

# PREDICTED ENERGY ASSESSMENT



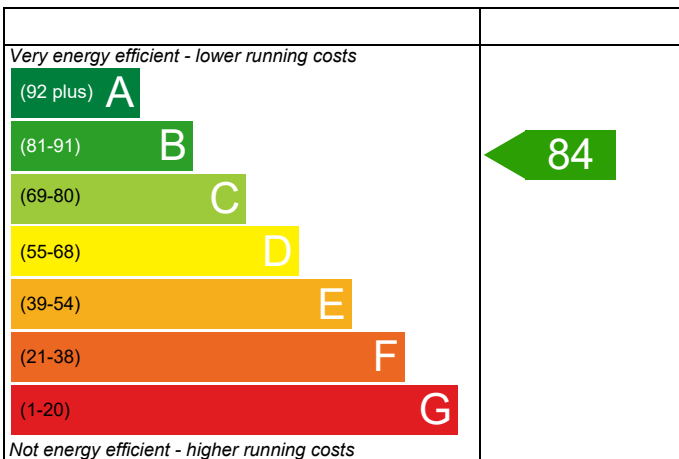
Plot 37

Dwelling type: House, End-Terrace  
 Date of assessment: 18/08/2022  
 Produced by: Michael Juckes  
 Total floor area: 94.14 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.

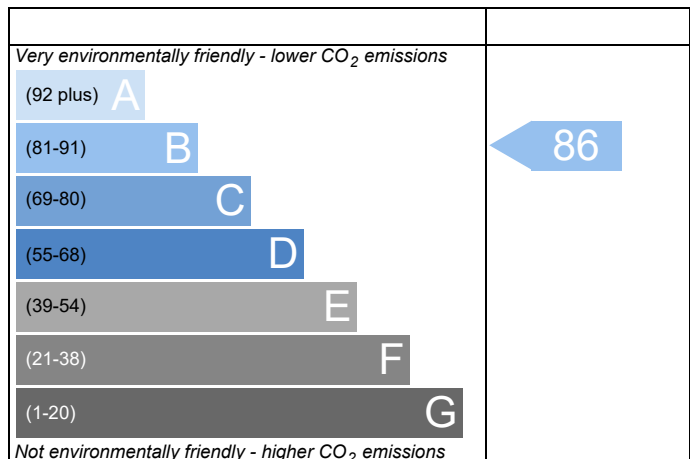
## Energy Efficiency Rating



**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.

# BUILDING REGULATION COMPLIANCE

## Calculation Type: New Build (As Designed)



Property Reference	037 - PRJ012620		Issued on Date	18/08/2022	
Assessment Reference	037 E	Prop Type Ref	Clover		
Property	Plot 37				
SAP Rating	84 B	DER	17.01	TER	17.60
Environmental	86 B	% DER<TER	3.36		
CO <sub>2</sub> Emissions (t/year)	1.34	DFEE	45.21	TFEE	51.02
General Requirements Compliance	Pass	% DFEE<TFEE	11.38		
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)	17.60	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	17.01	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-0.59 (-3.4%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.02	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.21	kWh/m <sup>2</sup> /yr	
	-5.8 (-11.4%)	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
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (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

# BUILDING REGULATION COMPLIANCE

## Calculation Type: New Build (As Designed)



Main heating system

Boiler system with radiators or underfloor - Mains gas  
Data from database  
Ideal LOGIC COMBI ESP1 30  
Combi boiler  
Efficiency: 89.6% SEDBUK2009  
Minimum: 88.0%

Pass

Secondary heating system

None

### 5 Cylinder insulation

Hot water storage

No cylinder

### 6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

### 7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

### 8 Mechanical ventilation

Not applicable

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

### 9 Summertime temperature

Overheating risk (South East England)

Slight

Pass

Based on:

Overshading

Average

Windows facing East

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

Windows facing West

5.99 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

0.10

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

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



Property Reference	037 - PRJ012620	Issued on Date	18/08/2022
Assessment Reference	037 E	Prop Type Ref	Clover
Property	Plot 37		

SAP Rating	84 B	DER	17.01	TER	17.60
Environmental	86 B	% DER<TER	3.36		
CO <sub>2</sub> Emissions (t/year)	1.34	DFEE	45.21	TTEE	51.02
General Requirements Compliance	Pass	% DFEE<TTEE	11.38		

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	47.0700 (1b)	x 2.3900 (2b)	= 112.4973 (1b) - (3b)
First floor	47.0700 (1c)	x 2.6900 (2c)	= 126.6183 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1400		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 239.1156 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m <sup>3</sup> per hour							
Number of chimneys	0	0	0	0 + 40 =	0.0000 (6a)							
Number of open flues	0	0	0	0 + 20 =	0.0000 (6b)							
Number of intermittent fans				3 * 10 =	30.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)				30.0000 / (5) =	0.1255 (8)							
Pressure test				Yes								
Measured/design AP50					5.0100							
Infiltration rate					0.3760 (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) =		0.3478 (21)							
Wind speed	Jan 4.8000	Feb 4.5000	Mar 4.4000	Apr 3.9000	May 3.9000	Jun 3.6000	Jul 3.7000	Aug 3.5000	Sep 3.7000	Oct 4.0000	Nov 4.1000	Dec 4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infiltr rate	0.4173	0.3912	0.3825	0.3391	0.3391	0.3130	0.3217	0.3043	0.3217	0.3478	0.3565	0.3825 (22b)
Effective ac	0.5871	0.5765	0.5732	0.5575	0.5575	0.5490	0.5517	0.5463	0.5517	0.5605	0.5635	0.5732 (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)			11.9300	1.3258	15.8163		(27)
Solid Door			1.9500	1.2000	2.3400		(26)
F1r - Ground			47.0720	0.1500	7.0608		(28a)
W1 - Brick	8.2850	3.1500	5.1350	0.2500	1.2838	75.6000	3558.6432 (28a)
W1 - Render	90.8210	10.7300	80.0910	0.2500	20.0228	51.1800	262.8093 (29a)
Rf - Ins Joist	47.0720		47.0720	0.1000	4.7072	51.1800	4099.0574 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			193.2500			5.8200	273.9590 (30)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.2308		(31)
Party Wall			43.5970	0.0000	0.0000	54.0300	2355.5459 (32)
Ground Floor Stud			82.7595			5.8200	481.6603 (32c)
1st Floor Stud			100.8056			5.8200	586.6888 (32c)
Internal Floor			47.0700			18.0000	847.2600 (32d)
Internal Ceiling			47.0700			5.8200	273.9474 (32e)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	12739.5713 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							135.3258 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.8331 (36)
Total fabric heat loss						(33) + (36) =	61.0639 (37)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF HEAT DEMAND 09 Jan 2014

