

# PREDICTED ENERGY ASSESSMENT



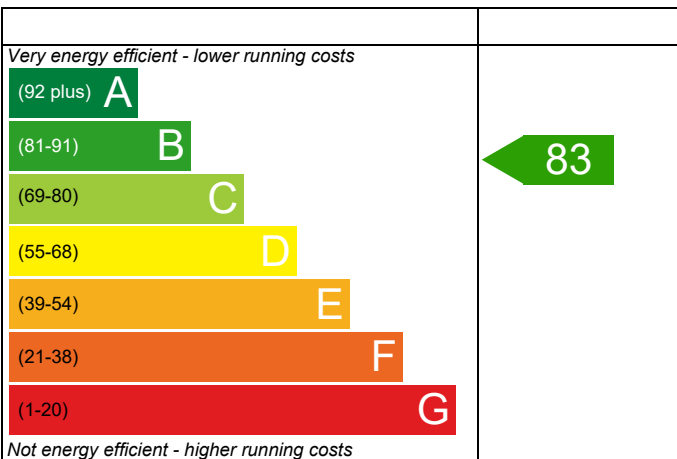
Plot 676

Dwelling type: Flat, Mid-Terrace  
 Date of assessment: 26/02/2021  
 Produced by: Michael Juckes  
 Total floor area: 50.62 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.

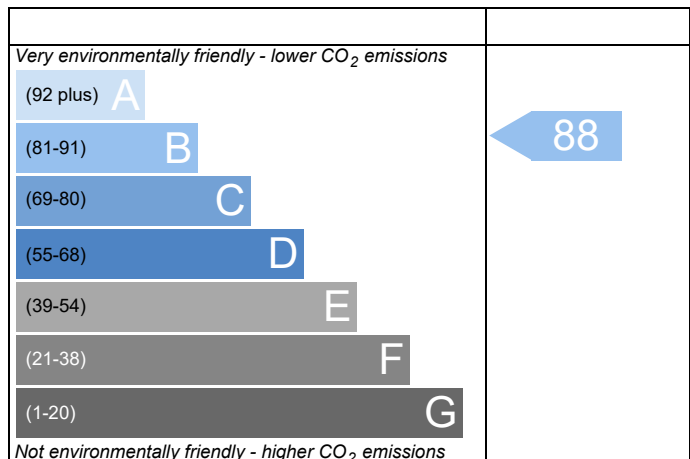
## Energy Efficiency Rating



**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	676 - PRJ009149		Issued on Date	26/02/2021	
Assessment Reference	676	Prop Type Ref	Block B		
Property	Plot 676				
SAP Rating	83 B	DER	17.80	TER	19.58
Environmental	88 B	% DER<TER	9.10		
CO <sub>2</sub> Emissions (t/year)	0.76	DFEE	41.68	TFEE	47.69
General Requirements Compliance	Pass	% DFEE<TFEE	12.59		
Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk			Assessor ID	T850-0001
Client					

### SUMMARY FOR INPUT DATA FOR New Build (As Designed)

#### Criterion 1 – Achieving the TER and TFEE rate

##### 1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	19.58	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	17.80	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-1.78 (-9.1%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	47.69	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	41.68	kWh/m <sup>2</sup> /yr	
	-6.0 (-12.6%)	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	0.25 (max. 0.30)	0.25 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	Pass
Openings	1.37 (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)

Medium

Pass

Based on:

Overshading

Average

Windows facing North East

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

Windows facing South East

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

Air change rate

3.87 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

0.11

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

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# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



Property Reference	676 - PRJ009149	Issued on Date	26/02/2021
Assessment Reference	676	Prop Type Ref	Block B
Property	Plot 676		

SAP Rating	83 B	DER	17.80	TER	19.58
Environmental	88 B	% DER<TER	9.10		
CO <sub>2</sub> Emissions (t/year)	0.76	DFEE	41.68	TTEE	47.69
General Requirements Compliance	Pass	% DFEE<TTEE	12.59		

Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	Assessor ID	T850-0001
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Client	
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### CALCULATION OF HEAT DEMAND 09 Jan 2014

