

# PREDICTED ENERGY ASSESSMENT



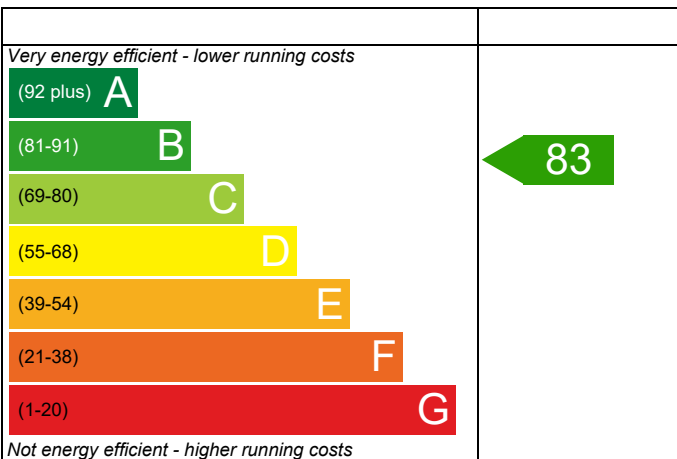
PL 14 - S - GF

Dwelling type: Flat, Semi-Detached  
 Date of assessment: 17/12/2020  
 Produced by: Michael Juckes  
 Total floor area: 52.7 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.

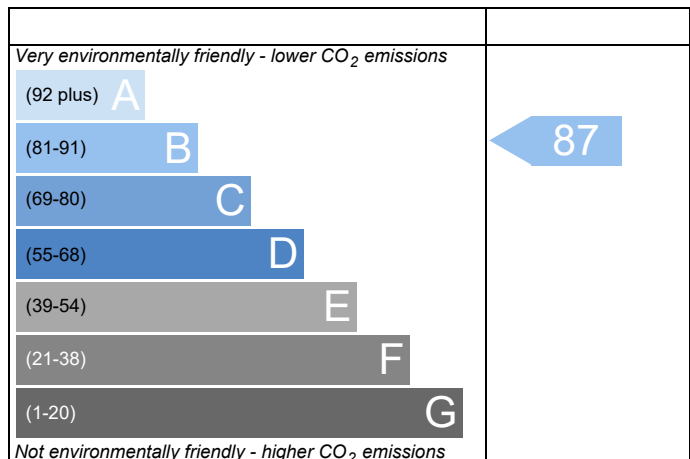
## Energy Efficiency Rating



**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	014 - PRJ010331 - GF		Issued on Date	17/12/2020
Assessment Reference	014 S	Prop Type Ref	Apartment - GF	
Property	PL 14 - S - GF			

SAP Rating	83 B	DER	20.27	TER	20.74
Environmental	87 B	% DER<TER	2.25		
CO <sub>2</sub> Emissions (t/year)	0.87	DFEE	49.49	TFEE	53.10
General Requirements Compliance	Pass	% DFEE<TFEE	6.79		

Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	Assessor ID	T850-0001
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Client	
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### 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)	20.74	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	20.27	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-0.47 (-2.3%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.10	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	49.49	kWh/m <sup>2</sup> /yr	
	-3.6 (-6.8%)	kWh/m <sup>2</sup> /yr	Pass

#### Criterion 2 – Limits on design flexibility

##### Limiting Fabric Standards

##### 2 Fabric U-values

Element	Average	Highest	
External wall	0.26 (max. 0.30)	0.26 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	Pass
Openings	1.32 (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

Not applicable

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

### 9 Summertime temperature

Overheating risk (Thames Valley)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

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

Windows facing South

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

Windows facing West

0.67 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

Door U-value

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

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# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



Property Reference	014 - PRJ010331 - GF	Issued on Date	17/12/2020
Assessment Reference	014 S	Prop Type Ref	Apartment - GF
Property	PL 14 - S - GF		

SAP Rating	83 B	DER	20.27	TER	20.74
Environmental	87 B	% DER<TER	2.25		
CO <sub>2</sub> Emissions (t/year)	0.87	DFEE	49.49	TTEE	53.10
General Requirements Compliance	Pass	% DFEE<TTEE	6.79		