Ventilation heat loss calculated monthly (38)m =  $0.33 \times (25)m \times (5)$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	46.3252	45.4931	45.2277	43.9901	43.9901	43.3191	43.5368	43.1073	43.5368	44.2257	44.4672	45.2277 (38)
Heat transfer coeff	107.3891	106.5570	106.2916	105.0540	105.0540	104.3829	104.6007	104.1712	104.6007	105.2896	105.5311	106.2916 (39)
Average = Sum(39)m / 12 =												105.4344 (39)
HLP	1.1407	1.1319	1.1291	1.1159	1.1159	1.1088	1.1111	1.1066	1.1111	1.1184	1.1210	1.1291 (40)
HLP (average)												1.1200 (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												2.6783 (42)
Average daily hot water use (litres/day)												97.8086 (43)
Daily hot water use	107.5894	103.6771	99.7648	95.8524	91.9401	88.0277	88.0277	91.9401	95.8524	99.7648	103.6771	107.5894 (44)
Energy conte	159.5520	139.5452	143.9982	125.5411	120.4597	103.9475	96.3227	110.5317	111.8518	130.3525	142.2899	154.5176 (45)
Energy content (annual)												Total = Sum(45)m = 1538.9098 (45)
Distribution loss (46)m = $0.15 \times (45)m$	23.9328	20.9318	21.5997	18.8312	18.0690	15.5921	14.4484	16.5798	16.7778	19.5529	21.3435	23.1776 (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	14.6956	13.2597	14.6479	14.1193	14.5492	14.0328	14.4713	14.5218	14.0799	14.6070	14.1852	14.6805 (61)
Total heat required for water heating calculated for each month	174.2476	152.8049	158.6461	139.6604	135.0088	117.9803	110.7940	125.0535	125.9317	144.9595	156.4751	169.1981 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Solar input (sum of months) = Sum(63)m =												0.0000 (63)
Output from w/h	174.2476	152.8049	158.6461	139.6604	135.0088	117.9803	110.7940	125.0535	125.9317	144.9595	156.4751	169.1981 (64)
Total per year (kWh/year) = Sum(64)m =												1710.7600 (64)
RHI water heating demand												1711 (64)
Heat gains from water heating, kWh/month	56.7249	49.7137	51.5414	45.2722	43.6901	38.0708	35.6451	40.3822	40.7107	46.9940	50.8577	55.0472 (65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.2487	53.5124	43.5192	32.9468	24.6281	20.7921	22.4666	29.2030	39.1962	49.7685	58.0872	61.9232 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	367.8979	371.7155	362.0952	341.6147	315.7618	291.4637	275.2311	271.4134	281.0337	301.5142	327.3672	351.6653 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478 (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)	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302 (71)
Water heating gains (Table 5)	76.2432	73.9787	69.2760	62.8781	58.7233	52.8761	47.9101	54.2772	56.5426	63.1639	70.6357	73.9882 (72)
Total internal gains	614.7027	609.5196	585.2034	547.7526	509.4262	475.4448	455.9207	465.2065	487.0854	524.7596	566.4030	597.8896 (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						
East	5.9360	23.7288	0.5000	0.0000	0.7700	54.2289 (76)						
West	5.9910	23.7288	0.5000	0.0000	0.7700	54.7313 (80)						
Solar gains	108.9602	189.4214	309.9615	474.2749	556.9895	608.6565	573.0558	498.2369	385.2730	240.1730	137.1839	86.6500 (83)
Total gains	723.6629	798.9410	895.1649	1022.0275	1066.4156	1084.1013	1028.9765	963.4434	872.3584	764.9326	703.5869	684.5396 (84)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	32.9528	33.2101	33.2930	33.6853	33.6853	33.9018	33.8312	33.9707	33.8312	33.6099	33.5330	33.2930
alpha	3.1969	3.2140	3.2195	3.2457	3.2457	3.2601	3.2554	3.2647	3.2554	3.2407	3.2355	3.2195
util living area	0.9625	0.9483	0.9107	0.8240	0.6877	0.5035	0.3570	0.3684	0.6278	0.8486	0.9392	0.9663 (86)
MIT	19.3966	19.5767	19.9572	20.4215	20.7644	20.9386	20.9855	20.9847	20.8734	20.4786	19.8943	19.3972 (87)
Th 2	19.9677	19.9749	19.9772	19.9878	19.9878	19.9936	19.9918	19.9955	19.9918	19.9858	19.9837	19.9772 (88)
util rest of house	0.9556	0.9390	0.8942	0.7923	0.6324	0.4245	0.2609	0.2671	0.5476	0.8117	0.9259	0.9599 (89)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF HEAT DEMAND 09 Jan 2014

MIT 2	18.5304	18.7117	19.0823	19.5263	19.8271	19.9631	19.9876	19.9913	19.9214	19.5886	19.0326	18.5386 (90)
Living area fraction									fLA = Living area / (4) =			0.2014 (91)
MIT	18.7049	18.8859	19.2585	19.7066	20.0159	20.1595	20.1886	20.1914	20.1132	19.7679	19.2062	18.7115 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.5549	18.7359	19.1085	19.5566	19.8659	20.0095	20.0386	20.0414	19.9632	19.6179	19.0562	18.5615 (93)

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9431	0.9246	0.8772	0.7770	0.6251	0.4258	0.2655	0.2718	0.5451	0.7959	0.9106	0.9482 (94)
Useful gains	682.5070	738.6657	785.2528	794.0960	666.6546	461.6034	273.2044	261.8959	475.5606	608.8461	640.7022	649.0807 (95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)
Heat loss rate W	1455.6444	1421.0332	1276.4076	1056.4874	763.3064	481.1577	275.9997	264.7371	519.1514	833.6681	1156.2180	1420.2148 (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	575.2142	458.5509	365.4192	188.9219	71.9090	0.0000	0.0000	0.0000	0.0000	167.2675	371.1714	573.7238 (98)
Space heating												2772.1778 (98)
RHI space heating demand												2772 (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	47.0700 (1b)	2.3900 (2b)	112.4973 (1b) - (3b)
First floor	47.0700 (1c)	2.6900 (2c)	126.6183 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1400		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 239.1156 (5)
Dwelling volume			

#### 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				3 * 10 =	30.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1255 (8)
Pressure test				Yes	
Measured/design AP50					5.0100
Infiltration rate					0.3760 (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) =	0.3478 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4434	0.4347	0.4260	0.3825	0.3738	0.3304	0.3304	0.3217	0.3478	0.3738	0.3912	0.4086 (22b)
	0.5983	0.5945	0.5907	0.5732	0.5699	0.5546	0.5546	0.5517	0.5605	0.5699	0.5765	0.5835 (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)			11.9300	1.3258	15.8163		(27)
Solid Door			1.9500	1.2000	2.3400		(26)
Flr - Ground			47.0720	0.1500	7.0608	75.6000	3558.6432 (28a)
Wl - Brick	8.2850	3.1500	5.1350	0.2500	1.2838	51.1800	262.8093 (29a)
Wl - Render	90.8210	10.7300	80.0910	0.2500	20.0228	51.1800	4099.0574 (29a)
Rf - Ins Joist	47.0720		47.0720	0.1000	4.7072	5.8200	273.9590 (30)
Total net area of external elements Aum(A, m2)			193.2500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.2308		(33)
Party Wall			43.5970	0.0000	0.0000	54.0300	2355.5459 (32)
Ground Floor Stud			82.7595			5.8200	481.6603 (32c)
1st Floor Stud			100.8056			5.8200	586.6888 (32c)
Internal Floor			47.0700			18.0000	847.2600 (32d)
Internal Ceiling			47.0700			5.8200	273.9474 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12739.5713 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							135.3258 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.8331 (36)
Total fabric heat loss						(33) + (36) =	61.0639 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	47.2109	46.9097	46.6145	45.2277	44.9683	43.7604	43.7604	43.5368	44.2257	44.9683	45.4931	46.0419 (38)
Average = Sum(39)m / 12 =	108.2748	107.9736	107.6783	106.2916	106.0321	104.8243	104.8243	104.6007	105.2896	106.0321	106.5570	107.1057 (39)
												106.2903 (39)
HLP	1.1501	1.1469	1.1438	1.1291	1.1263	1.1135	1.1135	1.1111	1.1184	1.1263	1.1319	1.1377 (40)
HLP (average)												1.1291 (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												2.6783 (42)
Average daily hot water use (litres/day)												97.8086 (43)
Daily hot water use	107.5894	103.6771	99.7648	95.8524	91.9401	88.0277	88.0277	91.9401	95.8524	99.7648	103.6771	107.5894 (44)
Energy conte	159.5520	139.5452	143.9982	125.5411	120.4597	103.9475	96.3227	110.5317	111.8518	130.3525	142.2899	154.5176 (45)



# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS 09 Jan 2014

Energy content (annual)												Total = Sum(45)m =	1538.9098 (45)
Distribution loss (46)m = 0.15 x (45)m													
	23.9328	20.9318	21.5997	18.8312	18.0690	15.5921	14.4484	16.5798	16.7778	19.5529	21.3435	23.1776	23.1776 (46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	14.6956	13.2597	14.6479	14.1193	14.5492	14.0328	14.4713	14.5218	14.0799	14.6070	14.1852	14.6805	14.6805 (61)
Total heat required for water heating calculated for each month	174.2476	152.8049	158.6461	139.6604	135.0088	117.9803	110.7940	125.0535	125.9317	144.9595	156.4751	169.1981	169.1981 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	174.2476	152.8049	158.6461	139.6604	135.0088	117.9803	110.7940	125.0535	125.9317	144.9595	156.4751	169.1981	169.1981 (64)
Heat gains from water heating, kWh/month	56.7249	49.7137	51.5414	45.2722	43.6901	38.0708	35.6451	40.3822	40.7107	46.9940	50.8577	55.0472	55.0472 (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	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.2487	53.5124	43.5192	32.9468	24.6281	20.7921	22.4666	29.2030	39.1962	49.7685	58.0872	61.9232	61.9232 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	367.8979	371.7155	362.0952	341.6147	315.7618	291.4637	275.2311	271.4134	281.0337	301.5142	327.3672	351.6653	351.6653 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302 (71)
Water heating gains (Table 5)	76.2432	73.9787	69.2760	62.8781	58.7233	52.8761	47.9101	54.2772	56.5426	63.1639	70.6357	73.9882	73.9882 (72)
Total internal gains	614.7027	609.5196	585.2034	547.7526	509.4262	475.4448	455.9207	465.2065	487.0854	524.7596	566.4030	597.8896	597.8896 (73)

#### 6. Solar gains

[Jan]		Area m <sup>2</sup>	Solar flux Table 6a W/m <sup>2</sup>	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W						
East		5.9360	19.6403	0.5000	0.0000	0.7700	44.8851	44.8851 (76)					
West		5.9910	19.6403	0.5000	0.0000	0.7700	45.3010	45.3010 (80)					
Solar gains	90.1860	176.4230	290.5436	423.7405	519.3098	531.6060	506.1106	434.7415	337.9142	209.3408	112.4514	74.1646	74.1646 (83)
Total gains	704.8888	785.9426	875.7469	971.4931	1028.7360	1007.0508	962.0313	899.9480	824.9996	734.1003	678.8543	672.0542	672.0542 (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	32.6832	32.7744	32.8643	33.2930	33.3745	33.7591	33.7591	33.8312	33.6099	33.3745	33.2101	33.0400	33.0400
alpha	3.1789	3.1850	3.1910	3.2195	3.2250	3.2506	3.2506	3.2554	3.2407	3.2250	3.2140	3.2027	3.2027
util living area	0.9689	0.9546	0.9239	0.8571	0.7469	0.5939	0.4555	0.4998	0.7135	0.8904	0.9542	0.9728	0.9728 (86)
MIT	19.2388	19.4521	19.8205	20.2860	20.6569	20.8849	20.9636	20.9504	20.7823	20.2922	19.6888	19.2006	19.2006 (87)
Th 2	19.9601	19.9627	19.9652	19.9772	19.9794	19.9898	19.9898	19.9918	19.9858	19.9794	19.9749	19.9701	19.9701 (88)
util rest of house	0.9632	0.9465	0.9099	0.8305	0.6997	0.5199	0.3601	0.4030	0.6459	0.8639	0.9445	0.9679	0.9679 (89)
MIT 2	18.3689	18.5802	18.9412	19.3936	19.7303	19.9243	19.9757	19.9711	19.8487	19.4116	18.8252	18.3388	18.3388 (90)
Living area fraction												fLA = Living area / (4) = 0.2014 (91)	
MIT	18.5441	18.7558	19.1183	19.5734	19.9169	20.1178	20.1747	20.1683	20.0367	19.5889	18.9991	18.5124	18.5124 (92)
Temperature adjustment												-0.1500	
adjusted MIT	18.3941	18.6058	18.9683	19.4234	19.7669	19.9678	20.0247	20.0183	19.8867	19.4389	18.8491	18.3624	18.3624 (93)

#### 8. Space heating requirement

Utilisation	0.9519	0.9328	0.8932	0.8137	0.6888	0.5181	0.3635	0.4057	0.6386	0.8469	0.9307	0.9575	0.9575 (94)
Useful gains	670.9881	733.0945	782.2558	790.5207	708.5478	521.7994	349.7150	365.0682	526.8189	621.6785	631.8269	643.5204	643.5204 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	4.2000 (96)
Heat loss rate W	1526.0366	1479.8648	1342.5618	1118.5453	855.3488	562.6718	358.9887	378.4796	609.2816	937.2121	1251.9500	1516.8718	1516.8718 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	636.1561	501.8296	416.8677	236.1777	109.2200	0.0000	0.0000	0.0000	0.0000	234.7570	446.4886	649.7734	649.7734 (98)
Space heating												3231.2702 (98)	
Space heating per m2												(98) / (4) = 34.3241 (99)	

#### 8c. Space cooling requirement



# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS 09 Jan 2014

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3570.4643 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	636.1561	501.8296	416.8677	236.1777	109.2200	0.0000	0.0000	0.0000	0.0000	234.7570	446.4886	649.7734	(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)	702.9349	554.5079	460.6273	260.9698	120.6851	0.0000	0.0000	0.0000	0.0000	259.4000	493.3576	717.9817	(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	174.2476	152.8049	158.6461	139.6604	135.0088	117.9803	110.7940	125.0535	125.9317	144.9595	156.4751	169.1981	(64)
Efficiency of water heater (217)m	89.7923	89.7322	89.5947	89.2839	88.7026	87.3000	87.3000	87.3000	87.3000	89.2511	89.6472	87.3000	(216)
Fuel for water heating, kWh/month	194.0562	170.2899	177.0708	156.4229	152.2039	135.1436	126.9117	143.2457	144.2517	162.4177	174.5453	188.3750	(219)
Water heating fuel used													1924.9344 (219)
Annual totals kWh/year													
Space heating fuel - main system													3570.4643 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													425.6046 (232)
Total delivered energy for all uses													5996.0033 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3570.4643	3.4800	124.2522 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1924.9344	3.4800	66.9877 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	425.6046	13.1900	56.1372 (250)
Additional standing charges			120.0000 (251)
Total energy cost			377.2696 (255)

