

# PREDICTED ENERGY ASSESSMENT



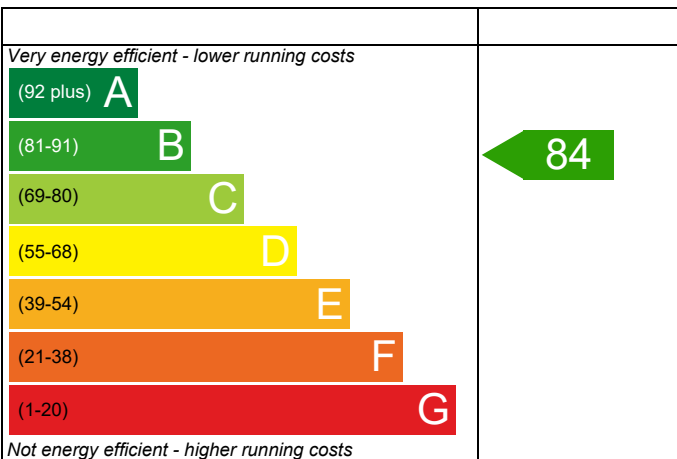
Plot 677

Dwelling type: Flat, End-Terrace  
 Date of assessment: 26/02/2021  
 Produced by: Michael Juckes  
 Total floor area: 69.37 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.

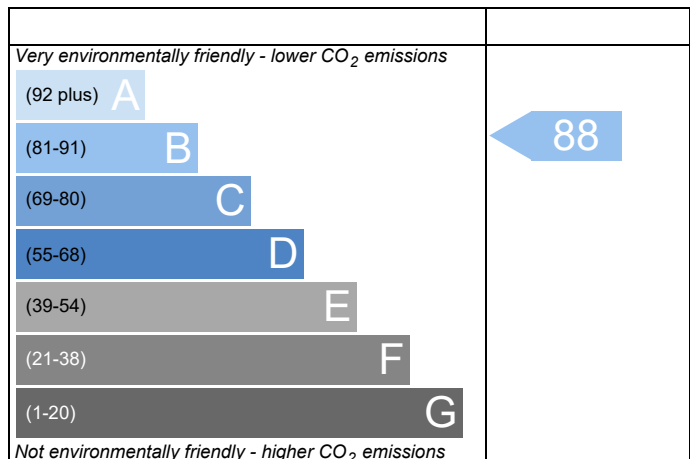
## Energy Efficiency Rating



**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	677 - PRJ009149		Issued on Date	26/02/2021	
Assessment Reference	677	Prop Type Ref	Block B		
Property	Plot 677				
SAP Rating	84 B	DER	16.54	TER	17.90
Environmental	88 B	% DER<TER	7.62		
CO <sub>2</sub> Emissions (t/year)	0.96	DFEE	40.43	TFEE	45.94
General Requirements Compliance	Pass	% DFEE<TFEE	12.00		
Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk			Assessor ID	T850-0001
Client					

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

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

##### 1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.90	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	16.54	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-1.36 (-7.6%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	45.94	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	40.43	kWh/m <sup>2</sup> /yr	
	-5.5 (-12.0%)	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	0.26 (max. 0.30)	0.26 (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)

Slight

Pass

Based on:

Overshading

Average

Windows facing South East

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

Windows facing South West

7.06 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

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.*

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



Property Reference	677 - PRJ009149	Issued on Date	26/02/2021
Assessment Reference	677	Prop Type Ref	Block B
Property	Plot 677		

SAP Rating	84 B	DER	16.54	TER	17.90
Environmental	88 B	% DER<TER	7.62		
CO <sub>2</sub> Emissions (t/year)	0.96	DFEE	40.43	TTEE	45.94
General Requirements Compliance	Pass	% DFEE<TTEE	12.00		