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

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

#### 1. Overall dwelling dimensions

	Area (m <sup>2</sup> ) (1b)	Storey height (m) (2b)	Volume (m <sup>3</sup> ) (3b) - (3b)
Ground floor	52.7000	x 2.4300	128.0610
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	128.0610 (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				2 * 10 =	20.0000 (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) =					20.0000 / (5) = 0.1562 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.4067 (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) =				0.3762 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infiltr rate	0.3950	0.3762	0.3762	0.3480	0.3480	0.3103	0.3197	0.3009	0.3103	0.3292	0.3292	0.3574 (22b)
Effective ac	0.5780	0.5708	0.5708	0.5605	0.5605	0.5482	0.5511	0.5453	0.5482	0.5542	0.5542	0.5639 (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)			7.8000	1.3258	10.3409		(27)
Solid Door			1.9700	1.0000	1.9700		(26)
F1r - Ground			52.7000	0.1500	7.9050	75.0000	3952.5000 (28a)
W1 - Brick	45.8700	7.7990	38.0710	0.2600	9.8985	58.7400	2236.2905 (29a)
W1 - To Corridor	3.8300	1.9730	1.8570	0.2200	0.4085	58.7400	109.0802 (29a)
W1 - Cycle Stoarge	11.2000		11.2000	0.2600	2.9120	58.7400	657.8880 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			113.5980				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		33.4349		(33)
Party Wall			20.7610	0.0000	0.0000	54.0300	1121.7168 (32)
Party Ceiling			52.7040			70.0000	3689.2800 (32b)
Ground Floor Stud			92.3537			5.8200	537.4985 (32c)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				12304.2541 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							233.4773 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.2486 (36)
Total fabric heat loss			(33) + (36) =				41.6835 (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
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# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF HEAT DEMAND 09 Jan 2014

(38)m	24.4266	24.1201	24.1201	23.6884	23.6884	23.1652	23.2904	23.0437	23.1652	23.4193	23.4193	23.8286 (38)
Heat transfer coeff	66.1101	65.8037	65.8037	65.3720	65.3720	64.8487	64.9739	64.7272	64.8487	65.1029	65.1029	65.5121 (39)
Average = Sum(39)m / 12 =												65.2982 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2545	1.2486	1.2486	1.2405	1.2405	1.2305	1.2329	1.2282	1.2305	1.2353	1.2353	1.2431 (40)
HLP (average)												1.2391 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

