

# PREDICTED ENERGY ASSESSMENT

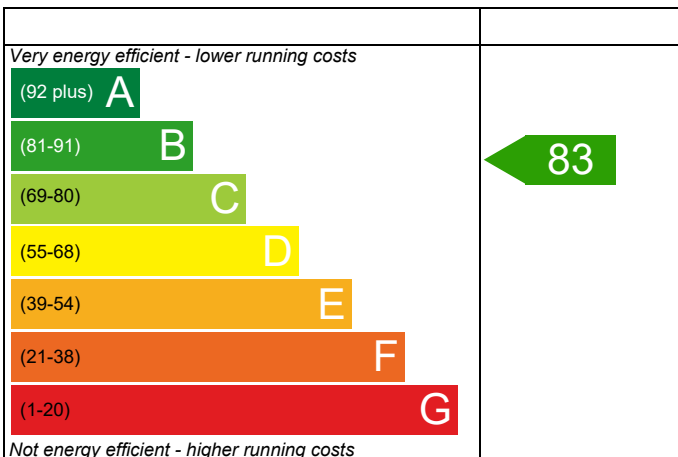
4, Woodcroft Lane,  
WATERLOOVILLE,  
Hampshire,  
PO8 9PY

Dwelling type: House, Semi-Detached  
Date of assessment: 31/03/2020  
Produced by: SRE Limited  
Total floor area: 80 m<sup>2</sup>  
DRRN: 6424-9757-7002

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

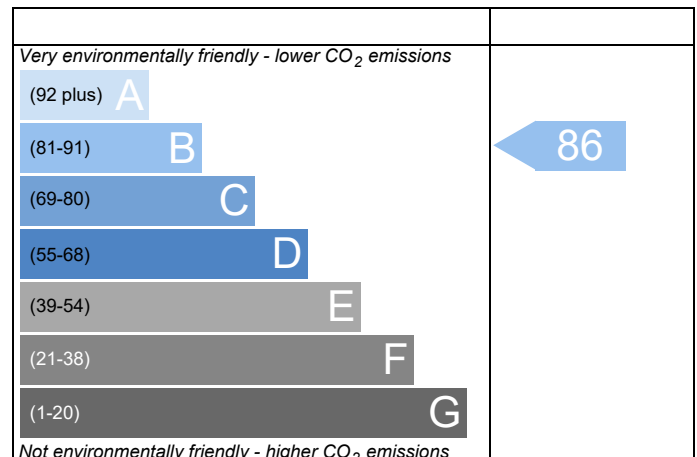


**England**

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.

This report has been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.



# BUILDING REGULATION COMPLIANCE

## Calculation Type: New Build (As Designed)

Property Reference	EXBU-WOOD-2166-C-04		Issued on Date	31/03/2020	
Assessment Reference	DF	Prop Type Ref			
Property	4, Woodcroft Lane, WATERLOOVILLE, Hampshire, PO8 9PY				
SAP Rating	83 B	DER	18.43	TER	18.69
Environmental	86 B	% DER<TER	1.37		
CO <sub>2</sub> Emissions (t/year)	1.22	DFEE	50.92	TFEE	52.78
General Requirements Compliance	Pass	% DFEE<TFEE	3.51		
Assessor Details	Mr. Malcolm Maclean, SRE Limited, Tel: 01730 710044, malcolm@sre.co.uk			Assessor ID	V497-0002
Client					

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

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

##### 1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	18.69	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	18.43	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-0.26 (-1.4%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.78	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	50.92	kWh/m <sup>2</sup> /yr	
	-1.9 (-3.6%)	kWh/m <sup>2</sup> /yr	Pass

#### Criterion 2 – Limits on design flexibility

##### Limiting Fabric Standards

##### 2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.21 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.09 (max. 0.20)	0.09 (max. 0.35)	Pass
Openings	1.42 (max. 2.00)	1.50 (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	4.50 (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  
Vaillant ecoTEC exclusive 835 VUW 356/5-7 (H-GB)  
Combi boiler  
Efficiency: 89.7% SEDBUK2009  
Minimum: 88.0%

Pass

Secondary heating system

None

### 5 Cylinder insulation

Hot water storage

No cylinder

### 6 Controls

Space heating controls

Time and temperature zone control

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 (Southern England)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North East

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

Windows facing South East

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

Windows facing North West

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

Air change rate

4.00 ach

Blinds/curtains

Light-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

4.50 (design value) m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Maximum