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	69.3700 (1b)	x 2.4700 (2b)	= 171.3439 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 171.3439 (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				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 5.1000	Feb 4.7000	Mar 4.6000	Apr 4.3000	May 4.3000	Jun 4.0000	Jul 4.0000	Aug 3.9000	Sep 4.0000	Oct 4.5000	Nov 4.4000	Dec 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:													
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)			11.9400	1.3258	15.8163		(27)
Solid Door			2.1200	1.2000	2.5440		(26)
W1 - Brick	44.9920	11.9360	33.0560	0.2600	8.5946	58.7400	1941.7094 (29a)
W1 - To Corridor	27.1700	2.1170	25.0530	0.2499	6.2610	106.6200	2671.1509 (29a)
RF - Ins Joist	69.3710		69.3710	0.1100	7.6308	5.8200	403.7392 (30)
Total net area of external elements Aum(A, m <sup>2</sup> )			141.5300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.8467		(33)
Party Wall			13.8690	0.0000	0.0000	54.0300	749.3421 (32)
Party Floor			69.3710			40.0000	2774.8400 (32d)
1st Floor Stud			135.1041			5.8200	786.3056 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9327.0872 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							134.4542 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.0517 (36)
Total fabric heat loss							(33) + (36) = 47.8983 (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	30.8407	29.5305	29.2030	28.2717	28.2717	28.2717	28.2717	28.2717	28.2717	28.8754	28.5479	29.5305 (38)
Average = Sum(39)m / 12 =	78.7391	77.4289	77.1013	76.1701	76.1701	76.1701	76.1701	76.1701	76.1701	76.7738	76.4462	77.4289 (39)
												76.7449 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1351	1.1162	1.1115	1.0980	1.0980	1.0980	1.0980	1.0980	1.0980	1.1067	1.1020	1.1162 (40)
Days in month												1.1063 (40)
	31	28	31	30	31	30	31	31	30	31	30	31 (41)

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

Assumed occupancy													2.2307 (42)
Average daily hot water use (litres/day)													87.1799 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	95.8979	92.4107	88.9235	85.4363	81.9491	78.4619	78.4619	81.9491	85.4363	88.9235	92.4107	95.8979 (44)	
Distribution loss (46)m = 0.15 x (45)m	142.2138	124.3811	128.3502	111.8988	107.3695	92.6518	85.8555	98.5204	99.6971	116.1873	126.8275	137.7265 (45)	
Water storage loss:	21.3321	18.6572	19.2525	16.7848	16.1054	13.8978	12.8783	14.7781	14.9546	17.4281	19.0241	20.6590 (46)	
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	14.6261	13.1859	14.5593	14.0451	14.4809	13.9764	14.4190	14.4591	14.0138	14.5269	14.1099	14.6131 (61)	
Total heat required for water heating calculated for each month	156.8399	137.5670	142.9095	125.9439	121.8504	106.6281	100.2745	112.9795	113.7109	130.7142	140.9374	152.3396 (62)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)	
Output from w/h	156.8399	137.5670	142.9095	125.9439	121.8504	106.6281	100.2745	112.9795	113.7109	130.7142	140.9374	152.3396 (64)	
RHI water heating demand	Total per year (kWh/year) = Sum(64)m =											1542.6949 (64)	
Heat gains from water heating, kWh/month	50.9426	44.6532	46.3163	40.7176	39.3206	34.3008	32.1517	36.3728	36.6527	42.2640	45.6976	49.4473 (65)	

#### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	44.9163	39.8942	32.4442	24.5623	18.3606	15.5008	16.7492	21.7712	29.2213	37.1031	43.3048	46.1646 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	292.2720	295.3049	287.6621	271.3917	250.8531	231.5498	218.6540	215.6211	223.2638	239.5343	260.0728	279.3762 (68)
Pumps, fans	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293 (71)
Total internal gains	68.4712	66.4482	62.2530	56.5523	52.8503	47.6400	43.2146	48.8882	50.9066	56.8064	63.4689	66.4615 (72)
	503.8893	499.8771	480.5891	450.7360	420.2938	392.9204	376.8476	384.5103	401.6215	431.6737	465.0764	490.2321 (73)