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

Assumed occupancy												1.7697 (42)
Average daily hot water use (litres/day)												76.2308 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	83.8539	80.8046	77.7554	74.7062	71.6569	68.6077	68.6077	71.6569	74.7062	77.7554	80.8046	83.8539 (44)
Energy conte	124.3529	108.7598	112.2304	97.8452	93.8848	81.0154	75.0727	86.1470	87.1759	101.5951	110.8990	120.4291 (45)
Energy content (annual)												Total = Sum(45)m = 1199.4071 (45)
Distribution loss (46)m = 0.15 x (45)m	18.6529	16.3140	16.8346	14.6768	14.0827	12.1523	11.2609	12.9221	13.0764	15.2393	16.6348	18.0644 (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	0.0000 (57)
Combi loss	14.5297	13.1047	14.4787	13.9776	14.4187	13.9250	14.3714	14.4021	13.9537	14.4539	14.0271	14.5199 (61)
Total heat required for water heating calculated for each month	138.8826	121.8645	126.7091	111.8228	108.3035	94.9405	89.4441	100.5491	101.1296	116.0490	124.9261	134.9490 (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	138.8826	121.8645	126.7091	111.8228	108.3035	94.9405	89.4441	100.5491	101.1296	116.0490	124.9261	134.9490 (64)
RHI water heating demand												Total per year (kWh/year) = Sum(64)m = 1369.5698 (64)
Heat gains from water heating, kWh/month	44.9798	39.4388	40.9363	36.0279	34.8214	30.4189	28.5545	32.2444	32.4744	37.3938	40.3807	43.6726 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	36.4429	32.3683	26.3236	19.9287	14.8969	12.5766		13.5895	17.6641	23.7087	30.1037	35.1354 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	230.2100	232.5988	226.5790	213.7634	197.5861	182.3817	172.2242	169.8354	175.8552	188.6708	204.8481	220.0525 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880 (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)	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887 (71)
Water heating gains (Table 5)	60.4567	58.6887	55.0219	50.0388	46.8029	42.2485	38.3797	43.3393	45.1033	50.2605	56.0843	58.6998 (72)
Total internal gains	412.8919	409.4382	393.7069	369.5133	345.0683	322.9891	309.9758	316.6211	330.4497	354.8173	381.8502	401.9904 (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			
North		3.3990	11.9814	0.5000		0.0000	0.7700	15.6791 (74)				
South		3.7300	50.9848	0.5000		0.0000	0.7700	73.2168 (78)				
West		0.6700	22.3313	0.5000		0.0000	0.7700	5.7604 (80)				
Solar gains	94.6562	144.9505	197.7770	259.3629	291.4127	314.1422	297.6845	272.0283	234.1772	171.3615	116.0607	80.3135 (83)
Total gains	507.5481	554.3886	591.4839	628.8762	636.4810	637.1313	607.6603	588.6494	564.6269	526.1789	497.9109	482.3039 (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	51.6993	51.9401	51.9401	52.2831	52.2831	52.7050	52.6034	52.8039	52.7050	52.4992	52.4992	52.1712
alpha	4.4466	4.4627	4.4627	4.4855	4.4855	4.5137	4.5069	4.5203	4.5137	4.4999	4.4999	4.4781
util living area	0.9793	0.9681	0.9404	0.8710	0.7296	0.4968	0.3299	0.3498	0.6264	0.8741	0.9600	0.9827 (86)
MIT	19.9786	20.1204	20.3750	20.6712	20.8917	20.9857	20.9983	20.9978	20.9584	20.7187	20.3186	19.9513 (87)
Th 2	19.8767	19.8813	19.8813	19.8878	19.8878	19.8957	19.8938	19.8975	19.8957	19.8918	19.8918	19.8857 (88)
util rest of house												
0.9731	0.9588	0.9224	0.8327	0.6559	0.3928	0.2130	0.2304	0.5235	0.8285	0.9463	0.9774 (89)	
MIT 2	18.9864	19.1280	19.3725	19.6489	19.8271	19.8913	19.8936	19.8972	19.8791	19.6996	19.3312	18.9671 (90)
Living area fraction												fLA = Living area / (4) = 0.4516 (91)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF HEAT DEMAND 09 Jan 2014

MIT	19.4345	19.5762	19.8252	20.1106	20.3079	20.3855	20.3925	20.3943	20.3665	20.1599	19.7771	19.4116 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.2845	19.4262	19.6752	19.9606	20.1579	20.2355	20.2425	20.2443	20.2165	20.0099	19.6271	19.2616 (93)