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

#### 1. Overall dwelling dimensions

	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	50.6200 (1b)	x 2.4700 (2b)	= 125.0314 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 125.0314 (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)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				Air changes per hour	0.0000 / (5) = 0.0000 (8)							
Pressure test				Yes								
Measured/design AP50				5.0100								
Infiltration rate				0.2505	(18)							
Number of sides sheltered				2	(19)							
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)							
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.2129 (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 (22)
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 (22a)
Mechanical extract ventilation - decentralised	0.2715	0.2502	0.2449	0.2289	0.2289	0.2129	0.2129	0.2076	0.2129	0.2395	0.2342	0.2502 (22b)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5215	0.5002	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5002 (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)			10.1800	1.3258	13.5095		(27)
Solid Door			2.1200	1.2000	2.5440		(26)
W1 - Clad	36.1340	10.1830	25.9510	0.2500	6.4878	61.0100	1583.2705 (29a)
W1 - To Corridor	3.9200	2.1170	1.8030	0.2499	0.4506	106.6200	192.2359 (29a)
RF - Ins Joist	50.6170		50.6170	0.1100	5.5679	5.8200	294.5909 (30)
Total net area of external elements Aum(A, m <sup>2</sup> )			90.6810				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.5597		(33)
Party Wall			32.2120	0.0000	0.0000	54.0300	1740.4144 (32)
Party Floor			50.6170			40.0000	2024.6800 (32d)
1st Floor Stud			97.9750			5.8200	570.2146 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		6405.4063 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							126.5390 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.4452 (36)
Total fabric heat loss						(33) + (36) =	35.0049 (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)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	21.5164	20.6379	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6379 (38)
Average = Sum(39)m / 12 =	56.5213	55.6428	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6428 (39) 55.7102 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1166	1.0992	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0992 (40) 1.1006 (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													1.7084 (42)
Average daily hot water use (litres/day)													74.7737 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	82.2511	79.2601	76.2692	73.2782	70.2873	67.2963	67.2963	70.2873	73.2782	76.2692	79.2601	82.2511 (44)	
Distribution loss (46)m = 0.15 x (45)m	121.9760	106.6810	110.0852	95.9749	92.0902	79.4669	73.6377	84.5004	85.5096	99.6532	108.7792	118.1272 (45)	
Water storage loss:													Total = Sum(45)m = 1176.4816 (45)
Total storage loss	18.2964	16.0021	16.5128	14.3962	13.8135	11.9200	11.0457	12.6751	12.8264	14.9480	16.3169	17.7191 (46)	
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 (56)	
Combi 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 (57)	
Total heat required for water heating calculated for each month	14.5179	13.0947	14.4688	13.9693	14.4111	13.9187	14.3656	14.3951	13.9463	14.4449	14.0170	14.5084 (61)	
Solar input	136.4939	119.7757	124.5540	109.9442	106.5013	93.3856	88.0033	98.8955	99.4559	114.0981	122.7962	132.6356 (62)	
Output from w/h	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)	
RHI water heating demand													Solar input (sum of months) = Sum(63)m = 0.0000 (63)
Heat gains from water heating, kWh/month	136.4939	119.7757	124.5540	109.9442	106.5013	93.3856	88.0033	98.8955	99.4559	114.0981	122.7962	132.6356 (64)	
													Total per year (kWh/year) = Sum(64)m = 1346.5393 (64) 1347 (64)
44.1865	38.7451	40.2205	35.4040	34.2228	29.9024	28.0759	31.6952	31.9185	36.7459	39.6733	42.9044	42.9044 (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	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.3877	29.6547	24.1168	18.2580	13.6480	11.5223	12.4502	16.1832	21.7211	27.5799	32.1899	34.3156 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	222.1554	224.4607	218.6514	206.2843	190.6730	176.0005	166.1985	163.8932	169.7024	182.0696	197.6809	212.3533 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586 (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)	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347 (71)
Water heating gains (Table 5)	59.3904	57.6564	54.0598	49.1722	45.9984	41.5311	37.7365	42.6010	44.3313	49.3897	55.1019	57.6672 (72)
Total internal gains	399.0594	395.8976	380.9540	357.8404	334.4453	313.1798	300.5110	306.8033	319.8807	343.1651	369.0985	388.4620 (73)

