

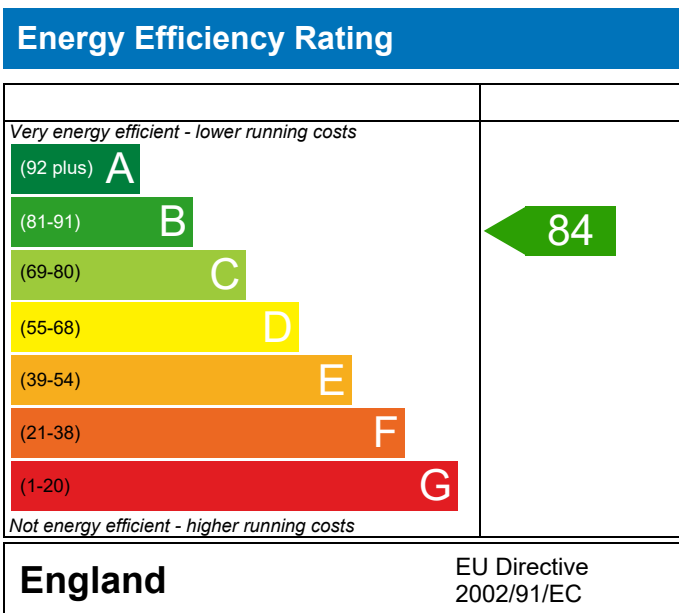
# PREDICTED ENERGY ASSESSMENT

112 - PRJ009250 - GF

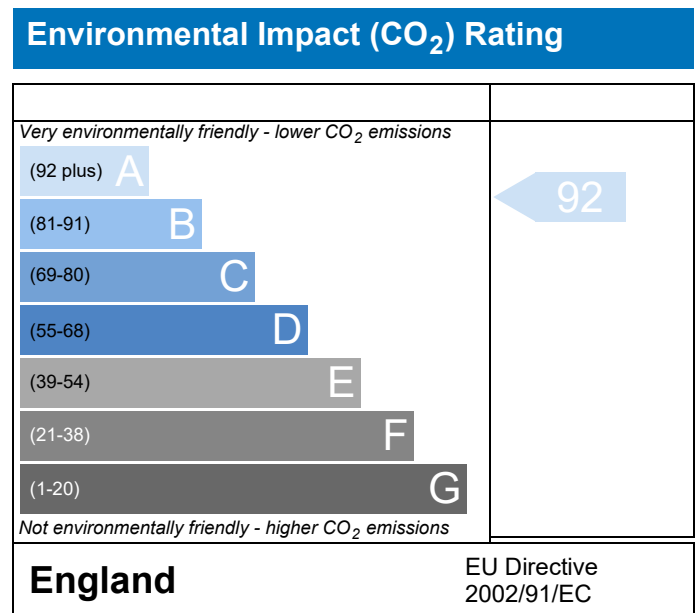
Dwelling type: Flat, End-Terrace  
Date of assessment: 13/10/2021  
Produced by: Michael Juckes  
Total floor area: 96.6 m<sup>2</sup>

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.



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.



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.

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

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

Property Reference	112 - PRJ009250 - GF		Issued on Date	13/10/2021	
Assessment Reference	112 E	Prop Type Ref	Block 1B - GF		
Property	112 - PRJ009250 - GF				
SAP Rating	84 B	DER	10.33	TER	19.03
Environmental	92 A	% DER<TER	45.70		
CO <sub>2</sub> Emissions (t/year)	0.59	DFEE	48.28	TTEE	59.10
General Requirements Compliance	Pass	% DFEE<TTEE	18.31		
Assessor Details	Chris Nicholls, , Tel: ,			Assessor ID	T850-0001
Client					