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9690	0.9541	0.9185	0.8355	0.6751	0.4256	0.2501	0.2682	0.5549	0.8340	0.9423	0.9736 (94)
Useful gains	491.8017	528.9470	543.2796	525.4407	429.6750	271.1313	151.9775	157.9049	313.2940	438.8589	469.1687	469.5795 (95)
Ext temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000 (96)
Heat loss rate W												
Month fracti	937.7376	909.8124	807.7541	657.6801	467.9271	274.6686	152.2002	158.2098	325.3157	547.5068	756.9599	927.7561 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating	331.7763	255.9416	196.7691	95.2124	28.4596	0.0000	0.0000	0.0000	0.0000	80.8341	207.2097	340.8834 (98)
RHI space heating demand												1537.0861 (98)
												1537 (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	52.7000 (1b)	2.4300 (2b)	128.0610 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	128.0610 (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				2 * 10 =	20.0000 (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) =				20.0000 / (5) =	0.1562 (8)
Pressure test				Yes	
Measured/design AP50					5.0100
Infiltration rate					0.4067 (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) =	0.3762 (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	0.4796	0.4702	0.4608	0.4138	0.4044	0.3574	0.3574	0.3480	0.3762	0.4044	0.4232	0.4420 (22b)
	0.6150	0.6106	0.6062	0.5856	0.5818	0.5639	0.5639	0.5605	0.5708	0.5818	0.5895	0.5977 (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)			7.8000	1.3258	10.3409		(27)
Solid Door			1.9700	1.0000	1.9700		(26)
Flr - Ground			52.7000	0.1500	7.9050	75.0000	3952.5000 (28a)
Wl - Brick	45.8700	7.7990	38.0710	0.2600	9.8985	58.7400	2236.2905 (29a)
Wl - To Corridor	3.8300	1.9730	1.8570	0.2200	0.4085	58.7400	109.0802 (29a)
Wl - Cycle Stoarge	11.2000		11.2000	0.2600	2.9120	58.7400	657.8880 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			113.5980				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4349		(33)
Party Wall			20.7610	0.0000	0.0000	54.0300	1121.7168 (32)
Party Ceiling			52.7040			70.0000	3689.2800 (32b)
Ground Floor Stud			92.3537			5.8200	537.4985 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12304.2541 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							233.4773 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.2486 (36)
Total fabric heat loss						(33) + (36) =	41.6835 (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	25.9908	25.8020	25.6170	24.7480	24.5855	23.8286	23.8286	23.6884	24.1201	24.5855	24.9144	25.2582 (38)
Heat transfer coeff	67.6743	67.4856	67.3006	66.4316	66.2690	65.5121	65.5121	65.3720	65.8037	66.2690	66.5979	66.9418 (39)
Average = Sum(39)m / 12 =												66.4308 (39)
HLP	1.2841	1.2806	1.2771	1.2606	1.2575	1.2431	1.2431	1.2405	1.2486	1.2575	1.2637	1.2702 (40)
HLP (average)												1.2605 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.7697 (42)
Average daily hot water use (litres/day)												76.2308 (43)
Daily hot water use	83.8539	80.8046	77.7554	74.7062	71.6569	68.6077	68.6077	71.6569	74.7062	77.7554	80.8046	83.8539 (44)
Energy conte	124.3529	108.7598	112.2304	97.8452	93.8848	81.0154	75.0727	86.1470	87.1759	101.5951	110.8990	120.4291 (45)
Energy content (annual)										Total = Sum(45)m =		1199.4071 (45)
Distribution loss (46)m = 0.15 x (45)m	18.6529	16.3140	16.8346	14.6768	14.0827	12.1523	11.2609	12.9221	13.0764	15.2393	16.6348	18.0644 (46)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF ENERGY RATINGS 09 Jan 2014

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	14.5297	13.1047	14.4787	13.9776	14.4187	13.9250	14.3714	14.4021	13.9537	14.4539	14.0271	14.5199	(61)
Total heat required for water heating calculated for each month	138.8826	121.8645	126.7091	111.8228	108.3035	94.9405	89.4441	100.5491	101.1296	116.0490	124.9261	134.9490	(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	138.8826	121.8645	126.7091	111.8228	108.3035	94.9405	89.4441	100.5491	101.1296	116.0490	124.9261	134.9490	(64)
Heat gains from water heating, kWh/month	44.9798	39.4388	40.9363	36.0279	34.8214	30.4189	28.5545	32.2444	32.4744	37.3938	40.3807	43.6726	(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	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	36.4429	32.3683	26.3236	19.9287	14.8969	12.5766	13.5895	17.6641	23.7087	30.1037	35.1354	37.4558	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	230.2100	232.5988	226.5790	213.7634	197.5861	182.3817	172.2242	169.8354	175.8552	188.6708	204.8481	220.0525	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	(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)	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	(71)
Water heating gains (Table 5)	60.4567	58.6887	55.0219	50.0388	46.8029	42.2485	38.3797	43.3393	45.1033	50.2605	56.0843	58.6998	(72)
Total internal gains	412.8919	409.4382	393.7069	369.5133	345.0683	322.9891	309.9758	316.6211	330.4497	354.8173	381.8502	401.9904	(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								
North	3.3990	10.6334	0.5000	0.0000	0.7700	13.9150 (74)							
South	3.7300	46.7521	0.5000	0.0000	0.7700	67.1383 (78)							
West	0.6700	19.6403	0.5000	0.0000	0.7700	5.0662 (80)							
Solar gains	86.1195	146.4581	201.5716	254.6874	291.9070	293.2852	281.2642	252.5861	219.6244	162.0114	103.0647	73.7801	(83)
Total gains	499.0114	555.8963	595.2785	624.2007	636.9753	616.2744	591.2400	569.2072	550.0741	516.8288	484.9149	475.7705	(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	50.5044	50.6456	50.7848	51.4492	51.5754	52.1712	52.1712	52.2831	51.9401	51.5754	51.3207	51.0571	
alpha	4.3670	4.3764	4.3857	4.4299	4.4384	4.4781	4.4781	4.4855	4.4627	4.4384	4.4214	4.4038	
util living area	0.9841	0.9733	0.9520	0.9024	0.8024	0.6362	0.4773	0.5136	0.7312	0.9119	0.9719	0.9868	(86)
MIT	19.8285	19.9994	20.2490	20.5571	20.8062	20.9498	20.9888	20.9846	20.9043	20.5985	20.1638	19.7960	(87)
Th 2	19.8533	19.8561	19.8589	19.8719	19.8743	19.8857	19.8857	19.8878	19.8813	19.8743	19.8694	19.8642	(88)
util rest of house	0.9794	0.9656	0.9379	0.8730	0.7446	0.5424	0.3615	0.3966	0.6441	0.8792	0.9623	0.9829	(89)
MIT 2	18.8198	18.9893	19.2334	19.5332	19.7501	19.8635	19.8829	19.8836	19.8331	19.5791	19.1632	18.7965	(90)
Living area fraction									fLA = Living area / (4) =			0.4516	(91)
MIT	19.2753	19.4455	19.6921	19.9956	20.2271	20.3541	20.3824	20.3808	20.3169	20.0395	19.6151	19.2479	(92)
Temperature adjustment												-0.1500	
adjusted MIT	19.1253	19.2955	19.5421	19.8456	20.0771	20.2041	20.2324	20.2308	20.1669	19.8895	19.4651	19.0979	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9756	0.9609	0.9331	0.8722	0.7560	0.5706	0.3984	0.4337	0.6682	0.8797	0.9581	0.9795	(94)
Useful gains	486.8458	534.1518	555.4721	544.4452	481.5745	351.6344	235.5326	246.8599	367.5322	454.6528	464.5865	466.0343	(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	1003.2932	971.4866	877.7373	727.1333	555.1398	367.1360	237.9640	250.4263	399.2223	615.6062	823.4880	997.2912	(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	384.2369	293.8890	239.7653	131.5354	54.7327	0.0000	0.0000	0.0000	0.0000	119.7493	258.4091	395.2551	(98)
Space heating												1877.5727	(98)
Space heating per m2												(98) / (4) =	35.6276 (99)