#### 6. Solar gains

[Jan]	Area	Solar flux	Specific data	Specific data	Access	Gains						
	m2	Table 6a	g	FF	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Northeast	4.7080	15.0428	0.5000	0.0000	0.7700	27.2663 (75)						
Southeast	5.4750	46.3896	0.5000	0.0000	0.7700	97.7835 (77)						
Solar gains	125.0498	190.0146	279.7820	389.1843	447.7306	495.7950	460.5820	407.0764	333.9038	228.1703	150.0907	101.1444 (83)
Total gains	524.1092	585.9123	660.7360	747.0246	782.1759	808.9748	761.0930	713.8797	653.7845	571.3354	519.1892	489.6064 (84)

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

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	31.4798	31.9768	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9768	
alpha	3.0987	3.1318	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1318	
util living area	0.9082	0.8770	0.8091	0.6928	0.5431	0.3730	0.2672	0.2842	0.4781	0.7148	0.8575	0.9188 (86)	
MIT	19.7527	19.9570	20.2966	20.6394	20.8685	20.9696	20.9922	20.9907	20.9344	20.6803	20.2095	19.7248 (87)	
Th 2	19.9873	20.0015	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0015 (88)	
util rest of house	0.8939	0.8591	0.7828	0.6543	0.4905	0.3105	0.1965	0.2093	0.4083	0.6672	0.8332	0.9058 (89)	
MIT 2	18.8930	19.0979	19.4162	19.7237	19.9147	19.9867	19.9993	19.9988	19.9665	19.7695	19.3438	18.8784 (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) =		0.4417 (91)	
MIT	19.2727	19.4774	19.8051	20.1282	20.3360	20.4209	20.4379	20.4370	20.3941	20.1718	19.7262	19.2523 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.1227	19.3274	19.6551	19.9782	20.1860	20.2709	20.2879	20.2870	20.2441	20.0218	19.5762	19.1023 (93)

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8796	0.8453	0.7728	0.6533	0.5006	0.3277	0.2170	0.2309	0.4258	0.6683	0.8214	0.8919 (94)
Useful gains	461.0028	495.3002	510.5879	488.0589	391.5246	265.0647	165.1220	164.8500	278.3716	381.8036	426.4856	436.6639 (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	775.6273	758.2641	687.3774	577.3908	422.0475	270.9923	166.2314	166.1798	291.7547	457.4233	621.7878	756.8677 (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	234.0806	176.7117	131.5314	64.3190	22.7091	0.0000	0.0000	0.0000	0.0000	56.2611	140.6176	238.2316 (98)
RHI space heating demand												1064.4621 (98)
												1064 (98)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