### 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	96.6000 (1b)	x 2.5800 (2b)	= 249.2280 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 249.2280 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m <sup>3</sup> per hour								
Number of chimneys	0	0	0	0 + 40 =	0.0000 (6a)								
Number of open flues	0	0	0	0 + 20 =	0.0000 (6b)								
Number of intermittent fans				0 + 10 =	0.0000 (7a)								
Number of passive vents				0 + 10 =	0.0000 (7b)								
Number of flueless gas fires				0 + 40 =	0.0000 (7c)								
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				Air changes per hour	0.0000 / (5) = 0.0000 (8)								
Pressure test				Yes									
Measured/design AP50				5.0100									
Infiltration rate				0.2505	(18)								
Number of sides sheltered				1	(19)								
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)								
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.2317 (21)								
Wind speed	Jan 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	0.2781	0.2607	0.2549	0.2259	0.2259	0.2085	0.2143	0.2027	0.2143	0.2317	0.2375	0.2549	(22b)
Mechanical extract ventilation - centralised													
If mechanical ventilation:												0.5000	(23a)
Effective ac	0.5281	0.5107	0.5049	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5049	(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)			14.2600	1.3258	18.9053		(27)
Solid Door			2.3000	1.4000	3.2200		(26)
Flr - Ground			96.6000	0.0800	7.7280	110.0000	10626.0000 (28a)
Wl - Brick	83.7720	14.2570	69.5150	0.1800	12.5127	14.0000	973.2100 (29a)
Wl - To Corridor	26.3330	2.2990	24.0340	0.1300	3.1244	14.0000	336.4760 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			206.7090				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.4904		(33)
Party Wall			16.5550	0.0000	0.0000	54.0300	894.4667 (32)
Party Ceiling			96.6000			70.0000	6762.0000 (32b)
Ground Floor Stud			147.9286			5.8200	860.9445 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		20453.0971 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							211.7298 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.7761 (36)
Total fabric heat loss						(33) + (36) =	60.2665 (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	43.4300	42.0007	41.5243	41.1226	41.1226	41.1226	41.1226	41.1226	41.1226	41.1226	41.1226	41.5243	(38)
Heat transfer coeff	103.6965	102.2672	101.7908	101.3891	101.3891	101.3891	101.3891	101.3891	101.3891	101.3891	101.3891	101.7908	(39)
Average = Sum(39)m / 12 =												101.7215	(39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0735	1.0587	1.0537	1.0496	1.0496	1.0496	1.0496	1.0496	1.0496	1.0496	1.0496	1.0537	(40)
HLP (average)												1.0530	(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													2.7057	(42)	
Average daily hot water use (litres/day)													98.4614	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Daily hot water use	108.3075	104.3691	100.4306	96.4922	92.5537	88.6153	88.6153	92.5537	96.4922	100.4306	104.3691	108.3075	(44)		
Energy conte	160.6169	140.4766	144.9593	126.3790	121.2637	104.6413	96.9656	111.2694	112.5983	131.2225	143.2396	155.5489	(45)		
Energy content (annual)													Total = Sum(45)m =	1549.1812	(45)
Distribution loss (46)m = 0.15 x (45)m	24.0925	21.0715	21.7439	18.9569	18.1896	15.6962	14.5448	16.6904	16.8897	19.6834	21.4859	23.3323	(46)		
Water storage loss:															
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)		
If cylinder contains dedicated solar storage															
Combi loss	14.6988	13.2625	14.6518	14.1241	14.5536	14.0365	14.4747	14.5259	14.0842	14.6106	14.1880	14.6836	(61)		
Total heat required for water heating calculated for each month	175.3157	153.7391	159.6111	140.5031	135.8173	118.6778	111.4403	125.7953	126.6826	145.8331	157.4276	170.2325	(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	175.3157	153.7391	159.6111	140.5031	135.8173	118.6778	111.4403	125.7953	126.6826	145.8331	157.4276	170.2325	(64)		
Total per year (kWh/year) = Sum(64)m =													1721.0754	(64)	
RHI water heating demand													1721	(64)	
Heat gains from water heating, kWh/month	57.0798	50.0241	51.8619	45.5521	43.9586	38.3024	35.8597	40.6285	40.9600	47.2841	51.1742	55.3909	(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	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	59.2702	52.6433	42.8124	32.4117	24.2282	20.4544	22.1017	28.7287	38.5596	48.9602	57.1438	60.9175	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	374.1957	378.0787	368.2937	347.4626	321.1671	296.4531	279.9425	276.0596	285.8446	306.6756	332.9711	357.6852	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	(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)	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	(71)
Water heating gains (Table 5)	76.7202	74.4406	69.7069	63.2667	59.0841	53.1977	48.1986	54.6083	56.8889	63.5539	71.0752	74.4501	(72)
Total internal gains	621.2412	616.2176	591.8680	554.1962	515.5344	481.1603	461.2979	470.4516	492.3481	530.2448	572.2452	604.1079	(73)