#### 6. Solar gains

[Jan]	Area	Solar flux	Specific data	Specific data	Access	Gains						
	m <sup>2</sup>	Table 6a	g	FF	factor	W						
		W/m <sup>2</sup>	or Table 6b	or Table 6c	Table 6d							
Southeast	4.8740	46.3896	0.5000	0.0000	0.7700	87.0496 (77)						
Southwest	7.0620	46.3896	0.5000	0.0000	0.7700	126.1273 (79)						
Solar gains	213.1769	310.1364	422.6599	536.2588	577.5756	622.6099	585.0438	544.4196	486.0900	362.5623	252.9330	174.2622 (83)
Total gains	717.0662	810.0135	903.2490	986.9948	997.8693	1015.5303	961.8914	928.9299	887.7115	794.2360	718.0094	664.4943 (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)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha	32.9044	33.4611	33.6033	34.0141	34.0141	34.0141	34.0141	34.0141	34.0141	33.7466	33.8912	33.4611	
util living area	3.1936	3.2307	3.2402	3.2676	3.2676	3.2676	3.2676	3.2676	3.2676	3.2498	3.2594	3.2307	
MIT	0.9167	0.8842	0.8201	0.7145	0.5778	0.4054	0.2892	0.2991	0.4845	0.7180	0.8631	0.9280 (86)	
Th 2	19.7766	19.9909	20.3194	20.6467	20.8631	20.9677	20.9921	20.9913	20.9417	20.7062	20.2570	19.7430 (87)	
util rest of house	19.9723	19.9876	19.9915	20.0024	20.0024	20.0024	20.0024	20.0024	20.0024	19.9953	19.9992	19.9876 (88)	
MIT 2	0.9029	0.8665	0.7938	0.6758	0.5233	0.3381	0.2129	0.2203	0.4134	0.6693	0.8387	0.9157 (89)	
	18.9011	19.1164	19.4273	19.7311	19.9123	19.9869	20.0002	19.9999	19.9719	19.7845	19.3838	18.8819 (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) =	0.4159 (91)		
MIT	19.2652	19.4801	19.7983	20.1119	20.3077	20.3948	20.4127	20.4122	20.3752	20.1678	19.7470	19.2401 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.1152	19.3301	19.6483	19.9619	20.1577	20.2448	20.2627	20.2622	20.2252	20.0178	19.5970	19.0901 (93)

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8892	0.8532	0.7839	0.6742	0.5322	0.3548	0.2330	0.2411	0.4298	0.6705	0.8275	0.9026 (94)
Useful gains	637.6470	691.0873	708.0265	665.3961	531.0422	360.3157	224.1541	223.9528	381.5036	532.5303	594.1706	599.7789 (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	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	329.0542	244.7929	181.5687	89.1864	33.2053	0.0000	0.0000	0.0000	0.0000	73.1974	188.4920	336.6481 (98)
Space heating												1476.1452 (98)
RHI space heating demand												1476 (98)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