#### 1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.6200 (1b)	2.4700 (2b)	125.0314 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.6200		125.0314 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 125.0314 (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				2	(19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2129 (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	0.2715	0.2662	0.2608	0.2342	0.2289	0.2023	0.2023	0.1970	0.2129	0.2289	0.2395	0.2502 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												
Effective ac	0.5215	0.5162	0.5108	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5002 (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)			10.1800	1.3258	13.5095		(27)
Solid Door			2.1200	1.2000	2.5440		(26)
Wl - Clad	36.1340	10.1830	25.9510	0.2500	6.4878	61.0100	1583.2705 (29a)
Wl - To Corridor	3.9200	2.1170	1.8030	0.2499	0.4506	106.6200	192.2359 (29a)
Rf - Ins Joist	50.6170		50.6170	0.1100	5.5679	5.8200	294.5909 (30)
Total net area of external elements Aum(A, m2)			90.6810				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.5597		(33)
Party Wall			32.2120	0.0000	0.0000	54.0300	1740.4144 (32)
Party Floor			50.6170			40.0000	2024.6800 (32d)
1st Floor Stud			97.9750			5.8200	570.2146 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 6405.4063 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							126.5390 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.4452 (36)
Total fabric heat loss						(33) + (36) =	35.0049 (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	21.5164	21.2968	21.0772	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6379 (38)
Heat transfer coeff	56.5213	56.3017	56.0821	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6428 (39)
Average = Sum(39)m / 12 =												55.8024 (39)
HLP	1.1166	1.1122	1.1079	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0992 (40)
HLP (average)												1.1024 (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												1.7084 (42)
Average daily hot water use (litres/day)												74.7737 (43)
Daily hot water use	82.2511	79.2601	76.2692	73.2782	70.2873	67.2963	67.2963	70.2873	73.2782	76.2692	79.2601	82.2511 (44)
Energy conte	121.9760	106.6810	110.0852	95.9749	92.0902	79.4669	73.6377	84.5004	85.5096	99.6532	108.7792	118.1272 (45)
Energy content (annual)												Total = Sum(45)m = 1176.4816 (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	18.2964	16.0021	16.5128	14.3962	13.8135	11.9200	11.0457	12.6751	12.8264	14.9480	16.3169	17.7191 (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	14.5179	13.0947	14.4688	13.9693	14.4111	13.9187	14.3656	14.3951	13.9463	14.4449	14.0170	14.5084 (61)
Total heat required for water heating calculated for each month	136.4939	119.7757	124.5540	109.9442	106.5013	93.3856	88.0033	98.8955	99.4559	114.0981	122.7962	132.6356 (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	136.4939	119.7757	124.5540	109.9442	106.5013	93.3856	88.0033	98.8955	99.4559	114.0981	122.7962	132.6356 (64)
Heat gains from water heating, kWh/month	44.1865	38.7451	40.2205	35.4040	34.2228	29.9024	28.0759	31.6952	31.9185	36.7459	39.6733	42.9044 (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	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.3877	29.6547	24.1168	18.2580	13.6480	11.5223	12.4502	16.1832	21.7211	27.5799	32.1899	34.3156 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	222.1554	224.4607	218.6514	206.2843	190.6730	176.0005	166.1985	163.8932	169.7024	182.0696	197.6809	212.3533 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586 (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)	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347 (71)
Water heating gains (Table 5)	59.3904	57.6564	54.0598	49.1722	45.9984	41.5311	37.7365	42.6010	44.3313	49.3897	55.1019	57.6672 (72)
Total internal gains	399.0594	395.8976	380.9540	357.8404	334.4453	313.1798	300.5110	306.8033	319.8807	343.1651	369.0985	388.4620 (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	4.7080	11.2829	0.5000	0.0000	0.7700	20.4512 (75)
Southeast	5.4750	36.7938	0.5000	0.0000	0.7700	77.5568 (77)
Solar gains	98.0080	173.7370	255.7582	347.1406	416.4316	425.5628
Total gains	497.0675	569.6346	636.7122	704.9810	750.8769	738.7427

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

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	31.4798	31.6026	31.7264	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812
alpha	3.0987	3.1068	3.1151	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1318
util living area	0.9301	0.8970	0.8404	0.7402	0.6041	0.4553	0.3385	0.3761	0.5673	0.7835	0.8976	0.9382 (86)
MIT	19.5194	19.7825	20.1428	20.5323	20.8028	20.9391	20.9818	20.9744	20.8778	20.5194	19.9630	19.4783 (87)
Th 2	19.9873	19.9908	19.9944	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0015 (88)
util rest of house	0.9194	0.8820	0.8180	0.7058	0.5554	0.3920	0.2650	0.2992	0.5016	0.7457	0.8802	0.9287 (89)
MIT 2	18.6664	18.9220	19.2670	19.6304	19.8631	19.9678	19.9946	19.9911	19.9278	19.6297	19.1100	18.6376 (90)
Living area fraction	19.0432	19.3021	19.6539	20.0288	20.2782	20.3968	20.4307	20.4255	20.3474	20.0227	19.4868	19.0089 (92)
Temperature adjustment	18.8932	19.1521	19.5039	19.8788	20.1282	20.2468	20.2807	20.2755	20.1974	19.8727	19.3368	-0.1500
adjusted MIT												18.8589 (93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	450.0469	494.1604	512.9914	494.3269	421.8889	301.3855	201.7423	211.1759	312.6388	399.8368	422.6600	431.6321 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	824.8270	802.4177	729.2839	610.8062	468.9029	314.1626	204.7761	215.6128	339.2299	515.8889	680.7934	815.6649 (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	278.8364	207.1489	160.9216	83.8651	34.9785	0.0000	0.0000	0.0000	0.0000	86.3428	185.8560	285.7204 (98)
Space heating												1323.6697 (98)
Space heating per m2												(98) / (4) = 26.1491 (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													1462.6184 (211)
Space heating requirement	278.8364	207.1489	160.9216	83.8651	34.9785	0.0000	0.0000	0.0000	0.0000	86.3428	185.8560	285.7204	(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)	308.1065	228.8938	177.8139	92.6686	38.6502	0.0000	0.0000	0.0000	0.0000	95.4064	205.3657	315.7132	(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	136.4939	119.7757	124.5540	109.9442	106.5013	93.3856	88.0033	98.8955	99.4559	114.0981	122.7962	132.6356	(64)
Efficiency of water heater (217)m	89.4228	89.3007	89.0754	88.6565	88.0699	87.3000	87.3000	87.3000	87.3000	88.6503	89.1992	89.4604	(217)
Fuel for water heating, kWh/month	152.6388	134.1262	139.8298	124.0115	120.9282	106.9709	100.8056	113.2823	113.9243	128.7059	137.6651	148.2619	(219)
Water heating fuel used												1521.1505	(219)
Annual totals kWh/year													
Space heating fuel - main system													1462.6184 (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)													36.9215 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													111.9215 (231)
Electricity for lighting (calculated in Appendix L)													235.8549 (232)
Total delivered energy for all uses													3331.5453 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1462.6184	3.4800	50.8991	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	1521.1505	3.4800	52.9360	(247)
Mechanical ventilation fans	36.9215	13.1900	4.8700	(249)
Pumps and fans for heating	75.0000	13.1900	9.8925	(249)
Energy for lighting	235.8549	13.1900	31.1093	(250)
Additional standing charges			120.0000	(251)
Total energy cost			269.7069	(255)