#### 6. Solar gains

[Jan]		Area	Solar flux	g	FF	Access	Gains						
		m2	Table 6a	Specific data	Specific data	factor	W						
			W/m2	or Table 6b	or Table 6c	Table 6d							
Northwest		14.2570	13.7622	0.7600	0.7000	0.7700	72.3370	(81)					
Solar gains	72.3370	131.7808	237.5221	409.9999	526.9855	598.5866	554.2752	448.4061	309.7556	172.6126	92.1050	57.0003	(83)
Total gains	693.5782	747.9985	829.3901	964.1961	1042.5199	1079.7469	1015.5731	918.8576	802.1037	702.8574	664.3502	661.1082	(84)

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

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000	(85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
tau	54.7889	55.5546	55.8146	56.0357	56.0357	56.0357	56.0357	56.0357	56.0357	56.0357	56.0357	55.8146			
alpha	4.6526	4.7036	4.7210	4.7357	4.7357	4.7357	4.7357	4.7357	4.7357	4.7357	4.7357	4.7210			
util living area	0.9899	0.9847	0.9651	0.8940	0.7333	0.5137	0.3576	0.3836	0.6962	0.9223	0.9797	0.9911	(86)		
MIT	19.9069	20.0318	20.3066	20.6566	20.9015	20.9851	20.9979	20.9973	20.9436	20.6671	20.2578	19.9244	(87)		
Th 2	20.0226	20.0347	20.0388	20.0422	20.0422	20.0422	20.0422	20.0422	20.0422	20.0422	20.0422	20.0388	(88)		
util rest of house	0.9870	0.9805	0.9551	0.8653	0.6725	0.4310	0.2634	0.2800	0.6077	0.8925	0.9728	0.9885	(89)		
MIT 2	19.0412	19.1742	19.4464	19.7773	19.9818	20.0363	20.0418	20.0417	20.0154	19.7954	19.4046	19.0717	(90)		
Living area fraction													fLA = Living area / (4) =	0.3339	(91)
MIT	19.3302	19.4605	19.7336	20.0709	20.2889	20.3531	20.3610	20.3607	20.3253	20.0864	19.6894	19.3564	(92)		
Temperature adjustment													-0.1500		

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF HEAT DEMAND 09 Jan 2014

adjusted MIT 19.1802 19.3105 19.5836 19.9209 20.1389 20.2031 20.2110 20.2107 20.1753 19.9364 19.5394 19.2064 (93)

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 8. Space heating requirement  
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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9838	0.9763	0.9492	0.8612	0.6791	0.4452	0.2801	0.2984	0.6209	0.8885	0.9682	0.9856 (94)
Useful gains	682.3096	730.2994	787.2886	830.3257	707.9445	480.7567	284.5066	274.2033	498.0608	624.5135	643.2085	651.5718 (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	1470.4366	1422.5910	1270.7120	1056.5620	764.3598	486.9788	285.0063	274.8384	524.7181	835.0839	1159.8327	1425.7179 (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	586.3665	465.2200	359.6670	162.8901	41.9730	0.0000	0.0000	0.0000	0.0000	156.6643	371.9695	575.9647 (98)
Space heating												2720.7150 (98)
RHI space heating demand												2721 (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	96.6000 (1b)	2.5800 (2b)	249.2280 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.6000		249.2280 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	249.2280 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				0 * 10 =	0.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) =	0.0000 (8)
Pressure test				Yes	
Measured/design AP50				5.0100	
Infiltration rate				0.2505	(18)
Number of sides sheltered				1	(19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.2317 (21)