#### 8c. Space cooling requirement

Not applicable



# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

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													2074.6660 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	384.2369	293.8890	239.7653	131.5354	54.7327	0.0000	0.0000	0.0000	0.0000	119.7493	258.4091	395.2551	(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)	424.5711	324.7392	264.9341	145.3430	60.4781	0.0000	0.0000	0.0000	0.0000	132.3197	285.5349	436.7460	(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	138.8826	121.8645	126.7091	111.8228	108.3035	94.9405	89.4441	100.5491	101.1296	116.0490	124.9261	134.9490	(64)
Efficiency of water heater (217)m	89.6278	89.5380	89.3674	89.0010	88.3487	87.3000	87.3000	87.3000	87.3000	88.8963	89.4317	87.3000	(216)
Fuel for water heating, kWh/month	154.9549	136.1037	141.7845	125.6422	122.5864	108.7520	102.4560	115.1765	115.8414	130.5442	139.6889	150.5061	(219)
Water heating fuel used													1544.0367 (219)
Annual totals kWh/year													
Space heating fuel - main system													2074.6660 (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)													257.4371 (232)
Total delivered energy for all uses													3951.1399 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2074.6660	3.4800	72.1984 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1544.0367	3.4800	53.7325 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	257.4371	13.1900	33.9560 (250)
Additional standing charges			120.0000 (251)
Total energy cost			289.7793 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2457 (257)
SAP value		82.6221
SAP rating (Section 12)		83 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2074.6660	0.2160	448.1279 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1544.0367	0.2160	333.5119 (264)
Space and water heating			781.6398 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	257.4371	0.5190	133.6099 (268)
Total kg/year			954.1747 (272)
CO2 emissions per m2			18.1100 (273)
EI value			86.9131
EI rating			87 (274)
EI band			B

Calculation of stars for heating and DHW

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9050 = 3.845$ , stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9050 = 0.2387$ , stars = 4
Water heating energy efficiency	$3.48 / 0.8859 = 3.928$ , stars = 4
Water heating environmental impact	$0.216 / 0.8859 = 0.2438$ , stars = 4