#### 1. Overall dwelling dimensions

	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	69.3700 (1b)	x 2.4700 (2b)	= 171.3439 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 171.3439 (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	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:												
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 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 (U <sub>w</sub> = 1.40)			11.9400	1.3258	15.8163		(27)
Solid Door			2.1200	1.2000	2.5440		(26)
Wl - Brick	44.9920	11.9360	33.0560	0.2600	8.5946	58.7400	1941.7094 (29a)
Wl - To Corridor	27.1700	2.1170	25.0530	0.2499	6.2610	106.6200	2671.1509 (29a)
Rf - Ins Joist	69.3710		69.3710	0.1100	7.6308	5.8200	403.7392 (30)
Total net area of external elements A <sub>um</sub> (A, m <sup>2</sup> )			141.5300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.8467		(33)
Party Wall			13.8690	0.0000	0.0000	54.0300	749.3421 (32)
Party Floor			69.3710			40.0000	2774.8400 (32d)
1st Floor Stud			135.1041			5.8200	786.3056 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	9327.0872 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							134.4542 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.0517 (36)
Total fabric heat loss						(33) + (36) =	47.8983 (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	30.8407	30.5132	30.1856	28.5479	28.2717	28.2717	28.2717	28.2717	28.2717	28.2717	28.8754	29.5305 (38)
Heat transfer coeff	78.7391	78.4115	78.0840	76.4462	76.1701	76.1701	76.1701	76.1701	76.1701	76.1701	76.7738	77.4289 (39)
Average = Sum(39)m / 12 =												76.9087 (39)
HLP	1.1351	1.1303	1.1256	1.1020	1.0980	1.0980	1.0980	1.0980	1.0980	1.0980	1.1067	1.1162 (40)
HLP (average)												1.1087 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2307 (42)
Average daily hot water use (litres/day)												87.1799 (43)
Daily hot water use	95.8979	92.4107	88.9235	85.4363	81.9491	78.4619	78.4619	81.9491	85.4363	88.9235	92.4107	95.8979 (44)
Energy conte	142.2138	124.3811	128.3502	111.8988	107.3695	92.6518	85.8555	98.5204	99.6971	116.1873	126.8275	137.7265 (45)
Energy content (annual)										Total = Sum(45)m =		1371.6794 (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	21.3321	18.6572	19.2525	16.7848	16.1054	13.8978	12.8783	14.7781	14.9546	17.4281	19.0241	20.6590 (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	14.6261	13.1859	14.5593	14.0451	14.4809	13.9764	14.4190	14.4591	14.0138	14.5269	14.1099	14.6131 (61)
Total heat required for water heating calculated for each month	156.8399	137.5670	142.9095	125.9439	121.8504	106.6281	100.2745	112.9795	113.7109	130.7142	140.9374	152.3396 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	156.8399	137.5670	142.9095	125.9439	121.8504	106.6281	100.2745	112.9795	113.7109	130.7142	140.9374	152.3396 (64)
Heat gains from water heating, kWh/month	50.9426	44.6532	46.3163	40.7176	39.3206	34.3008	32.1517	36.3728	36.6527	42.2640	45.6976	49.4473 (65)
Solar input (sum of months) = Sum(63)m = 0.0000 (63)												
Total per year (kWh/year) = Sum(64)m = 1542.6949 (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	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	44.9163	39.8942	32.4442	24.5623	18.3606	15.5008	16.7492	21.7712	29.2213	37.1031	43.3048	46.1646 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	292.2720	295.3049	287.6621	271.3917	250.8531	231.5498	218.6540	215.6211	223.2638	239.5343	260.0728	279.3762 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293 (71)
Water heating gains (Table 5)	68.4712	66.4482	62.2530	56.5523	52.8503	47.6400	43.2146	48.8882	50.9066	56.8064	63.4689	66.4615 (72)
Total internal gains	503.8893	499.8771	480.5891	450.7360	420.2938	392.9204	376.8476	384.5103	401.6215	431.6737	465.0764	490.2321 (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							