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

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

Element	Gross 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)			14.2600	1.3258	18.9053		(27)
Solid Door			2.3000	1.4000	3.2200		(26)
Flr - Ground			96.6000	0.0800	7.7280	110.0000	10626.0000 (28a)
Wl - Brick	83.7720	14.2570	69.5150	0.1800	12.5127	14.0000	973.2100 (29a)
Wl - To Corridor	26.3330	2.2990	24.0340	0.1300	3.1244	14.0000	336.4760 (29a)
Total net area of external elements Aum(A, m2)			206.7090				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.4904		(33)
Party Wall			16.5550	0.0000	0.0000	54.0300	894.4667 (32)
Party Ceiling			96.6000			70.0000	6762.0000 (32b)
Ground Floor Stud			147.9286			5.8200	860.9445 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20453.0971 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							211.7298 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.7761 (36)
Total fabric heat loss						(33) + (36) =	60.2665 (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	44.8593	44.3829	43.9064	41.5243	41.1226	41.1226	41.1226	41.1226	41.1226	41.1226	42.0007	42.9536 (38)
Heat transfer coeff	105.1258	104.6494	104.1730	101.7908	101.3891	101.3891	101.3891	101.3891	101.3891	101.3891	102.2672	103.2201 (39)
Average = Sum(39)m / 12 =												102.4634 (39)
HLP	1.0883	1.0833	1.0784	1.0537	1.0496	1.0496	1.0496	1.0496	1.0496	1.0496	1.0587	1.0685 (40)
HLP (average)												1.0607 (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												2.7057 (42)
Average daily hot water use (litres/day)												98.4614 (43)
Daily hot water use	108.3075	104.3691	100.4306	96.4922	92.5537	88.6153	88.6153	92.5537	96.4922	100.4306	104.3691	108.3075 (44)
Energy conte	160.6169	140.4766	144.9593	126.3790	121.2637	104.6413	96.9656	111.2694	112.5983	131.2225	143.2396	155.5489 (45)
Energy content (annual)										Total = Sum(45)m =		1549.1812 (45)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF ENERGY RATINGS 09 Jan 2014

Distribution loss (46)m = 0.15 x (45)m	24.0925	21.0715	21.7439	18.9569	18.1896	15.6962	14.5448	16.6904	16.8897	19.6834	21.4859	23.3323 (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	14.6988	13.2625	14.6518	14.1241	14.5536	14.0365	14.4747	14.5259	14.0842	14.6106	14.1880	14.6836 (61)
Total heat required for water heating calculated for each month	175.3157	153.7391	159.6111	140.5031	135.8173	118.6778	111.4403	125.7953	126.6826	145.8331	157.4276	170.2325 (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	175.3157	153.7391	159.6111	140.5031	135.8173	118.6778	111.4403	125.7953	126.6826	145.8331	157.4276	170.2325 (64)
Heat gains from water heating, kWh/month	57.0798	50.0241	51.8619	45.5521	43.9586	38.3024	35.8597	40.6285	40.9600	47.2841	51.1742	55.3909 (65)
												Solar input (sum of months) = Sum(63)m = 0.0000 (63)
												Total per year (kWh/year) = Sum(64)m = 1721.0754 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	59.2702	52.6433	42.8124	32.4117	24.2282	20.4544	22.1017	28.7287	38.5596	48.9602	57.1438	60.9175 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	374.1957	378.0787	368.2937	347.4626	321.1671	296.4531	279.9425	276.0596	285.8446	306.6756	332.9711	357.6852 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402 (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)	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297 (71)
Water heating gains (Table 5)	76.7202	74.4406	69.7069	63.2667	59.0841	53.1977	48.1986	54.6083	56.8889	63.5539	71.0752	74.4501 (72)
Total internal gains	621.2412	616.2176	591.8680	554.1962	515.5344	481.1603	461.2979	470.4516	492.3481	530.2448	572.2452	604.1079 (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						
Northwest	14.2570	11.2829	0.7600	0.7000	0.7700	59.3056 (81)						
Solar gains	59.3056	120.7182	217.4957	357.1905	480.1341	511.8738	478.8474	381.7427	265.0220	147.5272	74.6217	48.4319 (83)
Total gains	680.5467	736.9358	809.3637	911.3866	995.6685	993.0340	940.1453	852.1943	757.3700	677.7720	646.8670	652.5398 (84)