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

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

#### 1. Overall dwelling dimensions

	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	52.7000 (1b)	2.4300 (2b)	128.0610 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	128.0610 (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				2 * 10 =	20.0000 (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) =				20.0000 / (5) =	0.1562 (8)
Pressure test				Yes	
Measured/design AP50				5.0100	
Infiltration rate				0.4067	(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) =	0.3762 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500
Adj infilt rate												
Effective ac	0.3950	0.3762	0.3762	0.3480	0.3480	0.3103	0.3197	0.3009	0.3103	0.3292	0.3292	0.3574
Effective ac	0.5780	0.5708	0.5708	0.5605	0.5605	0.5482	0.5511	0.5453	0.5482	0.5542	0.5542	0.5639

#### 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)			7.8000	1.3258	10.3409		(27)
Solid Door			1.9700	1.0000	1.9700		(26)
Flr - Ground			52.7000	0.1500	7.9050	75.0000	3952.5000 (28a)
Wl - Brick	45.8700	7.7990	38.0710	0.2600	9.8985	58.7400	2236.2905 (29a)
Wl - To Corridor	3.8300	1.9730	1.8570	0.2200	0.4085	58.7400	109.0802 (29a)
Wl - Cycle Stoarge	11.2000		11.2000	0.2600	2.9120	58.7400	657.8880 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			113.5980				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4349		(33)
Party Wall			20.7610	0.0000	0.0000	54.0300	1121.7168 (32)
Party Ceiling			52.7040			70.0000	3689.2800 (32b)
Ground Floor Stud			92.3537			5.8200	537.4985 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12304.2541 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							233.4773 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.2486 (36)
Total fabric heat loss						(33) + (36) =	41.6835 (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	24.4266	24.1201	24.1201	23.6884	23.6884	23.1652	23.2904	23.0437	23.1652	23.4193	23.4193	23.8286
Heat transfer coeff	66.1101	65.8037	65.8037	65.3720	65.3720	64.8487	64.9739	64.7272	64.8487	65.1029	65.1029	65.5121
Average = Sum(39)m / 12 =	65.2982 (39)											
HLP	1.2545	1.2486	1.2486	1.2405	1.2405	1.2305	1.2329	1.2282	1.2305	1.2353	1.2353	1.2431
HLP (average)	1.2391 (40)											
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy	1.7697 (42)											
Average daily hot water use (litres/day)	76.2308 (43)											
Daily hot water use	83.8539	80.8046	77.7554	74.7062	71.6569	68.6077	68.6077	71.6569	74.7062	77.7554	80.8046	83.8539
Energy conte	124.3529	108.7598	112.2304	97.8452	93.8848	81.0154	75.0727	86.1470	87.1759	101.5951	110.8990	120.4291
Energy content (annual)	Total = Sum(45)m = 1199.4071 (45)											
Distribution loss (46)m = 0.15 x (45)m	18.6529	16.3140	16.8346	14.6768	14.0827	12.1523	11.2609	12.9221	13.0764	15.2393	16.6348	18.0644