Southeast	4.8740	36.7938	0.5000	0.0000	0.7700	69.0433 (77)						
Southwest	7.0620	36.7938	0.5000	0.0000	0.7700	100.0376 (79)						
Solar gains	169.0809	288.0073	394.0642	488.2646	546.8971	542.9422	523.4542	479.7118	426.6882	318.3095	202.5200	144.6980 (83)
Total gains	672.9702	787.8844	874.6533	939.0007	967.1909	935.8626	900.3018	864.2221	828.3096	749.9831	667.5963	634.9301 (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	32.9044	33.0418	33.1804	33.8912	34.0141	34.0141	34.0141	34.0141	34.0141	34.0141	33.7466	33.4611
alpha	3.1936	3.2028	3.2120	3.2594	3.2676	3.2676	3.2676	3.2676	3.2676	3.2676	3.2498	3.2307
util living area	0.9388	0.9037	0.8502	0.7594	0.6361	0.4893	0.3629	0.3925	0.5733	0.7862	0.9056	0.9470 (86)
MIT	19.5364	19.8191	20.1652	20.5417	20.7982	20.9360	20.9817	20.9759	20.8901	20.5614	20.0008	19.4931 (87)
Th 2	19.9723	19.9761	19.9800	19.9992	20.0024	20.0024	20.0024	20.0024	20.0024	20.0024	19.9953	19.9876 (88)
util rest of house	0.9288	0.8889	0.8278	0.7251	0.5864	0.4224	0.2843	0.3124	0.5064	0.7477	0.8886	0.9382 (89)
MIT 2	18.6677	18.9424	19.2742	19.6366	19.8611	19.9673	19.9956	19.9928	19.9372	19.6659	19.1383	18.6376 (90)
Living area fraction	19.0289	19.3070	19.6447	20.0130	20.2508	20.3702	20.4057	20.4017	20.3335	20.0383	19.4970	18.9934 (92)
Temperature adjustment	18.8789	19.1570	19.4947	19.8630	20.1008	20.2202	20.2557	20.2517	20.1835	19.8883	19.3470	-0.1500
adjusted MIT												18.8434 (93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	616.3483	689.3998	713.5481	676.1014	572.1215	409.3932	274.2692	287.6465	429.9837	557.1451	584.6249	587.9740 (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	1147.9325	1117.9149	1014.6806	838.0798	639.8921	428.0899	278.4541	293.3813	463.3815	707.4916	940.2462	1133.8205 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	395.4987	287.9621	224.0426	116.6245	50.4213	0.0000	0.0000	0.0000	0.0000	111.8578	256.0473	406.1098 (98)
Space heating	1848.5641 (98)											
Space heating per m <sup>2</sup>	(98) / (4) = 26.6479 (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													2042.6123 (211)
Space heating requirement	395.4987	287.9621	224.0426	116.6245	50.4213	0.0000	0.0000	0.0000	0.0000	111.8578	256.0473	406.1098	(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)	437.0151	318.1902	247.5609	128.8669	55.7142	0.0000	0.0000	0.0000	0.0000	123.5997	282.9252	448.7401	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	156.8399	137.5670	142.9095	125.9439	121.8504	106.6281	100.2745	112.9795	113.7109	130.7142	140.9374	152.3396	(64)
Efficiency of water heater (217)m	89.5677	89.4401	89.2263	88.8098	88.2129	87.3000	87.3000	87.3000	87.3000	88.7470	89.3374	89.6040	(216)
Fuel for water heating, kWh/month	175.1075	153.8091	160.1653	141.8131	138.1322	122.1399	114.8619	129.4153	130.2530	147.2885	157.7586	170.0143	(219)
Water heating fuel used													1740.7585 (219)
Annual totals kWh/year													
Space heating fuel - main system													2042.6123 (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)													50.5975 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													125.5975 (231)
Electricity for lighting (calculated in Appendix L)													317.2942 (232)
Total delivered energy for all uses													4226.2625 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2042.6123	3.4800	71.0829 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1740.7585	3.4800	60.5784 (247)
Mechanical ventilation fans	50.5975	13.1900	6.6738 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	317.2942	13.1900	41.8511 (250)
Additional standing charges			120.0000 (251)
Total energy cost			310.0787 (255)