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

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.1388 (257)
SAP value		84.1137
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	3570.4643	0.2160	771.2203 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1924.9344	0.2160	415.7858 (264)
Space and water heating			1187.0061 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	425.6046	0.5190	220.8888 (268)
Total kg/year			1446.8199 (272)
CO2 emissions per m2			15.3700 (273)
EI value			86.0663
EI rating			86 (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	$3.48 / 0.8875 = 3.921$ , stars = 4
Water heating environmental impact	$0.216 / 0.8875 = 0.2434$ , stars = 4

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)  
 CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

#### 1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	47.0700 (1b)	x 2.3900 (2b)	= 112.4973 (1b) - (3b)
First floor	47.0700 (1c)	x 2.6900 (2c)	= 126.6183 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1400		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 239.1156 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)							
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)							
Number of intermittent fans					3 * 10 = 30.0000 (7a)							
Number of passive vents					0 * 10 = 0.0000 (7b)							
Number of flueless gas fires					0 * 40 = 0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1255 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.3760 (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) =	0.3478 (21)							
Wind speed	Jan 4.8000	Feb 4.5000	Mar 4.4000	Apr 3.9000	May 3.9000	Jun 3.6000	Jul 3.7000	Aug 3.5000	Sep 3.7000	Oct 4.0000	Nov 4.1000	Dec 4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.4173	0.3912	0.3825	0.3391	0.3391	0.3130	0.3217	0.3043	0.3217	0.3478	0.3565	0.3825 (22b)
Effective ac	0.5871	0.5765	0.5732	0.5575	0.5575	0.5490	0.5517	0.5463	0.5517	0.5605	0.5635	0.5732 (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)			11.9300	1.3258	15.8163		(27)
Solid Door			1.9500	1.2000	2.3400		(26)
Flr - Ground			47.0720	0.1500	7.0608	75.6000	3558.6432 (28a)
Wl - Brick	8.2850	3.1500	5.1350	0.2500	1.2838	51.1800	262.8093 (29a)
Wl - Render	90.8210	10.7300	80.0910	0.2500	20.0228	51.1800	4099.0574 (29a)
Rf - Ins Joist	47.0720		47.0720	0.1000	4.7072	5.8200	273.9590 (30)
Total net area of external elements Aum(A, m2)			193.2500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.2308		(33)
Party Wall			43.5970	0.0000	0.0000	54.0300	2355.5459 (32)
Ground Floor Stud			82.7595			5.8200	481.6603 (32c)
1st Floor Stud			100.8056			5.8200	586.6888 (32c)
Internal Floor			47.0700			18.0000	847.2600 (32d)
Internal Ceiling			47.0700			5.8200	273.9474 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12739.5713 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							135.3258 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.8331 (36)
Total fabric heat loss						(33) + (36) =	61.0639 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	46.3252	45.4931	45.2277	43.9901	43.9901	43.3191	43.5368	43.1073	43.5368	44.2257	44.4672	45.2277 (38)
Average = Sum(39)m / 12 =	107.3891	106.5570	106.2916	105.0540	105.0540	104.3829	104.6007	104.1712	104.6007	105.2896	105.5311	106.2916 (39)
HLP	1.1407	1.1319	1.1291	1.1159	1.1159	1.1088	1.1111	1.1066	1.1111	1.1184	1.1210	1.1291 (40)
HLP (average)												1.1200 (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												2.6783 (42)
Average daily hot water use (litres/day)												97.8086 (43)
Daily hot water use	107.5894	103.6771	99.7648	95.8524	91.9401	88.0277	88.0277	91.9401	95.8524	99.7648	103.6771	107.5894 (44)
Energy conte	159.5520	139.5452	143.9982	125.5411	120.4597	103.9475	96.3227	110.5317	111.8518	130.3525	142.2899	154.5176 (45)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

Energy content (annual)												Total = Sum(45)m =	1538.9098 (45)
Distribution loss (46)m = 0.15 x (45)m													
	23.9328	20.9318	21.5997	18.8312	18.0690	15.5921	14.4484	16.5798	16.7778	19.5529	21.3435	23.1776	(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	14.6956	13.2597	14.6479	14.1193	14.5492	14.0328	14.4713	14.5218	14.0799	14.6070	14.1852	14.6805	(61)
Total heat required for water heating calculated for each month	174.2476	152.8049	158.6461	139.6604	135.0088	117.9803	110.7940	125.0535	125.9317	144.9595	156.4751	169.1981	(62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Solar input (sum of months) = Sum(63)m =												0.0000 (63)	
Output from w/h	174.2476	152.8049	158.6461	139.6604	135.0088	117.9803	110.7940	125.0535	125.9317	144.9595	156.4751	169.1981	(64)
Total per year (kWh/year) = Sum(64)m =												1710.7600 (64)	
Heat gains from water heating, kWh/month	56.7249	49.7137	51.5414	45.2722	43.6901	38.0708	35.6451	40.3822	40.7107	46.9940	50.8577	55.0472	(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	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.2487	53.5124	43.5192	32.9468	24.6281	20.7921	22.4666	29.2030	39.1962	49.7685	58.0872	61.9232	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	367.8979	371.7155	362.0952	341.6147	315.7618	291.4637	275.2311	271.4134	281.0337	301.5142	327.3672	351.6653	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	(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)	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	(71)
Water heating gains (Table 5)	76.2432	73.9787	69.2760	62.8781	58.7233	52.8761	47.9101	54.2772	56.5426	63.1639	70.6357	73.9882	(72)
Total internal gains	614.7027	609.5196	585.2034	547.7526	509.4262	475.4448	455.9207	465.2065	487.0854	524.7596	566.4030	597.8896	(73)

#### 6. Solar gains

[Jan]		Area m <sup>2</sup>	Solar flux Table 6a W/m <sup>2</sup>	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W				
East		5.9360	23.7288	0.5000	0.0000	0.0000	0.7700	54.2289	(76)				
West		5.9910	23.7288	0.5000	0.0000	0.0000	0.7700	54.7313	(80)				
Solar gains	108.9602	189.4214	309.9615	474.2749	556.9895	608.6565	573.0558	498.2369	385.2730	240.1730	137.1839	86.6500	(83)
Total gains	723.6629	798.9410	895.1649	1022.0275	1066.4156	1084.1013	1028.9765	963.4434	872.3584	764.9326	703.5869	684.5396	(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	32.9528	33.2101	33.2930	33.6853	33.6853	33.9018	33.8312	33.9707	33.8312	33.6099	33.5330	33.2930	
alpha	3.1969	3.2140	3.2195	3.2457	3.2457	3.2601	3.2554	3.2647	3.2554	3.2407	3.2355	3.2195	
util living area	0.9625	0.9483	0.9107	0.8240	0.6877	0.5035	0.3570	0.3684	0.6278	0.8486	0.9392	0.9663	(86)
MIT	19.3966	19.5767	19.9572	20.4215	20.7644	20.9386	20.9855	20.9847	20.8734	20.4786	19.8943	19.3972	(87)
Th 2	19.9677	19.9749	19.9772	19.9878	19.9878	19.9936	19.9918	19.9955	19.9918	19.9858	19.9837	19.9772	(88)
util rest of house	0.9556	0.9390	0.8942	0.7923	0.6324	0.4245	0.2609	0.2671	0.5476	0.8117	0.9259	0.9599	(89)
MIT 2	18.5304	18.7117	19.0823	19.5263	19.8271	19.9631	19.9876	19.9913	19.9214	19.5886	19.0326	18.5386	(90)
Living area fraction												fLA = Living area / (4) = 0.2014 (91)	
MIT	18.7049	18.8859	19.2585	19.7066	20.0159	20.1595	20.1886	20.1914	20.1132	19.7679	19.2062	18.7115	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.5549	18.7359	19.1085	19.5566	19.8659	20.0095	20.0386	20.0414	19.9632	19.6179	19.0562	18.5615	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9431	0.9246	0.8772	0.7770	0.6251	0.4258	0.2655	0.2718	0.5451	0.7959	0.9106	0.9482	(94)
Useful gains	682.5070	738.6657	785.2528	794.0960	666.6546	461.6034	273.2044	261.8959	475.5606	608.8461	640.7022	649.0807	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	1455.6444	1421.0332	1276.4076	1056.4874	763.3064	481.1577	275.9997	264.7371	519.1514	833.6681	1156.2180	1420.2148	(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	575.2142	458.5509	365.4192	188.9219	71.9090	0.0000	0.0000	0.0000	0.0000	167.2675	371.1714	573.7238	(98)
Space heating												2772.1778 (98)	
Space heating per m <sup>2</sup>												(98) / (4) = 29.4474 (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