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

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)	0.9922	0.9875	0.9735	0.9236	0.8024	0.6204	0.4671	0.5326	0.7914	0.9522	0.9864	0.9935 (86)
MIT	19.7895	19.9266	20.1887	20.5600	20.8374	20.9629	20.9921	20.9858	20.8868	20.5379	20.1168	19.7784 (87)
Th 2	20.0104	20.0145	20.0185	20.0388	20.0422	20.0422	20.0422	20.0422	20.0422	20.0422	20.0347	20.0266 (88)
util rest of house	0.9900	0.9841	0.9659	0.9019	0.7523	0.5398	0.3691	0.4286	0.7202	0.9340	0.9820	0.9917 (89)
MIT 2	18.9149	19.0539	19.3151	19.6869	19.9329	20.0245	20.0399	20.0377	19.9778	19.6759	19.2596	18.9167 (90)
Living area fraction									fLA = Living area / (4) =			0.3339 (91)
MIT	19.2069	19.3452	19.6068	19.9783	20.2349	20.3378	20.3578	20.3542	20.2812	19.9637	19.5457	19.2044 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.0569	19.1952	19.4568	19.8283	20.0849	20.1878	20.2078	20.2042	20.1312	19.8137	19.3957	19.0544 (93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	671.8523	722.4634	777.3043	816.9048	751.4877	548.7710	363.2265	380.7088	551.0066	629.3795	632.7691	645.5439 (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	1551.3285	1495.9845	1349.7437	1112.4055	850.1364	566.5396	365.7952	385.7065	611.5032	934.1663	1257.4521	1533.2722 (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	654.3302	519.8062	425.8950	212.7605	73.3946	0.0000	0.0000	0.0000	0.0000	226.7614	449.7718	660.4699 (98)
Space heating												3223.1895 (98)
Space heating per m2												(98) / (4) = 33.3664 (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													3561.5354 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	654.3302	519.8062	425.8950	212.7605	73.3946	0.0000	0.0000	0.0000	0.0000	226.7614	449.7718	660.4699	(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)	723.0168	574.3715	470.6022	235.0944	81.0990	0.0000	0.0000	0.0000	0.0000	250.5651	496.9854	729.8010	(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	175.3157	153.7391	159.6111	140.5031	135.8173	118.6778	111.4403	125.7953	126.6826	145.8331	157.4276	170.2325	(64)
Efficiency of water heater (217)m	89.8044	89.7491	89.6046	89.1996	88.3965	87.3000	87.3000	87.3000	87.3000	89.2200	89.6480	87.3000	(216)
Fuel for water heating, kWh/month	195.2195	171.2988	178.1281	157.5155	153.6455	135.9425	127.6521	144.0954	145.1118	163.4534	175.6063	189.5152	(219)
Water heating fuel used												1937.1840	(219)
Annual totals kWh/year													
Space heating fuel - main system													3561.5354 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
(MEVCentralised, Database: in-use factor = 1.3000, SFP = 0.3380)													
mechanical ventilation fans (SFP = 0.3380)													102.7717 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													177.7717 (231)
Electricity for lighting (calculated in Appendix L)													418.6924 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 1.75 * 951 * 1.00) =													-1330.8624 (233)
Total delivered energy for all uses													4764.3211 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3561.5354	3.4800	123.9414 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1937.1840	3.4800	67.4140 (247)
Mechanical ventilation fans	102.7717	13.1900	13.5556 (249)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	418.6924	13.1900	55.2255 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	0.0000	0.0000	0.0000 (252)
Total energy cost			390.0290 (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] =	1.1569 (257)
SAP value		83.8617
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	3561.5354	0.2160	769.2916 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1937.1840	0.2160	418.4318 (264)
Space and water heating			1187.7234 (265)
Pumps and fans	177.7717	0.5190	92.2635 (267)
Energy for lighting	418.6924	0.5190	217.3014 (268)
Energy saving/generation technologies			
PV Unit	-1330.8624	0.5190	-690.7176 (269)
Total kg/year			806.5707 (272)
CO2 emissions per m2			8.3500 (273)
EI value			92.3672
EI rating			92 (274)
EI band			A

Calculation of stars for heating and DHW

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF ENERGY RATINGS 09 Jan 2014

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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  $3.48 / 0.8872 = 3.922$ , stars = 4  
Water heating environmental impact  $0.216 / 0.8872 = 0.2435$ , stars = 4  
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# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