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

Energy cost deflator (Table 12):		0.4200	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.1847	(257)
SAP value		83.4740	
SAP rating (Section 12)		83	(258)
SAP band		B	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1462.6184	0.2160	315.9256	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1521.1505	0.2160	328.5685	(264)
Space and water heating			644.4941	(265)
Pumps and fans	111.9215	0.5190	58.0873	(267)
Energy for lighting	235.8549	0.5190	122.4087	(268)
Total kg/year			824.9900	(272)
CO2 emissions per m2			16.3000	(273)
EI value			88.4388	
EI rating			88	(274)
EI band			B	

#### Calculation of stars for heating and DHW

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9050 = 3.845$ , stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9050 = 0.2387$ , stars = 4
Water heating energy efficiency	$3.48 / 0.8842 = 3.936$ , stars = 4
Water heating environmental impact	$0.216 / 0.8842 = 0.2443$ , 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 (m2)	Storey height (m)	Volume (m3)
Ground floor	50.6200 (1b)	x 2.4700 (2b)	= 125.0314 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 125.0314 (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)
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				2	(19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.2129 (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	0.2715	0.2502	0.2449	0.2289	0.2289	0.2129	0.2129	0.2076	0.2129	0.2395	0.2342	0.2502 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5215	0.5002	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5002 (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)			10.1800	1.3258	13.5095		(27)
Solid Door			2.1200	1.2000	2.5440		(26)
Wl - Clad	36.1340	10.1830	25.9510	0.2500	6.4878	61.0100	1583.2705 (29a)
Wl - To Corridor	3.9200	2.1170	1.8030	0.2499	0.4506	106.6200	192.2359 (29a)
Rf - Ins Joist	50.6170		50.6170	0.1100	5.5679	5.8200	294.5909 (30)
Total net area of external elements Aum(A, m2)			90.6810				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.5597		(33)
Party Wall			32.2120	0.0000	0.0000	54.0300	1740.4144 (32)
Party Floor			50.6170			40.0000	2024.6800 (32d)
1st Floor Stud			97.9750			5.8200	570.2146 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 6405.4063 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							126.5390 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.4452 (36)
Total fabric heat loss						(33) + (36) =	35.0049 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	21.5164	20.6379	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6302	20.6379 (38)
Heat transfer coeff	56.5213	55.6428	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6351	55.6428 (39)
Average = Sum(39)m / 12 =												55.7102 (39)
HLP	1.1166	1.0992	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0991	1.0992 (40)
HLP (average)												1.1006 (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												1.7084 (42)
Average daily hot water use (litres/day)												74.7737 (43)
Daily hot water use	82.2511	79.2601	76.2692	73.2782	70.2873	67.2963	67.2963	70.2873	73.2782	76.2692	79.2601	82.2511 (44)
Energy conte	121.9760	106.6810	110.0852	95.9749	92.0902	79.4669	73.6377	84.5004	85.5096	99.6532	108.7792	118.1272 (45)
Energy content (annual)												Total = Sum(45)m = 1176.4816 (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	18.2964	16.0021	16.5128	14.3962	13.8135	11.9200	11.0457	12.6751	12.8264	14.9480	16.3169	17.7191 (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	14.5179	13.0947	14.4688	13.9693	14.4111	13.9187	14.3656	14.3951	13.9463	14.4449	14.0170	14.5084 (61)
Total heat required for water heating calculated for each month	136.4939	119.7757	124.5540	109.9442	106.5013	93.3856	88.0033	98.8955	99.4559	114.0981	122.7962	132.6356 (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	136.4939	119.7757	124.5540	109.9442	106.5013	93.3856	88.0033	98.8955	99.4559	114.0981	122.7962	132.6356 (64)
Heat gains from water heating, kWh/month	44.1865	38.7451	40.2205	35.4040	34.2228	29.9024	28.0759	31.6952	31.9185	36.7459	39.6733	42.9044 (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	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020	102.5020 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.3877	29.6547	24.1168	18.2580	13.6480	11.5223	12.4502	16.1832	21.7211	27.5799	32.1899	34.3156 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	222.1554	224.4607	218.6514	206.2843	190.6730	176.0005	166.1985	163.8932	169.7024	182.0696	197.6809	212.3533 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586	46.9586 (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)	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347 (71)
Water heating gains (Table 5)	59.3904	57.6564	54.0598	49.1722	45.9984	41.5311	37.7365	42.6010	44.3313	49.3897	55.1019	57.6672 (72)
Total internal gains	399.0594	395.8976	380.9540	357.8404	334.4453	313.1798	300.5110	306.8033	319.8807	343.1651	369.0985	388.4620 (73)