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													3063.1799 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	575.2142	458.5509	365.4192	188.9219	71.9090	0.0000	0.0000	0.0000	0.0000	167.2675	371.1714	573.7238	(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)	635.5958	506.6861	403.7781	208.7534	79.4574	0.0000	0.0000	0.0000	0.0000	184.8260	410.1341	633.9489	(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	174.2476	152.8049	158.6461	139.6604	135.0088	117.9803	110.7940	125.0535	125.9317	144.9595	156.4751	169.1981	(64)
Efficiency of water heater (217)m	89.7353	89.6784	89.5068	89.1116	88.3861	87.3000	87.3000	87.3000	87.3000	88.9856	89.5268	87.3000	(216)
Fuel for water heating, kWh/month	194.1796	170.3922	177.2447	156.7252	152.7489	135.1436	126.9117	143.2457	144.2517	162.9022	174.7801	188.5200	(219)
Water heating fuel used													1927.0455 (219)
Annual totals kWh/year													
Space heating fuel - main system													3063.1799 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													425.6046 (232)
Total delivered energy for all uses													5490.8301 (238)

#### 10a. Fuel costs - using BEDF prices (500)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3063.1799	3.6300	111.1934 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1927.0455	3.6300	69.9518 (247)
Pumps and fans for heating	75.0000	19.4400	14.5800 (249)
Energy for lighting	425.6046	19.4400	82.7375 (250)
Additional standing charges			95.0000 (251)
Total energy cost			373.4627 (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	3063.1799	0.2160	661.6469 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1927.0455	0.2160	416.2418 (264)
Space and water heating			1077.8887 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	425.6046	0.5190	220.8888 (268)
Total kg/year			1337.7025 (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	3063.1799	1.2200	3737.0795 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1927.0455	1.2200	2350.9955 (264)
Space and water heating			6088.0750 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	425.6046	3.0700	1306.6062 (268)
Primary energy kWh/year			7624.9312 (272)
Primary energy kWh/m2/year			80.9957 (273)

#### SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 84  
 Current environmental impact rating: B 86

# 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	Recommended
O	Not considered
P	Not considered
R	Not considered
S	Not considered
T	Not considered
U Solar photovoltaic panels	Recommended
A2	Not considered
A3	Not considered
T2	Not considered
W	Not considered
X	Not considered
Y	Not considered
J2	Not considered
Q2	Not considered
Z1	Not considered
Z2	Not considered
Z3	Not considered
Z4	Not considered
Z5	Not considered
V2 Wind turbine	Not applicable
L2	Not considered
Q3	Not considered
O3	Not considered

Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 1.2	-£ 27	-191 kg (14.3%)
U Solar photovoltaic panels	+ 9.6	-£ 375	-1000 kg (87.2%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£27	2.03 kg/m <sup>2</sup>	B 85 B 88
Solar photovoltaic panels	£375	10.63 kg/m <sup>2</sup>	A 95 A 96
Total Savings	£401	12.65 kg/m <sup>2</sup>	

Potential energy efficiency rating: A 95  
 Potential environmental impact rating: A 96

Fuel prices for cost data on this page from database revision number 500 TEST (30 Jun 2022)  
 Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£97	£107	-£10
Mains gas	£276	£240	£36
Space heating	£221	£221	£0
Water heating	£70	£43	£27
Lighting	£83	£83	£0
Generated (PV)	-£0	-£375	£375
Total cost of fuels	£373	-£28	£401
Total cost of uses	£374	-£28	£402
Delivered energy	58 kWh/m <sup>2</sup>	28 kWh/m <sup>2</sup>	31 kWh/m <sup>2</sup>
Carbon dioxide emissions	1.3 tonnes	0.1 tonnes	1.2 tonnes
CO2 emissions per m <sup>2</sup>	14 kg/m <sup>2</sup>	2 kg/m <sup>2</sup>	13 kg/m <sup>2</sup>
Primary energy	81 kWh/m <sup>2</sup>	7 kWh/m <sup>2</sup>	74 kWh/m <sup>2</sup>

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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

#### 1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	47.0700 (1b)	2.3900 (2b)	112.4973 (1b) - (3b)
First floor	47.0700 (1c)	2.6900 (2c)	126.6183 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1400		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 239.1156 (5)
Dwelling volume			

#### 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				3 * 10 =	30.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1255 (8)
Pressure test				Yes	
Measured/design AP50					5.0100
Infiltration rate					0.3760 (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) =	0.3478 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4434	0.4347	0.4260	0.3825	0.3738	0.3304	0.3304	0.3217	0.3478	0.3738	0.3912	0.4086 (22b)
	0.5983	0.5945	0.5907	0.5732	0.5699	0.5546	0.5546	0.5517	0.5605	0.5699	0.5765	0.5835 (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)			11.9300	1.3258	15.8163		(27)
Solid Door			1.9500	1.2000	2.3400		(26)
Flr - Ground			47.0720	0.1500	7.0608	75.6000	3558.6432 (28a)
Wl - Brick	8.2850	3.1500	5.1350	0.2500	1.2838	51.1800	262.8093 (29a)
Wl - Render	90.8210	10.7300	80.0910	0.2500	20.0228	51.1800	4099.0574 (29a)
Rf - Ins Joist	47.0720		47.0720	0.1000	4.7072	5.8200	273.9590 (30)
Total net area of external elements Aum(A, m2)			193.2500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.2308		(33)
Party Wall			43.5970	0.0000	0.0000	54.0300	2355.5459 (32)
Ground Floor Stud			82.7595			5.8200	481.6603 (32c)
1st Floor Stud			100.8056			5.8200	586.6888 (32c)
Internal Floor			47.0700			18.0000	847.2600 (32d)
Internal Ceiling			47.0700			5.8200	273.9474 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12739.5713 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							135.3258 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.8331 (36)
Total fabric heat loss						(33) + (36) =	61.0639 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	47.2109	46.9097	46.6145	45.2277	44.9683	43.7604	43.7604	43.5368	44.2257	44.9683	45.4931	46.0419 (38)
Average = Sum(39)m / 12 =	108.2748	107.9736	107.6783	106.2916	106.0321	104.8243	104.8243	104.6007	105.2896	106.0321	106.5570	107.1057 (39)
												106.2903 (39)
HLP	1.1501	1.1469	1.1438	1.1291	1.1263	1.1135	1.1135	1.1111	1.1184	1.1263	1.1319	1.1377 (40)
HLP (average)												1.1291 (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												2.6783 (42)
Average daily hot water use (litres/day)												97.8086 (43)
Daily hot water use	107.5894	103.6771	99.7648	95.8524	91.9401	88.0277	88.0277	91.9401	95.8524	99.7648	103.6771	107.5894 (44)
Energy conte	159.5520	139.5452	143.9982	125.5411	120.4597	103.9475	96.3227	110.5317	111.8518	130.3525	142.2899	154.5176 (45)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