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

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

#### 1. Overall dwelling dimensions

	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	96.6000 (1b)	x 2.5800 (2b)	= 249.2280 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 249.2280 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m <sup>3</sup> per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				0 * 10 =	0.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) =	0.0000 (8)
Pressure test				Yes	
Measured/design AP50				5.0100	
Infiltration rate				0.2505	(18)
Number of sides sheltered				1	(19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.2317 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	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	0.2781	0.2607	0.2549	0.2259	0.2259	0.2085	0.2143	0.2027	0.2143	0.2317	0.2375	0.2549 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												
Effective ac	0.5281	0.5107	0.5049	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5049 (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)			14.2600	1.3258	18.9053		(27)
Solid Door			2.3000	1.4000	3.2200		(26)
Flr - Ground			96.6000	0.0800	7.7280	110.0000	10626.0000 (28a)
Wl - Brick	83.7720	14.2570	69.5150	0.1800	12.5127	14.0000	973.2100 (29a)
Wl - To Corridor	26.3330	2.2990	24.0340	0.1300	3.1244	14.0000	336.4760 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			206.7090				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.4904		(33)
Party Wall			16.5550	0.0000	0.0000	54.0300	894.4667 (32)
Party Ceiling			96.6000			70.0000	6762.0000 (32b)
Ground Floor Stud			147.9286			5.8200	860.9445 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20453.0971 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							211.7298 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.7761 (36)
Total fabric heat loss						(33) + (36) =	60.2665 (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	43.4300	42.0007	41.5243	41.1226	41.1226	41.1226	41.1226	41.1226	41.1226	41.1226	41.1226	41.5243 (38)
Heat transfer coeff	103.6965	102.2672	101.7908	101.3891	101.3891	101.3891	101.3891	101.3891	101.3891	101.3891	101.3891	101.7908 (39)
Average = Sum(39)m / 12 =												101.7215 (39)
HLP	1.0735	1.0587	1.0537	1.0496	1.0496	1.0496	1.0496	1.0496	1.0496	1.0496	1.0496	1.0537 (40)
HLP (average)												1.0530 (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												2.7057 (42)
Average daily hot water use (litres/day)												98.4614 (43)
Daily hot water use	108.3075	104.3691	100.4306	96.4922	92.5537	88.6153	88.6153	92.5537	96.4922	100.4306	104.3691	108.3075 (44)
Energy conte	160.6169	140.4766	144.9593	126.3790	121.2637	104.6413	96.9656	111.2694	112.5983	131.2225	143.2396	155.5489 (45)
Energy content (annual)										Total = Sum(45)m =		1549.1812 (45)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

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

Distribution loss (46)m = 0.15 x (45)m	24.0925	21.0715	21.7439	18.9569	18.1896	15.6962	14.5448	16.6904	16.8897	19.6834	21.4859	23.3323 (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	14.6988	13.2625	14.6518	14.1241	14.5536	14.0365	14.4747	14.5259	14.0842	14.6106	14.1880	14.6836 (61)
Total heat required for water heating calculated for each month	175.3157	153.7391	159.6111	140.5031	135.8173	118.6778	111.4403	125.7953	126.6826	145.8331	157.4276	170.2325 (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	175.3157	153.7391	159.6111	140.5031	135.8173	118.6778	111.4403	125.7953	126.6826	145.8331	157.4276	170.2325 (64)
Heat gains from water heating, kWh/month	57.0798	50.0241	51.8619	45.5521	43.9586	38.3024	35.8597	40.6285	40.9600	47.2841	51.1742	55.3909 (65)
										Solar input (sum of months) = Sum(63)m =		0.0000 (63)
										Total per year (kWh/year) = Sum(64)m =		1721.0754 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446	162.3446 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	59.2702	52.6433	42.8124	32.4117	24.2282	20.4544	22.1017	28.7287	38.5596	48.9602	57.1438	60.9175 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	374.1957	378.0787	368.2937	347.4626	321.1671	296.4531	279.9425	276.0596	285.8446	306.6756	332.9711	357.6852 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402	53.9402 (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)	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297	-108.2297 (71)
Water heating gains (Table 5)	76.7202	74.4406	69.7069	63.2667	59.0841	53.1977	48.1986	54.6083	56.8889	63.5539	71.0752	74.4501 (72)
Total internal gains	621.2412	616.2176	591.8680	554.1962	515.5344	481.1603	461.2979	470.4516	492.3481	530.2448	572.2452	604.1079 (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					
Northwest		14.2570	13.7622	0.7600	0.7000	0.7700	72.3370 (81)					
Solar gains	72.3370	131.7808	237.5221	409.9999	526.9855	598.5866	554.2752	448.4061	309.7556	172.6126	92.1050	57.0003 (83)
Total gains	693.5782	747.9985	829.3901	964.1961	1042.5199	1079.7469	1015.5731	918.8576	802.1037	702.8574	664.3502	661.1082 (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	54.7889	55.5546	55.8146	56.0357	56.0357	56.0357	56.0357	56.0357	56.0357	56.0357	56.0357	55.8146
alpha	4.6526	4.7036	4.7210	4.7357	4.7357	4.7357	4.7357	4.7357	4.7357	4.7357	4.7357	4.7210
util living area	0.9899	0.9847	0.9651	0.8940	0.7333	0.5137	0.3576	0.3836	0.6962	0.9223	0.9797	0.9911 (86)
MIT	19.9069	20.0318	20.3066	20.6566	20.9015	20.9851	20.9979	20.9973	20.9436	20.6671	20.2578	19.9244 (87)
Th 2	20.0226	20.0347	20.0388	20.0422	20.0422	20.0422	20.0422	20.0422	20.0422	20.0422	20.0422	20.0388 (88)
util rest of house	0.9870	0.9805	0.9551	0.8653	0.6725	0.4310	0.2634	0.2800	0.6077	0.8925	0.9728	0.9885 (89)
MIT 2	19.0412	19.1742	19.4464	19.7773	19.9818	20.0363	20.0418	20.0417	20.0154	19.7954	19.4046	19.0717 (90)
Living area fraction									fLA = Living area / (4) =			0.3339 (91)
MIT	19.3302	19.4605	19.7336	20.0709	20.2889	20.3531	20.3610	20.3607	20.3253	20.0864	19.6894	19.3564 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.1802	19.3105	19.5836	19.9209	20.1389	20.2031	20.2110	20.2107	20.1753	19.9364	19.5394	19.2064 (93)