10.0 m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Pass

### 10 Key features

Party wall U-value

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

Roof U-value

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

Floor U-value

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

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# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

Property Reference	EXBU-WOOD-2166-C-04			Issued on Date	31/03/2020
Assessment Reference	DF	Prop Type Ref			
Property	4, Woodcroft Lane, WATERLOOVILLE, Hampshire, PO8 9PY				
SAP Rating	83 B	DER	18.43	TER	18.69
Environmental	86 B	% DER<TER	1.37		
CO <sub>2</sub> Emissions (t/year)	1.22	DFEE	50.92	TFEE	52.78
General Requirements Compliance	Pass	% DFEE<TFEE	3.51		
Assessor Details	Mr. Malcolm Maclean, SRE Limited, Tel: 01730 710044, malcolm@sre.co.uk			Assessor ID	V497-0002
Client					

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Semi-Detached House, total floor area 80 m<sup>2</sup>

This report covers items included within the SAP calculations.  
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Mains gas  
Fuel factor:1.00 (mains gas)  
Target Carbon Dioxide Emission Rate (TER) 18.69 kgCO<sub>2</sub>/m<sup>2</sup>  
Dwelling Carbon Dioxide Emission Rate (DER) 18.43 kgCO<sub>2</sub>/m<sup>2</sup>OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.8 kWh/m<sup>2</sup>/yr  
Dwelling Fabric Energy Efficiency (DFEE) 50.9 kWh/m<sup>2</sup>/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.21 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.09 (max. 0.20)	0.09 (max. 0.35)	OK
Openings	1.42 (max. 2.00)	1.50 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 4.50 (design value)  
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas

Data from database

Vaillant ecoTEC exclusive 835 VUW 356/5-7 (H-GB)

Combi boiler

Efficiency: 89.7% SEDBUK2009

Minimum: 88.0%

OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%

Minimum 75% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Southern England): Not significant OK

Based on:

Overshading:

Average

Windows facing North East: 0.82 m<sup>2</sup>, No overhang

Windows facing South East: 5.43 m<sup>2</sup>, No overhang

Windows facing North West: 4.96 m<sup>2</sup>, No overhang

Air change rate: 4.00 ach

Blinds/curtains: Light-coloured curtain or roller blind, closed 100% of daylight hours

10 Key features

Party wall U-value 0.00 W/m<sup>2</sup>K

Roof U-value 0.09 W/m<sup>2</sup>K

Floor U-value 0.12 W/m<sup>2</sup>K

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)  
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

#### 1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	40.0000 (1b)	2.4500 (2b)	98.0000 (1b) - (3b)
First floor	40.0000 (1c)	2.7000 (2c)	108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 206.0000 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				3 * 10 =	30.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1456 (8)
Pressure test				Yes	
Measured/design AP50				4.5000	
Infiltration rate				0.3706 (18)	
Number of sides sheltered				2 (19)	
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3150 (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	0.4017	0.3938	0.3859	0.3465	0.3387	0.2993	0.2993	0.2914	0.3150	0.3387	0.3544	0.3702 (22b)
Effective ac	0.5807	0.5775	0.5745	0.5600	0.5573	0.5448	0.5448	0.5425	0.5496	0.5573	0.5628	0.5685 (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 Normal (Uw = 1.40)			9.1200	1.3258	12.0909		(27)
Front Door			2.2700	1.5000	3.4050		(26a)
Semi Transparent (Uw = 1.40)			0.8200	1.3258	1.0871		(27)
'Spandrel' (Uw = 1.40)			1.2700	1.3258	1.6837		(27)
Ground Floor			40.0000	0.1200	4.8000	75.0000	3000.0000 (28a)
Ext Wall	92.3000	13.4800	78.8200	0.2100	16.5522	110.0000	8670.2000 (29a)
Ceiling Roof	40.0000		40.0000	0.0900	3.6000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m2)			172.3000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	43.2189	(33)
Party Wall			48.7200	0.0000	0.0000	0.0000	0.0000 (32)
Internal Wall 1			40.0000			9.0000	360.0000 (32c)
Internal Wall 2			14.0000			75.0000	1050.0000 (32c)
Internal Floor 1			40.0000			18.0000	720.0000 (32d)
Internal Ceiling 1			40.0000			18.0000	720.0000 (32e)
Internal Ceiling 2			40.0000			18.0000	720.0000 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 15600.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							195.0025 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							16.3629 (36)
Total fabric heat loss							(33) + (36) = 59.5818 (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)	39.4739	39.2610	39.0523	38.0719	37.8884	37.0345	37.0345	36.8764	37.3634	37.8884	38.2595	38.6475 (38)
Heat transfer coeff	99.0558	98.8428	98.6341	97.6537	97.4703	96.6164	96.6164	96.4582	96.9453	97.4703	97.8413	98.2293 (39)
Average = Sum(39)m / 12 =												97.6528 (39)
HLP	1.2382	1.2355	1.2329	1.2207	1.2184	1.2077	1.2077	1.2057	1.2118	1.2184	1.2230	1.2279 (40)
HLP (average)												1.2207 (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												2.4629 (42)
Average daily hot water use (litres/day)												92.6930 (43)
Daily hot water use												