Energy content (annual)												Total = Sum(45)m =	1538.9098 (45)
Distribution loss (46)m = 0.15 x (45)m													
	23.9328	20.9318	21.5997	18.8312	18.0690	15.5921	14.4484	16.5798	16.7778	19.5529	21.3435	23.1776	(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	14.6956	13.2597	14.6479	14.1193	14.5492	14.0328	14.4713	14.5218	14.0799	14.6070	14.1852	14.6805	(61)
Total heat required for water heating calculated for each month	174.2476	152.8049	158.6461	139.6604	135.0088	117.9803	110.7940	125.0535	125.9317	144.9595	156.4751	169.1981	(62)
Aperture area of solar collector													
Zero-loss collector efficiency													
Collector heat loss coefficient													
Collector 2nd order heat loss coefficient													
Collector effective heat loss coefficient													
Collector performance ratio													
Annual solar radiation per m2													
Overshading factor													
Solar energy available													
Adjustment factor for showers													
Solar-to-load ratio													
Utilisation factor													
Collector performance factor													
Dedicated solar storage volume													
Effective solar volume													
Daily hot water demand													
Volume ratio Veff/V													
Solar storage volume factor													
Solar input	-25.0444	-41.7920	-71.1765	-95.3905	-117.8470	-115.8623	-114.3312	-99.8917	-78.2352	-53.4255	-29.7063	-863.6605	(63)
Solar input (sum of months) = Sum(63)m =													
Output from w/h	149.2032	111.0130	87.4696	44.2699	17.1619	2.1180	0.0000	25.1617	47.6965	91.5340	126.7688	148.2402	(64)
Total per year (kWh/year) = Sum(64)m =													
Heat gains from water heating, kWh/month	56.7249	49.7137	51.5414	45.2722	43.6901	38.0708	35.6451	40.3822	40.7107	46.9940	50.8577	55.0472	(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	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.2487	53.5124	43.5192	32.9468	24.6281	20.7921	22.4666	29.2030	39.1962	49.7685	58.0872	61.9232	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	367.8979	371.7155	362.0952	341.6147	315.7618	291.4637	275.2311	271.4134	281.0337	301.5142	327.3672	351.6653	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	(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)	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	(71)
Water heating gains (Table 5)	76.2432	73.9787	69.2760	62.8781	58.7233	52.8761	47.9101	54.2772	56.5426	63.1639	70.6357	73.9882	(72)
Total internal gains	614.7027	609.5196	585.2034	547.7526	509.4262	475.4448	455.9207	465.2065	487.0854	524.7596	566.4030	597.8896	(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							
East	5.9360	19.6403	0.5000	0.0000	0.7700	44.8851 (76)							
West	5.9910	19.6403	0.5000	0.0000	0.7700	45.3010 (80)							
Solar gains	90.1860	176.4230	290.5436	423.7405	519.3098	531.6060	506.1106	434.7415	337.9142	209.3408	112.4514	74.1646	(83)
Total gains	704.8888	785.9426	875.7469	971.4931	1028.7360	1007.0508	962.0313	899.9480	824.9996	734.1003	678.8543	672.0542	(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	32.6832	32.7744	32.8643	33.2930	33.3745	33.7591	33.7591	33.8312	33.6099	33.3745	33.2101	33.0400	
alpha	3.1789	3.1850	3.1910	3.2195	3.2250	3.2506	3.2506	3.2554	3.2407	3.2250	3.2140	3.2027	
util living area	0.9689	0.9546	0.9239	0.8571	0.7469	0.5939	0.4555	0.4998	0.7135	0.8904	0.9542	0.9728	(86)
MIT	19.2388	19.4521	19.8205	20.2860	20.6569	20.8849	20.9636	20.9504	20.7823	20.2922	19.6888	19.2006	(87)
Th 2	19.9601	19.9627	19.9652	19.9772	19.9794	19.9898	19.9898	19.9918	19.9858	19.9794	19.9749	19.9701	(88)
util rest of house	0.9632	0.9465	0.9099	0.8305	0.6997	0.5199	0.3601	0.4030	0.6459	0.8639	0.9445	0.9679	(89)
MIT 2	18.3689	18.5802	18.9412	19.3936	19.7303	19.9243	19.9757	19.9711	19.8487	19.4116	18.8252	18.3388	(90)
Living area fraction													
MIT	18.5441	18.7558	19.1183	19.5734	19.9169	20.1178	20.1747	20.1683	20.0367	19.5889	18.9991	18.5124	(91)
Temperature adjustment													
adjusted MIT	18.3941	18.6058	18.9683	19.4234	19.7669	19.9678	20.0247	20.0183	19.8867	19.4389	18.8491	18.3624	(92)



# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9519	0.9328	0.8932	0.8137	0.6888	0.5181	0.3635	0.4057	0.6386	0.8469	0.9307	0.9575	(94)	
Useful gains	670.9881	733.0945	782.2558	790.5207	708.5478	521.7994	349.7150	365.0682	526.8189	621.6785	631.8269	643.5204	(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	1526.0366	1479.8648	1342.5618	1118.5453	855.3488	562.6718	358.9887	378.4796	609.2816	937.2121	1251.9500	1516.8718	(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	636.1561	501.8296	416.8677	236.1777	109.2200	0.0000	0.0000	0.0000	0.0000	234.7570	446.4886	649.7734	(98)	
Space heating												3231.2702	(98)	
Space heating per m2												(98) / (4) =	34.3241	(99)

#### 8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)	
Fraction of space heat from main system(s)														1.0000	(202)
Efficiency of main space heating system 1 (in %)														90.5000	(206)
Efficiency of secondary/supplementary heating system, %														0.0000	(208)
Space heating requirement														3570.4643	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement	636.1561	501.8296	416.8677	236.1777	109.2200	0.0000	0.0000	0.0000	0.0000	234.7570	446.4886	649.7734	(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)	702.9349	554.5079	460.6273	260.9698	120.6851	0.0000	0.0000	0.0000	0.0000	259.4000	493.3576	717.9817	(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															
Water heating requirement	149.2032	111.0130	87.4696	44.2699	17.1619	2.1180	0.0000	25.1617	47.6965	91.5340	126.7688	148.2402	(64)		
Efficiency of water heater													87.3000	(216)	
(217)m	89.8741	89.9031	89.9283	89.9794	90.0518	87.3000	87.3000	87.3000	87.3000	89.5789	89.7723	89.8879	(217)		
Fuel for water heating, kWh/month	166.0135	123.4808	97.2659	49.2000	19.0578	2.4261	0.0000	28.8222	54.6351	102.1826	141.2114	164.9166	(219)		
Water heating fuel used													949.2121	(219)	
Annual totals kWh/year															
Space heating fuel - main system													3570.4643	(211)	
Space heating fuel - secondary													0.0000	(215)	
Electricity for pumps and fans:															
central heating pump													30.0000	(230c)	
main heating flue fan													45.0000	(230e)	
pump for solar water heating													50.0000	(230g)	
Total electricity for the above, kWh/year													125.0000	(231)	
Electricity for lighting (calculated in Appendix L)													425.6046	(232)	
Energy saving/generation technologies (Appendices M ,N and Q)															
PV Unit 0 (0.80 * 2.50 * 1080 * 0.80) =										-1727.2394			-1727.2394	(233)	
Total delivered energy for all uses													3343.0416	(238)	