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

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.1387 (257)
SAP value		84.1151
SAP rating (Section 12)		84 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2042.6123	0.2160	441.2042 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1740.7585	0.2160	376.0038 (264)
Space and water heating			817.2081 (265)
Pumps and fans	125.5975	0.5190	65.1851 (267)
Energy for lighting	317.2942	0.5190	164.6757 (268)
Total kg/year			1047.0689 (272)
CO2 emissions per m2			15.0900 (273)
EI value			87.7322
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	$3.48 / 0.8851 = 3.932$ , stars = 4
Water heating environmental impact	$0.216 / 0.8851 = 0.2440$ , 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	69.3700 (1b)	x 2.4700 (2b)	= 171.3439 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.3700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 171.3439 (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	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:												
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 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)			11.9400	1.3258	15.8163		(27)
Solid Door			2.1200	1.2000	2.5440		(26)
Wl - Brick	44.9920	11.9360	33.0560	0.2600	8.5946	58.7400	1941.7094 (29a)
Wl - To Corridor	27.1700	2.1170	25.0530	0.2499	6.2610	106.6200	2671.1509 (29a)
Rf - Ins Joist	69.3710		69.3710	0.1100	7.6308	5.8200	403.7392 (30)
Total net area of external elements Aum(A, m2)			141.5300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.8467		(33)
Party Wall			13.8690	0.0000	0.0000	54.0300	749.3421 (32)
Party Floor			69.3710			40.0000	2774.8400 (32d)
1st Floor Stud			135.1041			5.8200	786.3056 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9327.0872 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							134.4542 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.0517 (36)
Total fabric heat loss							(33) + (36) = 47.8983 (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	30.8407	29.5305	29.2030	28.2717	28.2717	28.2717	28.2717	28.2717	28.2717	28.8754	28.5479	29.5305 (38)
Heat transfer coeff	78.7391	77.4289	77.1013	76.1701	76.1701	76.1701	76.1701	76.1701	76.1701	76.7738	76.4462	77.4289 (39)
Average = Sum(39)m / 12 =												76.7449 (39)
HLP	1.1351	1.1162	1.1115	1.0980	1.0980	1.0980	1.0980	1.0980	1.0980	1.1067	1.1020	1.1162 (40)
HLP (average)												1.1063 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.2307 (42)
Average daily hot water use (litres/day)												87.1799 (43)
Daily hot water use	95.8979	92.4107	88.9235	85.4363	81.9491	78.4619	78.4619	81.9491	85.4363	88.9235	92.4107	95.8979 (44)
Energy conte	142.2138	124.3811	128.3502	111.8988	107.3695	92.6518	85.8555	98.5204	99.6971	116.1873	126.8275	137.7265 (45)
Energy content (annual)												Total = Sum(45)m = 1371.6794 (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	21.3321	18.6572	19.2525	16.7848	16.1054	13.8978	12.8783	14.7781	14.9546	17.4281	19.0241	20.6590 (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	14.6261	13.1859	14.5593	14.0451	14.4809	13.9764	14.4190	14.4591	14.0138	14.5269	14.1099	14.6131 (61)
Total heat required for water heating calculated for each month	156.8399	137.5670	142.9095	125.9439	121.8504	106.6281	100.2745	112.9795	113.7109	130.7142	140.9374	152.3396 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	156.8399	137.5670	142.9095	125.9439	121.8504	106.6281	100.2745	112.9795	113.7109	130.7142	140.9374	152.3396 (64)
Heat gains from water heating, kWh/month	50.9426	44.6532	46.3163	40.7176	39.3206	34.3008	32.1517	36.3728	36.6527	42.2640	45.6976	49.4473 (65)
												Solar input (sum of months) = Sum(63)m = 0.0000 (63)
												Total per year (kWh/year) = Sum(64)m = 1542.6949 (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	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440	133.8440 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	44.9163	39.8942	32.4442	24.5623	18.3606	15.5008	16.7492	21.7712	29.2213	37.1031	43.3048	46.1646 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	292.2720	295.3049	287.6621	271.3917	250.8531	231.5498	218.6540	215.6211	223.2638	239.5343	260.0728	279.3762 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151	50.6151 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293	-89.2293 (71)
Water heating gains (Table 5)	68.4712	66.4482	62.2530	56.5523	52.8503	47.6400	43.2146	48.8882	50.9066	56.8064	63.4689	66.4615 (72)
Total internal gains	503.8893	499.8771	480.5891	450.7360	420.2938	392.9204	376.8476	384.5103	401.6215	431.6737	465.0764	490.2321 (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						
Southeast	4.8740	46.3896	0.5000	0.0000	0.7700	87.0496 (77)						
Southwest	7.0620	46.3896	0.5000	0.0000	0.7700	126.1273 (79)						
Solar gains	213.1769	310.1364	422.6599	536.2588	577.5756	622.6099	585.0438	544.4196	486.0900	362.5623	252.9330	174.2622 (83)
Total gains	717.0662	810.0135	903.2490	986.9948	997.8693	1015.5303	961.8914	928.9299	887.7115	794.2360	718.0094	664.4943 (84)