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

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	14.5297	13.1047	14.4787	13.9776	14.4187	13.9250	14.3714	14.4021	13.9537	14.4539	14.0271	14.5199	(61)
Total heat required for water heating calculated for each month	138.8826	121.8645	126.7091	111.8228	108.3035	94.9405	89.4441	100.5491	101.1296	116.0490	124.9261	134.9490	(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	138.8826	121.8645	126.7091	111.8228	108.3035	94.9405	89.4441	100.5491	101.1296	116.0490	124.9261	134.9490	(64)
Heat gains from water heating, kWh/month	44.9798	39.4388	40.9363	36.0279	34.8214	30.4189	28.5545	32.2444	32.4744	37.3938	40.3807	43.6726	(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	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	106.1830	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	36.4429	32.3683	26.3236	19.9287	14.8969	12.5766	13.5895	17.6641	23.7087	30.1037	35.1354	37.4558	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	230.2100	232.5988	226.5790	213.7634	197.5861	182.3817	172.2242	169.8354	175.8552	188.6708	204.8481	220.0525	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	47.3880	(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)	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	(71)
Water heating gains (Table 5)	60.4567	58.6887	55.0219	50.0388	46.8029	42.2485	38.3797	43.3393	45.1033	50.2605	56.0843	58.6998	(72)
Total internal gains	412.8919	409.4382	393.7069	369.5133	345.0683	322.9891	309.9758	316.6211	330.4497	354.8173	381.8502	401.9904	(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					
North	94.6562	144.9505	3.3990	11.9814	0.5000	0.0000	0.7700	15.6791	(74)				
South	507.5481	554.3886	3.7300	50.9848	0.5000	0.0000	0.7700	73.2168	(78)				
West			0.6700	22.3313	0.5000	0.0000	0.7700	5.7604	(80)				
Solar gains	94.6562	144.9505	197.7770	259.3629	291.4127	314.1422	297.6845	272.0283	234.1772	171.3615	116.0607	80.3135	(83)
Total gains	507.5481	554.3886	591.4839	628.8762	636.4810	637.1313	607.6603	588.6494	564.6269	526.1789	497.9109	482.3039	(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	51.6993	51.9401	51.9401	52.2831	52.2831	52.7050	52.6034	52.8039	52.7050	52.4992	52.4992	52.1712		
alpha	4.4466	4.4627	4.4627	4.4855	4.4855	4.5137	4.5069	4.5203	4.5137	4.4999	4.4999	4.4781		
util living area	0.9793	0.9681	0.9404	0.8710	0.7296	0.4968	0.3299	0.3498	0.6264	0.8741	0.9600	0.9827	(86)	
MIT	19.9786	20.1204	20.3750	20.6712	20.8917	20.9857	20.9983	20.9978	20.9584	20.7187	20.3186	19.9513	(87)	
Th 2	19.8767	19.8813	19.8813	19.8878	19.8878	19.8957	19.8938	19.8975	19.8957	19.8918	19.8918	19.8857	(88)	
util rest of house	0.9731	0.9588	0.9224	0.8327	0.6559	0.3928	0.2130	0.2304	0.5235	0.8285	0.9463	0.9774	(89)	
MIT 2	18.9864	19.1280	19.3725	19.6489	19.8271	19.8913	19.8936	19.8972	19.8791	19.6996	19.3312	18.9671	(90)	
Living area fraction									fLA = Living area / (4) =			0.4516	(91)	
MIT	19.4345	19.5762	19.8252	20.1106	20.3079	20.3855	20.3925	20.3943	20.3665	20.1599	19.7771	19.4116	(92)	
Temperature adjustment												-0.1500		
adjusted MIT	19.2845	19.4262	19.6752	19.9606	20.1579	20.2355	20.2425	20.2443	20.2165	20.0099	19.6271	19.2616	(93)	

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9690	0.9541	0.9185	0.8355	0.6751	0.4256	0.2501	0.2682	0.5549	0.8340	0.9423	0.9736	(94)
Ext temp.	491.8017	528.9470	543.2796	525.4407	429.6750	271.1313	151.9775	157.9049	313.2940	438.8589	469.1687	469.5795	(95)
Heat loss rate W	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000	(96)
Month fracti	937.7376	909.8124	807.7541	657.6801	467.9271	274.6686	152.2002	158.2098	325.3157	547.5068	756.9599	927.7561	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating	331.7763	255.9416	196.7691	95.2124	28.4596	0.0000	0.0000	0.0000	0.0000	80.8341	207.2097	340.8834	(98)
Space heating per m2												1537.0861	(98)
										(98) / (4) =		29.1667	(99)

#### 8c. Space cooling requirement

Not applicable

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

#### 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													1698.4377 (211)
Space heating requirement	331.7763	255.9416	196.7691	95.2124	28.4596	0.0000	0.0000	0.0000	0.0000	80.8341	207.2097	340.8834	(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)	366.6036	282.8084	217.4244	105.2071	31.4470	0.0000	0.0000	0.0000	0.0000	89.3194	228.9610	376.6667	(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	138.8826	121.8645	126.7091	111.8228	108.3035	94.9405	89.4441	100.5491	101.1296	116.0490	124.9261	134.9490	(64)
Efficiency of water heater (217)m	89.5316	89.4425	89.2190	88.7431	87.9471	87.3000	87.3000	87.3000	87.3000	88.5860	89.2692	87.3000	(216)
Fuel for water heating, kWh/month	155.1213	136.2491	142.0203	126.0073	123.1462	108.7520	102.4560	115.1765	115.8414	131.0014	139.9431	150.6650	(219)
Water heating fuel used													1546.3797 (219)
Annual totals kWh/year													
Space heating fuel - main system													1698.4377 (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)													257.4371 (232)
Total delivered energy for all uses													3577.2545 (238)