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3570.4643	3.4800	124.2522	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	949.2121	3.4800	33.0326	(247)
Pumps and fans for heating	75.0000	13.1900	9.8925	(249)
Pump for solar water heating	50.0000	13.1900	6.5950	(249)
Energy for lighting	425.6046	13.1900	56.1372	(250)
Additional standing charges			120.0000	(251)
Energy saving/generation technologies				
PV Unit	-1727.2394	13.1900	-227.8229	(252)
Total energy cost			122.0866	(255)

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

Energy cost deflator (Table 12):		0.4200	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.3685	(257)
SAP value		94.8591	
SAP rating (Section 12)		95	(258)
SAP band		A	

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

Energy Emission factor Emissions

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

	kWh/year	kg CO2/kWh	kg CO2/year
Space heating - main system 1	3570.4643	0.2160	771.2203 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	949.2121	0.2160	205.0298 (264)
Space and water heating			976.2501 (265)
Pumps and fans	125.0000	0.5190	64.8750 (267)
Energy for lighting	425.6046	0.5190	220.8888 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			365.5766 (272)
CO2 emissions per m2			3.8800 (273)
EI value			96.4793
EI rating			96 (274)
EI band			A

# 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

#### 1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	47.0700 (1b)	2.3900 (2b)	112.4973 (1b) - (3b)
First floor	47.0700 (1c)	2.6900 (2c)	126.6183 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1400		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 239.1156 (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				3 * 10 =	30.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1255 (8)							
Pressure test				Yes								
Measured/design AP50					5.0100							
Infiltration rate					0.3760 (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) =	0.3478 (21)							
Wind speed	Jan 4.8000	Feb 4.5000	Mar 4.4000	Apr 3.9000	May 3.9000	Jun 3.6000	Jul 3.7000	Aug 3.5000	Sep 3.7000	Oct 4.0000	Nov 4.1000	Dec 4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.4173	0.3912	0.3825	0.3391	0.3391	0.3130	0.3217	0.3043	0.3217	0.3478	0.3565	0.3825 (22b)
Effective ac	0.5871	0.5765	0.5732	0.5575	0.5575	0.5490	0.5517	0.5463	0.5517	0.5605	0.5635	0.5732 (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)			11.9300	1.3258	15.8163		(27)
Solid Door			1.9500	1.2000	2.3400		(26)
Flr - Ground			47.0720	0.1500	7.0608	75.6000	3558.6432 (28a)
Wl - Brick	8.2850	3.1500	5.1350	0.2500	1.2838	51.1800	262.8093 (29a)
Wl - Render	90.8210	10.7300	80.0910	0.2500	20.0228	51.1800	4099.0574 (29a)
Rf - Ins Joist	47.0720		47.0720	0.1000	4.7072	5.8200	273.9590 (30)
Total net area of external elements Aum(A, m2)			193.2500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.2308		(33)
Party Wall			43.5970	0.0000	0.0000	54.0300	2355.5459 (32)
Ground Floor Stud			82.7595			5.8200	481.6603 (32c)
1st Floor Stud			100.8056			5.8200	586.6888 (32c)
Internal Floor			47.0700			18.0000	847.2600 (32d)
Internal Ceiling			47.0700			5.8200	273.9474 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12739.5713 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							135.3258 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.8331 (36)
Total fabric heat loss						(33) + (36) =	61.0639 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	46.3252	45.4931	45.2277	43.9901	43.9901	43.3191	43.5368	43.1073	43.5368	44.2257	44.4672	45.2277 (38)
Average = Sum(39)m / 12 =	107.3891	106.5570	106.2916	105.0540	105.0540	104.3829	104.6007	104.1712	104.6007	105.2896	105.5311	106.2916 (39)
HLP	1.1407	1.1319	1.1291	1.1159	1.1159	1.1088	1.1111	1.1066	1.1111	1.1184	1.1210	1.1291 (40)
HLP (average)												1.1200 (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												2.6783 (42)
Average daily hot water use (litres/day)												97.8086 (43)
Daily hot water use	107.5894	103.6771	99.7648	95.8524	91.9401	88.0277	88.0277	91.9401	95.8524	99.7648	103.6771	107.5894 (44)
Energy conte	159.5520	139.5452	143.9982	125.5411	120.4597	103.9475	96.3227	110.5317	111.8518	130.3525	142.2899	154.5176 (45)



# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

Energy content (annual)												Total = Sum(45)m =	1538.9098 (45)
Distribution loss (46)m = 0.15 x (45)m													
	23.9328	20.9318	21.5997	18.8312	18.0690	15.5921	14.4484	16.5798	16.7778	19.5529	21.3435	23.1776	(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	14.6956	13.2597	14.6479	14.1193	14.5492	14.0328	14.4713	14.5218	14.0799	14.6070	14.1852	14.6805	(61)
Total heat required for water heating calculated for each month	174.2476	152.8049	158.6461	139.6604	135.0088	117.9803	110.7940	125.0535	125.9317	144.9595	156.4751	169.1981	(62)
Aperture area of solar collector													
Zero-loss collector efficiency													
Collector heat loss coefficient													
Collector 2nd order heat loss coefficient													
Collector effective heat loss coefficient													
Collector performance ratio													
Annual solar radiation per m2													
Overshading factor													
Solar energy available													
Adjustment factor for showers													
Solar-to-load ratio													
Utilisation factor													
Collector performance factor													
Dedicated solar storage volume													
Effective solar volume													
Daily hot water demand													
Volume ratio Veff/V													
Solar storage volume factor													
Solar input	-27.6705	-41.1031	-69.8119	-98.6192	-117.1418	-123.1027	-120.0657	-105.9061	-82.1621	-56.2149	-33.1541	-22.3851	(63)
Solar input (sum of months) = Sum(63)m =													
Output from w/h	146.5771	111.7019	88.8341	41.0412	17.8670	0.0000	0.0000	19.1474	43.7697	88.7446	123.3210	146.8130	(64)
Total per year (kWh/year) = Sum(64)m =													
Heat gains from water heating, kWh/month	56.7249	49.7137	51.5414	45.2722	43.6901	38.0708	35.6451	40.3822	40.7107	46.9940	50.8577	55.0472	(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	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	160.6954	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.2487	53.5124	43.5192	32.9468	24.6281	20.7921	22.4666	29.2030	39.1962	49.7685	58.0872	61.9232	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	367.8979	371.7155	362.0952	341.6147	315.7618	291.4637	275.2311	271.4134	281.0337	301.5142	327.3672	351.6653	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	53.7478	(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)	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	-107.1302	(71)
Water heating gains (Table 5)	76.2432	73.9787	69.2760	62.8781	58.7233	52.8761	47.9101	54.2772	56.5426	63.1639	70.6357	73.9882	(72)
Total internal gains	614.7027	609.5196	585.2034	547.7526	509.4262	475.4448	455.9207	465.2065	487.0854	524.7596	566.4030	597.8896	(73)