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

Temperature during heating periods in the living area from Table 9, Thl (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
tau	32.9044	33.4611	33.6033	34.0141	34.0141	34.0141	34.0141	34.0141	34.0141	33.7466	33.8912	33.4611
alpha	3.1936	3.2307	3.2402	3.2676	3.2676	3.2676	3.2676	3.2676	3.2676	3.2498	3.2594	3.2307
util living area	0.9167	0.8842	0.8201	0.7145	0.5778	0.4054	0.2892	0.2991	0.4845	0.7180	0.8631	0.9280 (86)
MIT	19.7766	19.9909	20.3194	20.6467	20.8631	20.9677	20.9921	20.9913	20.9417	20.7062	20.2570	19.7430 (87)
Th 2	19.9723	19.9876	19.9915	20.0024	20.0024	20.0024	20.0024	20.0024	20.0024	19.9953	19.9992	19.9876 (88)
util rest of house	0.9029	0.8665	0.7938	0.6758	0.5233	0.3381	0.2129	0.2203	0.4134	0.6693	0.8387	0.9157 (89)
MIT 2	18.9011	19.1164	19.4273	19.7311	19.9123	19.9869	20.0002	19.9999	19.9719	19.7845	19.3838	18.8819 (90)
Living area fraction	19.2652	19.4801	19.7983	20.1119	20.3077	20.3948	20.4127	20.4122	20.3752	20.1678	19.7470	19.2401 (92)
Temperature adjustment	19.1152	19.3301	19.6483	19.9619	20.1577	20.2448	20.2627	20.2622	20.2252	20.0178	19.5970	-0.1500
adjusted MIT												19.0901 (93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	637.6470	691.0873	708.0265	665.3961	531.0422	360.3157	224.1541	223.9528	381.5036	532.5303	594.1706	599.7789 (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	1079.9241	1055.3625	952.0705	789.2661	575.6729	369.0295	225.6704	225.6331	398.0071	630.9139	855.9651	1052.2630 (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	329.0542	244.7929	181.5687	89.1864	33.2053	0.0000	0.0000	0.0000	0.0000	73.1974	188.4920	336.6481 (98)
Space heating												1476.1452 (98)
Space heating per m2												(98) / (4) = 21.2793 (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													1631.0996 (211)
Space heating requirement	329.0542	244.7929	181.5687	89.1864	33.2053	0.0000	0.0000	0.0000	0.0000	73.1974	188.4920	336.6481	(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)	363.5958	270.4894	200.6284	98.5486	36.6909	0.0000	0.0000	0.0000	0.0000	80.8811	208.2785	371.9869	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	156.8399	137.5670	142.9095	125.9439	121.8504	106.6281	100.2745	112.9795	113.7109	130.7142	140.9374	152.3396	(64)
Efficiency of water heater (217)m	89.4417	89.3220	89.0622	88.5988	87.9661	87.3000	87.3000	87.3000	87.3000	88.4223	89.1027	89.4782	(216)
Fuel for water heating, kWh/month	175.3542	154.0124	160.4603	142.1509	138.5198	122.1399	114.8619	129.4153	130.2530	147.8294	158.1742	170.2534	(219)
Water heating fuel used													1743.4246 (219)
Annual totals kWh/year													
Space heating fuel - main system													1631.0996 (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)													50.5975 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													125.5975 (231)
Electricity for lighting (calculated in Appendix L)													317.2942 (232)
Total delivered energy for all uses													3817.4159 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1631.0996	3.8700	63.1236 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1743.4246	3.8700	67.4705 (247)
Mechanical ventilation fans	50.5975	18.9000	9.5629 (249)
Pumps and fans for heating	75.0000	18.9000	14.1750 (249)
Energy for lighting	317.2942	18.9000	59.9686 (250)
Additional standing charges			93.0000 (251)
Total energy cost			307.3006 (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	1631.0996	0.2160	352.3175 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1743.4246	0.2160	376.5797 (264)
Space and water heating			728.8972 (265)
Pumps and fans	125.5975	0.5190	65.1851 (267)
Energy for lighting	317.2942	0.5190	164.6757 (268)
Total kg/year			958.7580 (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	1631.0996	1.2200	1989.9415 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1743.4246	1.2200	2126.9780 (264)
Space and water heating			4116.9196 (265)
Pumps and fans	125.5975	3.0700	385.5844 (267)
Energy for lighting	317.2942	3.0700	974.0931 (268)
Primary energy kWh/year			5476.5971 (272)
Primary energy kWh/m2/year			78.9476 (273)

#### SAP 2012 EPC IMPROVEMENTS

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

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

(For testing purposes):

A	Not considered
B	Not considered
C	Not considered
D	Not considered
E Low energy lighting	Already installed
F	Not considered
G	Not considered
H	Not considered
I	Not considered
J	Not considered
K	Not considered
M	Not considered
N Solar water heating	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 84  
 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	£84	£84	£0
Mains gas	£224	£224	£0
Space heating	£180	£180	£0
Water heating	£67	£67	£0
Lighting	£60	£60	£0
Total cost of fuels	£308	£308	£0
Total cost of uses	£307	£307	£0
Delivered energy	55 kWh/m <sup>2</sup>	55 kWh/m <sup>2</sup>	0 kWh/m <sup>2</sup>
Carbon dioxide emissions	1.0 tonnes	1.0 tonnes	0.0 tonnes
CO2 emissions per m <sup>2</sup>	14 kg/m <sup>2</sup>	14 kg/m <sup>2</sup>	0 kg/m <sup>2</sup>
Primary energy	79 kWh/m <sup>2</sup>	79 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>	677 - PRJ009149	<b>Issued on Date</b>	26/02/2021
<b>Assessment Reference</b>	677	<b>Prop Type Ref</b>	Block B
<b>Property</b>	Plot 677		

<b>SAP Rating</b>	84 B	<b>DER</b>	16.54	<b>TER</b>	17.90
<b>Environmental</b>	88 B	<b>% DER&lt;TER</b>	7.62		
<b>CO<sub>2</sub> Emissions (t/year)</b>	0.96	<b>DFEE</b>	40.43	<b>TFEE</b>	45.94
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	12.00		

<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)	17.90	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	16.54	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-1.36 (-7.6%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	45.94	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	40.43	kWh/m <sup>2</sup> /yr	
	-5.5 (-12.0%)	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	0.26 (max. 0.30)	0.26 (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)

Slight

Pass

Based on:

Overshading

Average

Windows facing South East

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

Windows facing South West

7.06 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

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.*