#### 8. Space heating requirement

Utilisation	0.9838	0.9763	0.9492	0.8612	0.6791	0.4452	0.2801	0.2984	0.6209	0.8885	0.9682	0.9856 (94)
Useful gains	682.3096	730.2994	787.2886	830.3257	707.9445	480.7567	284.5066	274.2033	498.0608	624.5135	643.2085	651.5718 (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	1470.4366	1422.5910	1270.7120	1056.5620	764.3598	486.9788	285.0063	274.8384	524.7181	835.0839	1159.8327	1425.7179 (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	586.3665	465.2200	359.6670	162.8901	41.9730	0.0000	0.0000	0.0000	0.0000	156.6643	371.9695	575.9647 (98)
Space heating												2720.7150 (98)
Space heating per m2										(98) / (4) =		28.1648 (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													3006.3149 (211)
Space heating requirement	586.3665	465.2200	359.6670	162.8901	41.9730	0.0000	0.0000	0.0000	0.0000	156.6643	371.9695	575.9647	(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)	647.9187	514.0552	397.4222	179.9891	46.3790	0.0000	0.0000	0.0000	0.0000	173.1097	411.0160	636.4250	(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	175.3157	153.7391	159.6111	140.5031	135.8173	118.6778	111.4403	125.7953	126.6826	145.8331	157.4276	170.2325	(64)
Efficiency of water heater (217)m	89.7428	89.6835	89.4917	88.9894	88.0349	87.3000	87.3000	87.3000	87.3000	88.9285	89.5242	87.3000	(216)
Fuel for water heating, kWh/month	195.3534	171.4241	178.3529	157.8875	154.2767	135.9425	127.6521	144.0954	145.1118	163.9891	175.8493	189.6752	(219)
Water heating fuel used													1939.6099 (219)
Annual totals kWh/year													
Space heating fuel - main system													3006.3149 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans: (MEV Centralised, Database: in-use factor = 1.3000, SFP = 0.3380)													
mechanical ventilation fans (SFP = 0.3380)													102.7717 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													177.7717 (231)
Electricity for lighting (calculated in Appendix L)													418.6924 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 1.75 * 1082 * 1.00) =													-1514.2176 (233)
Total delivered energy for all uses													4028.1713 (238)