#### 6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b g	Specific data or Table 6c FF	Access factor Table 6d	Gains W							
East	5.9360	23.7288	0.5000	0.0000	0.7700	54.2289 (76)							
West	5.9910	23.7288	0.5000	0.0000	0.7700	54.7313 (80)							
Solar gains	108.9602	189.4214	309.9615	474.2749	556.9895	608.6565	573.0558	498.2369	385.2730	240.1730	137.1839	86.6500	(83)
Total gains	723.6629	798.9410	895.1649	1022.0275	1066.4156	1084.1013	1028.9765	963.4434	872.3584	764.9326	703.5869	684.5396	(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	32.9528	33.2101	33.2930	33.6853	33.6853	33.9018	33.8312	33.9707	33.8312	33.6099	33.5330	33.2930	
alpha	3.1969	3.2140	3.2195	3.2457	3.2457	3.2601	3.2554	3.2647	3.2554	3.2407	3.2355	3.2195	
util living area	0.9625	0.9483	0.9107	0.8240	0.6877	0.5035	0.3570	0.3684	0.6278	0.8486	0.9392	0.9663	(86)
MIT	19.3966	19.5767	19.9572	20.4215	20.7644	20.9386	20.9855	20.9847	20.8734	20.4786	19.8943	19.3972	(87)
Th 2	19.9677	19.9749	19.9772	19.9878	19.9878	19.9936	19.9918	19.9955	19.9918	19.9858	19.9837	19.9772	(88)
util rest of house	0.9556	0.9390	0.8942	0.7923	0.6324	0.4245	0.2609	0.2671	0.5476	0.8117	0.9259	0.9599	(89)
MIT 2	18.5304	18.7117	19.0823	19.5263	19.8271	19.9631	19.9876	19.9913	19.9214	19.5886	19.0326	18.5386	(90)
Living area fraction													
MIT	18.7049	18.8859	19.2585	19.7066	20.0159	20.1595	20.1886	20.1914	20.1132	19.7679	19.2062	18.7115	(92)
Temperature adjustment													
adjusted MIT	18.5549	18.7359	19.1085	19.5566	19.8659	20.0095	20.0386	20.0414	19.9632	19.6179	19.0562	18.5615	(93)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9431	0.9246	0.8772	0.7770	0.6251	0.4258	0.2655	0.2718	0.5451	0.7959	0.9106	0.9482	(94)
Useful gains	682.5070	738.6657	785.2528	794.0960	666.6546	461.6034	273.2044	261.8959	475.5606	608.8461	640.7022	649.0807	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	1455.6444	1421.0332	1276.4076	1056.4874	763.3064	481.1577	275.9997	264.7371	519.1514	833.6681	1156.2180	1420.2148	(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	575.2142	458.5509	365.4192	188.9219	71.9090	0.0000	0.0000	0.0000	0.0000	167.2675	371.1714	573.7238	(98)
Space heating												2772.1778	(98)
Space heating per m2												(98) / (4) =	29.4474 (99)

#### 8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3063.1799 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	575.2142	458.5509	365.4192	188.9219	71.9090	0.0000	0.0000	0.0000	0.0000	167.2675	371.1714	573.7238	(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)	635.5958	506.6861	403.7781	208.7534	79.4574	0.0000	0.0000	0.0000	0.0000	184.8260	410.1341	633.9489	(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	146.5771	111.7019	88.8341	41.0412	17.8670	0.0000	0.0000	19.1474	43.7697	88.7446	123.3210	146.8130	(64)
Efficiency of water heater	89.8313	89.8548	89.8559	89.9118	89.8446	87.3000	87.3000	87.3000	87.3000	89.3645	89.6802	89.8291	(217)
Fuel for water heating, kWh/month	163.1692	124.3137	98.8629	45.6460	19.8865	0.0000	0.0000	21.9329	50.1371	99.3063	137.5120	163.4359	(219)
Water heating fuel used												924.2025	(219)
Annual totals kWh/year													
Space heating fuel - main system													3063.1799 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
pump for solar water heating													50.0000 (230g)
Total electricity for the above, kWh/year													125.0000 (231)
Electricity for lighting (calculated in Appendix L)													425.6046 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 2.50 * 1205 * 0.80) =										-1927.6103			-1927.6103 (233)
Total delivered energy for all uses													2610.3768 (238)

#### 10a. Fuel costs - using BEDF prices (500)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost f/year	
Space heating - main system 1	3063.1799	3.6300	111.1934	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	924.2025	3.6300	33.5486	(247)
Pumps and fans for heating	75.0000	19.4400	14.5800	(249)
Pump for solar water heating	50.0000	19.4400	9.7200	(249)
Energy for lighting	425.6046	19.4400	82.7375	(250)
Additional standing charges			95.0000	(251)
Energy saving/generation technologies				
PV Unit		-1927.6103	19.4400	-374.7274 (252)
Total energy cost			-27.9479	(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	3063.1799	0.2160	661.6469	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	924.2025	0.2160	199.6277	(264)
Space and water heating			861.2746	(265)
Pumps and fans	125.0000	0.5190	64.8750	(267)
Energy for lighting	425.6046	0.5190	220.8888	(268)
Energy saving/generation technologies				
PV Unit		-1927.6103	0.5190	-1000.4297 (269)
Total kg/year			146.6087	(272)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

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 13a. Primary energy - Individual heating systems including micro-CHP  
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	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3063.1799	1.2200	3737.0795 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	924.2025	1.2200	1127.5270 (264)
Space and water heating			4864.6066 (265)
Pumps and fans	125.0000	3.0700	383.7500 (267)
Energy for lighting	425.6046	3.0700	1306.6062 (268)
Energy saving/generation technologies			
PV Unit	-1927.6103	3.0700	-5917.7636 (269)
Primary energy kWh/year			637.1992 (272)
Primary energy kWh/m2/year			6.7686 (273)

# BASIC COMPLIANCE REPORT

## Calculation Type: New Build (As Designed)



<b>Property Reference</b>	037 - PRJ012620	<b>Issued on Date</b>	18/08/2022
<b>Assessment Reference</b>	037 E	<b>Prop Type Ref</b>	Clover
<b>Property</b>	Plot 37		

<b>SAP Rating</b>	84 B	<b>DER</b>	17.01	<b>TER</b>	17.60
<b>Environmental</b>	86 B	<b>% DER&lt;TER</b>	3.36		
<b>CO<sub>2</sub> Emissions (t/year)</b>	1.34	<b>DFEE</b>	45.21	<b>TFEE</b>	51.02
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	11.38		

<b>Assessor Details</b>	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	<b>Assessor ID</b>	T850-0001
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<b>Client</b>	
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### SUMMARY FOR INPUT DATA FOR New Build (As Designed)

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

##### 1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.60	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	17.01	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-0.59 (-3.4%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.02	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.21	kWh/m <sup>2</sup> /yr	
	-5.8 (-11.4%)	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
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (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

# BASIC COMPLIANCE REPORT

## Calculation Type: New Build (As Designed)



Main heating system

Boiler system with radiators or underfloor - Mains gas  
Data from database  
Ideal LOGIC COMBI ESP1 30  
Combi boiler  
Efficiency: 89.6% SEDBUK2009  
Minimum: 88.0%

Pass

Secondary heating system

None

### 5 Cylinder insulation

Hot water storage

No cylinder

### 6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

### 7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

### 8 Mechanical ventilation

Not applicable

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

### 9 Summertime temperature

Overheating risk (South East England)

Slight

Pass

Based on:

Overshading

Average

Windows facing East

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

Windows facing West

5.99 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

0.10

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