#### 10a. Fuel costs - using BEDF prices (467)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1698.4377	3.9500	67.0883 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1546.3797	3.9500	61.0820 (247)
Pumps and fans for heating	75.0000	18.7000	14.0250 (249)
Energy for lighting	257.4371	18.7000	48.1407 (250)
Additional standing charges			91.0000 (251)
Total energy cost			281.3360 (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	1698.4377	0.2160	366.8625 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1546.3797	0.2160	334.0180 (264)
Space and water heating			700.8805 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	257.4371	0.5190	133.6099 (268)
Total kg/year			873.4154 (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	1698.4377	1.2200	2072.0940 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1546.3797	1.2200	1886.5832 (264)
Space and water heating			3958.6772 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	257.4371	3.0700	790.3320 (268)
Primary energy kWh/year			4979.2592 (272)
Primary energy kWh/m2/year			94.4831 (273)

#### SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 83  
 Current environmental impact rating: B 87

(For testing purposes):

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



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

A		Not considered
B		Not considered
C		Not considered
D		Not considered
E	Low energy lighting	Already installed
F		Not considered
G		Not considered
H		Not considered
I		Not considered
J		Not considered
K		Not considered
M		Not considered
N	Solar water heating	Not applicable
O		Not considered
P		Not considered
R		Not considered
S		Not considered
T		Not considered
U	Solar photovoltaic panels	Not applicable
A2		Not considered
A3		Not considered
T2		Not considered
W		Not considered
X		Not considered
Y		Not considered
J2		Not considered
Q2		Not considered
Z1		Not considered
Z2		Not considered
Z3		Not considered
Z4		Not considered
Z5		Not considered
V2	Wind turbine	Not applicable
L2		Not considered
Q3		Not considered
O3		Not considered

Recommended measures: (none)	SAP change	Cost change	CO2 change
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Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings £0		0.00 kg/m <sup>2</sup>
Potential energy efficiency rating:		B 83	
Potential environmental impact rating:			B 87

Fuel prices for cost data on this page from database revision number 467 TEST (29 Oct 2020)  
 Recommendation texts revision number 4.9c (22 Feb 2014)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£62	£62	£0
Mains gas	£219	£219	£0
Space heating	£172	£172	£0
Water heating	£61	£61	£0
Lighting	£48	£48	£0
Total cost of fuels	£281	£281	£0
Total cost of uses	£281	£281	£0
Delivered energy	68 kWh/m <sup>2</sup>	68 kWh/m <sup>2</sup>	0 kWh/m <sup>2</sup>
Carbon dioxide emissions	0.9 tonnes	0.9 tonnes	0.0 tonnes
CO2 emissions per m <sup>2</sup>	17 kg/m <sup>2</sup>	17 kg/m <sup>2</sup>	0 kg/m <sup>2</sup>
Primary energy	94 kWh/m <sup>2</sup>	94 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

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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>	014 - PRJ010331 - GF	<b>Issued on Date</b>	17/12/2020
<b>Assessment Reference</b>	014 S	<b>Prop Type Ref</b>	Apartment - GF
<b>Property</b>	PL 14 - S - GF		

<b>SAP Rating</b>	83 B	<b>DER</b>	20.27	<b>TER</b>	20.74
<b>Environmental</b>	87 B	<b>% DER&lt;TER</b>	2.25		
<b>CO<sub>2</sub> Emissions (t/year)</b>	0.87	<b>DFEE</b>	49.49	<b>TFEE</b>	53.10
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	6.79		

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

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

##### 1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	20.74	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	20.27	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-0.47 (-2.3%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.10	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	49.49	kWh/m <sup>2</sup> /yr	
	-3.6 (-6.8%)	kWh/m <sup>2</sup> /yr	Pass

#### Criterion 2 – Limits on design flexibility

##### Limiting Fabric Standards

##### 2 Fabric U-values

Element	Average	Highest	
External wall	0.26 (max. 0.30)	0.26 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	Pass
Openings	1.32 (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

Not applicable

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

### 9 Summertime temperature

Overheating risk (Thames Valley)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

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

Windows facing South

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

Windows facing West

0.67 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

Door U-value

1.00

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

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