#### 6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m <sup>2</sup>	Table 6a	Specific data	Specific data	factor	W						
		W/m <sup>2</sup>	or Table 6b	or Table 6c	Table 6d							
Northeast	4.7080	15.0428	0.5000	0.0000	0.7700	27.2663 (75)						
Southeast	5.4750	46.3896	0.5000	0.0000	0.7700	97.7835 (77)						
Solar gains	125.0498	190.0146	279.7820	389.1843	447.7306	495.7950	460.5820	407.0764	333.9038	228.1703	150.0907	101.1444 (83)
Total gains	524.1092	585.9123	660.7360	747.0246	782.1759	808.9748	761.0930	713.8797	653.7845	571.3354	519.1892	489.6064 (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	31.4798	31.9768	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9812	31.9768
alpha	3.0987	3.1318	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1321	3.1318
util living area	0.9082	0.8770	0.8091	0.6928	0.5431	0.3730	0.2672	0.2842	0.4781	0.7148	0.8575	0.9188 (86)
MIT	19.7527	19.9570	20.2966	20.6394	20.8685	20.9696	20.9922	20.9907	20.9344	20.6803	20.2095	19.7248 (87)
Th 2	19.9873	20.0015	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0016	20.0015 (88)
util rest of house	0.8939	0.8591	0.7828	0.6543	0.4905	0.3105	0.1965	0.2093	0.4083	0.6672	0.8332	0.9058 (89)
MIT 2	18.8930	19.0979	19.4162	19.7237	19.9147	19.9867	19.9993	19.9988	19.9665	19.7695	19.3438	18.8784 (90)
Living area fraction	19.2727	19.4774	19.8051	20.1282	20.3360	20.4209	20.4379	20.4370	20.3941	20.1718	19.7262	19.2523 (91)
Temperature adjustment	19.1227	19.3274	19.6551	19.9782	20.1860	20.2709	20.2879	20.2870	20.2441	20.0218	19.5762	-0.1500 (92)
adjusted MIT												19.1023 (93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8796	0.8453	0.7728	0.6533	0.5006	0.3277	0.2170	0.2309	0.4258	0.6683	0.8214	0.8919 (94)
Ext temp.	461.0028	495.3002	510.5879	488.0589	391.5246	265.0647	165.1220	164.8500	278.3716	381.8036	426.4856	436.6639 (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	775.6273	758.2641	687.3774	577.3908	422.0475	270.9923	166.2314	166.1798	291.7547	457.4233	621.7878	756.8677 (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	234.0806	176.7117	131.5314	64.3190	22.7091	0.0000	0.0000	0.0000	0.0000	56.2611	140.6176	238.2316 (98)
												1064.4621 (98)
												(98) / (4) = 21.0285 (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													1176.2012 (211)
Space heating requirement	234.0806	176.7117	131.5314	64.3190	22.7091	0.0000	0.0000	0.0000	0.0000	56.2611	140.6176	238.2316	(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)	258.6526	195.2615	145.3385	71.0707	25.0929	0.0000	0.0000	0.0000	0.0000	62.1669	155.3786	263.2393	(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	136.4939	119.7757	124.5540	109.9442	106.5013	93.3856	88.0033	98.8955	99.4559	114.0981	122.7962	132.6356	(64)
Efficiency of water heater (217)m	89.2944	89.1794	88.9148	88.4544	87.8459	87.3000	87.3000	87.3000	87.3000	88.3315	88.9795	89.3290	(216)
Fuel for water heating, kWh/month	152.8582	134.3087	140.0824	124.2948	121.2365	106.9709	100.8056	113.2823	113.9243	129.1704	138.0050	148.4800	(219)
Water heating fuel used													1523.4191 (219)
Annual totals kWh/year													
Space heating fuel - main system													1176.2012 (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)													36.9215 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													111.9215 (231)
Electricity for lighting (calculated in Appendix L)													235.8549 (232)
Total delivered energy for all uses													3047.3967 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1176.2012	3.8700	45.5190 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1523.4191	3.8700	58.9563 (247)
Mechanical ventilation fans	36.9215	18.9000	6.9782 (249)
Pumps and fans for heating	75.0000	18.9000	14.1750 (249)
Energy for lighting	235.8549	18.9000	44.5766 (250)
Additional standing charges			93.0000 (251)
Total energy cost			263.2050 (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	1176.2012	0.2160	254.0595 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1523.4191	0.2160	329.0585 (264)
Space and water heating			583.1180 (265)
Pumps and fans	111.9215	0.5190	58.0873 (267)
Energy for lighting	235.8549	0.5190	122.4087 (268)
Total kg/year			763.6139 (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	1176.2012	1.2200	1434.9654 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1523.4191	1.2200	1858.5713 (264)
Space and water heating			3293.5367 (265)
Pumps and fans	111.9215	3.0700	343.5991 (267)
Energy for lighting	235.8549	3.0700	724.0745 (268)
Primary energy kWh/year			4361.2104 (272)
Primary energy kWh/m2/year			86.1559 (273)

#### SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 83  
Current environmental impact rating: B 88

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

(For testing purposes):

A		Not considered
B		Not considered
C		Not considered
D		Not considered
E	Low energy lighting	Already installed
F		Not considered
G		Not considered
H		Not considered
I		Not considered
J		Not considered
K		Not considered
M		Not considered
N	Solar water heating	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 83  
 Potential environmental impact rating: B 88

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	£66	£66	£0
Mains gas	£197	£197	£0
Space heating	£160	£160	£0
Water heating	£59	£59	£0
Lighting	£45	£45	£0
Total cost of fuels	£263	£263	£0
Total cost of uses	£264	£264	£0
Delivered energy	60 kWh/m <sup>2</sup>	60 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>	15 kg/m <sup>2</sup>	15 kg/m <sup>2</sup>	0 kg/m <sup>2</sup>
Primary energy	86 kWh/m <sup>2</sup>	86 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>	676 - PRJ009149	<b>Issued on Date</b>	26/02/2021
<b>Assessment Reference</b>	676	<b>Prop Type Ref</b>	Block B
<b>Property</b>	Plot 676		

<b>SAP Rating</b>	83 B	<b>DER</b>	17.80	<b>TER</b>	19.58
<b>Environmental</b>	88 B	<b>% DER&lt;TER</b>	9.10		
<b>CO<sub>2</sub> Emissions (t/year)</b>	0.76	<b>DFEE</b>	41.68	<b>TFEE</b>	47.69
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	12.59		

<b>Assessor Details</b>	Mr. Michael Jukes, Michael Jukes, 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)	19.58	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	17.80	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-1.78 (-9.1%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	47.69	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	41.68	kWh/m <sup>2</sup> /yr	
	-6.0 (-12.6%)	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	0.25 (max. 0.30)	0.25 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	Pass
Openings	1.37 (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)

Medium

Pass

Based on:

Overshading

Average

Windows facing North East

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

Windows facing South East

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

Air change rate

3.87 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

0.11

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.*