#### 10a. Fuel costs - using BEDF prices (483)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3006.3149	3.7400	112.4362	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	1939.6099	3.7400	72.5414	(247)
Mechanical ventilation fans	102.7717	19.1200	19.6499	(249)
Pumps and fans for heating	75.0000	19.1200	14.3400	(249)
Energy for lighting	418.6924	19.1200	80.0540	(250)
Additional standing charges			94.0000	(251)
Energy saving/generation technologies				
PV Unit	0.0000	0.0000	0.0000	(252)
Total energy cost			393.0215	(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	3006.3149	0.2160	649.3640	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1939.6099	0.2160	418.9557	(264)
Space and water heating			1068.3198	(265)
Pumps and fans	177.7717	0.5190	92.2635	(267)
Energy for lighting	418.6924	0.5190	217.3014	(268)
Energy saving/generation technologies				
PV Unit	-1514.2176	0.5190	-785.8789	(269)
Total kg/year			592.0057	(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	3006.3149	1.2200	3667.7042	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1939.6099	1.2200	2366.3241	(264)
Space and water heating			6034.0283	(265)
Pumps and fans	177.7717	3.0700	545.7590	(267)
Energy for lighting	418.6924	3.0700	1285.3857	(268)
Energy saving/generation technologies				
PV Unit	-1514.2176	3.0700	-4648.6480	(269)
Primary energy kWh/year			3216.5249	(272)
Primary energy kWh/m2/year			33.2974	(273)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

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

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SAP 2012 EPC IMPROVEMENTS  
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Current energy efficiency rating: B 84  
Current environmental impact rating: A 92

(For testing purposes):

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

Recommended measures: SAP change Cost change CO2 change  
(none)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)	Total Savings £0		0.00 kg/m <sup>2</sup>

Potential energy efficiency rating: B 84  
Potential environmental impact rating: A 92

Fuel prices for cost data on this page from database revision number 483 TEST (30 Sep 2021)  
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	£114	£114	£0
Mains gas	£279	£279	£0
Space heating	£240	£240	£0
Water heating	£73	£73	£0
Lighting	£80	£80	£0
Total cost of fuels	£393	£393	£0
Total cost of uses	£393	£393	£0
Delivered energy	42 kWh/m <sup>2</sup>	42 kWh/m <sup>2</sup>	0 kWh/m <sup>2</sup>
Carbon dioxide emissions	0.6 tonnes	0.6 tonnes	0.0 tonnes
CO2 emissions per m <sup>2</sup>	6 kg/m <sup>2</sup>	6 kg/m <sup>2</sup>	0 kg/m <sup>2</sup>
Primary energy	33 kWh/m <sup>2</sup>	33 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>	112 - PRJ009250 - GF		<b>Issued on Date</b>	13/10/2021
<b>Assessment Reference</b>	112 E	<b>Prop Type Ref</b>	Block 1B - GF	
<b>Property</b>	112 - PRJ009250 - GF			
<b>SAP Rating</b>	84 B	<b>DER</b>	10.33	<b>TER</b> 19.03
<b>Environmental</b>	92 A	<b>% DER&lt;TER</b>	45.70	
<b>CO<sub>2</sub> Emissions (t/year)</b>	0.59	<b>DFEE</b>	48.28	<b>TFEE</b> 59.10
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	18.31	
<b>Assessor Details</b>	Chris Nicholls, , Tel: ,		<b>Assessor ID</b>	T850-0001
<b>Client</b>				

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

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

##### 1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	19.03	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	10.33	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-8.70 (-45.7%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	59.10	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	48.28	kWh/m <sup>2</sup> /yr	
	-10.8 (-18.3%)	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	0.17 (max. 0.30)	0.18 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.08 (max. 0.25)	0.08 (max. 0.70)	Pass
Openings	1.40 (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
Secondary heating system	None	

# BASIC COMPLIANCE REPORT

## Calculation Type: New Build (As Designed)

### 5 Cylinder insulation

Hot water storage

### 6 Controls

Space heating controls

Hot water controls

Boiler interlock

### 7 Low energy lights

Percentage of fixed lights with low-energy fittings  %

Minimum  %

### 8 Mechanical ventilation

Continuous extract system

Specific fan power

Maximum

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

### 9 Summertime temperature

Overheating risk (South East England)

Based on:

Overshading

Windows facing North West

Air change rate

Blinds/curtains

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

### Party Walls

Type	U-value		
Filled Cavity with Edge Sealing	<input type="text" value="0.00"/>	W/m <sup>2</sup> K	<input type="text" value="Pass"/>

### Air permeability and pressure testing

#### 3 Air permeability

Air permeability at 50 pascals

Maximum

### 10 Key features

External wall U-value  W/m<sup>2</sup>K

Party wall U-value  W/m<sup>2</sup>K

Floor U-value  W/m<sup>2</sup>K

Photovoltaic array  kW

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