2136	88.6148	87.7594	87.3000	87.3000	87.3000	87.3000	88.5977	89.2584	89.5555	(216)
Fuel for water heating, kWh/month	144.1090	126.5872	132.0608	117.4421	114.9357	101.4025	95.6456	107.3601	107.9303	121.8980	130.1134	140.0284	(219)
Water heating fuel used													1439.5132 (219)
Annual totals kWh/year													
Space heating fuel - main system													1551.5055 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans: (MEVDecentralised, Database: total watage = 5.0830, total flow = 21.0000, SFP = 0.2420)													
mechanical ventilation fans (SFP = 0.2420)													32.6201 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													107.6201 (231)
Electricity for lighting (calculated in Appendix L)													208.8055 (232)
Total delivered energy for all uses													3307.4443 (238)

#### 10a. Fuel costs - using BEDF prices (472)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1551.5055	3.8700	60.0433 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1439.5132	3.8700	55.7092 (247)
Mechanical ventilation fans	32.6201	18.9000	6.1652 (249)
Pumps and fans for heating	75.0000	18.9000	14.1750 (249)
Energy for lighting	208.8055	18.9000	39.4642 (250)
Additional standing charges			93.0000 (251)
Total energy cost			268.5569 (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	1551.5055	0.2160	335.1252 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1439.5132	0.2160	310.9348 (264)
Space and water heating			646.0600 (265)
Pumps and fans	107.6201	0.5190	55.8548 (267)
Energy for lighting	208.8055	0.5190	108.3701 (268)
Total kg/year			810.2850 (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	1551.5055	1.2200	1892.8367 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1439.5132	1.2200	1756.2061 (264)
Space and water heating			3649.0428 (265)
Pumps and fans	107.6201	3.0700	330.3938 (267)
Energy for lighting	208.8055	3.0700	641.0329 (268)
Primary energy kWh/year			4620.4696 (272)
Primary energy kWh/m2/year			104.9868 (273)

#### SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 82  
 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	Not applicable
O		Not considered
P		Not considered
R		Not considered
S		Not considered
T		Not considered
U	Solar photovoltaic panels	Not applicable
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 <sup>2</sup>	
Potential energy efficiency rating:		B 82	
Potential environmental impact rating:			B 87

Fuel prices for cost data on this page from database revision number 472 TEST (30 Jan 2021)  
 Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£60	£60	£0
Mains gas	£209	£209	£0
Space heating	£173	£173	£0
Water heating	£56	£56	£0
Lighting	£39	£39	£0
Total cost of fuels	£269	£269	£0
Total cost of uses	£268	£268	£0
Delivered energy	75 kWh/m <sup>2</sup>	75 kWh/m <sup>2</sup>	0 kWh/m <sup>2</sup>
Carbon dioxide emissions	0.8 tonnes	0.8 tonnes	0.0 tonnes
CO2 emissions per m <sup>2</sup>	18 kg/m <sup>2</sup>	18 kg/m <sup>2</sup>	0 kg/m <sup>2</sup>
Primary energy	105 kWh/m <sup>2</sup>	105 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

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

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# 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>	667 - PRJ009149	<b>Issued on Date</b>	26/02/2021
<b>Assessment Reference</b>	667	<b>Prop Type Ref</b>	Block B
<b>Property</b>	Plot 667		

<b>SAP Rating</b>	82 B	<b>DER</b>	22.50	<b>TER</b>	23.00
<b>Environmental</b>	87 B	<b>% DER&lt;TER</b>	2.17		
<b>CO<sub>2</sub> Emissions (t/year)</b>	0.81	<b>DFEE</b>	58.95	<b>TFEE</b>	61.21
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	3.69		

<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)	23.00	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	22.50	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-0.50 (-2.2%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	61.21	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	58.95	kWh/m <sup>2</sup> /yr	
	-2.3 (-3.8%)	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	0.27 (max. 0.30)	0.28 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	Pass
Openings	1.36 (max. 2.00)	1.40 (max. 3.30)	Pass

##### 2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

##### 3 Air permeability

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

##### Limiting System Efficiencies

##### 4 Heating efficiency

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal LOGIC COMBI ESP1 30 Combi boiler Efficiency: 89.6% SEDBUK2009 Minimum: 88.0%	Pass
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# BASIC COMPLIANCE REPORT

## Calculation Type: New Build (As Designed)



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

Continuous extract system (decentralised)

Specific fan power

0.1900 0.1800

Maximum

0.7

Pass

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

### 9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North East

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

Windows facing North West

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

Air change rate

4.21 ach

Blinds/curtains

Dark-coloured curtain or roller blind, closed 100% of daylight hours

## Criterion 4 – Building performance consistent with DER and DFEE rate

### Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/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

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