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy conte	101.9622	98.2545	94.5468	90.8391	87.1314	83.4237	83.4237	87.1314	90.8391	94.5468	98.2545	101.9622 (44)
Energy content (annual)	151.2071	132.2467	136.4667	118.9750	114.1593	98.5108	91.2848	104.7506	106.0017	123.5347	134.8478	146.4360 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1458.4211 (45)
Water storage loss:	22.6811	19.8370	20.4700	17.8462	17.1239	14.7766	13.6927	15.7126	15.9002	18.5302	20.2272	21.9654 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	4.2507	3.8394	4.2507	4.1136	4.2507	4.1136	4.2507	4.2507	4.1136	4.2507	4.1136	4.2507 (61)
Total heat required for water heating calculated for each month	155.4578	136.0860	140.7174	123.0886	118.4101	102.6244	95.5355	109.0013	110.1153	127.7854	138.9614	150.6867 (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)
FGHRS	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	155.4578	136.0860	140.7174	123.0886	118.4101	102.6244	95.5355	109.0013	110.1153	127.7854	138.9614	150.6867 (64)
Heat gains from water heating, kWh/month	51.3390	44.9319	46.4379	40.5876	39.0207	33.7832	31.4149	35.8923	36.2739	42.1380	45.8653	49.7526 (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	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.9837	18.6376	15.1571	11.4749	8.5776	7.2416	7.8248	10.1710	13.6514	17.3336	20.2309	21.5669 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143 (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)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144 (71)
Water heating gains (Table 5)	69.0041	66.8629	62.4165	56.3716	52.4471	46.9212	42.2243	48.2423	50.3805	56.6371	63.7018	66.8718 (72)
Total internal gains	372.3713	370.1610	356.4959	334.5528	312.3105	290.9554	277.1594	283.2465	294.6034	316.7582	342.1407	361.1399 (73)

#### 6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W						
Southeast	5.4300	36.7938	0.6300	0.7000	0.7700	61.0586 (77)						
Northwest	3.6900	11.2829	0.6300	0.7000	0.7700	12.7239 (81)						
Northeast	0.8200	11.2829	0.4000	0.7000	0.7700	1.7953 (75)						
Northwest	1.2700	11.2829	0.0000	0.7000	0.7700	0.0000 (81)						
Solar gains	75.5777	133.5595	195.5519	263.7696	315.0420	321.3843	306.2613	266.6919	218.9684	151.0656	91.4030	64.1105 (83)
Total gains	447.9490	503.7205	552.0478	598.3225	627.3525	612.3398	583.4208	549.9384	513.5718	467.8238	433.5437	425.2504 (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)	43.7470	43.8412	43.9340	44.3751	44.4586	44.8515	44.8515	44.9250	44.6993	44.4586	44.2900	44.1150
tau	3.9165	3.9227	3.9289	3.9583	3.9639	3.9901	3.9901	3.9950	3.9800	3.9639	3.9527	3.9410
util living area	0.9956	0.9925	0.9853	0.9654	0.9147	0.8035	0.6582	0.7063	0.8891	0.9743	0.9925	0.9964 (86)
MIT	19.3157	19.4777	19.7631	20.1549	20.5343	20.8227	20.9423	20.9224	20.7024	20.2190	19.6998	19.2864 (87)
Th 2	19.8896	19.8917	19.8937	19.9035	19.9053	19.9138	19.9138	19.9154	19.9106	19.9053	19.9016	19.8978 (88)
util rest of house	0.9944	0.9904	0.9809	0.9538	0.8824	0.7238	0.5250	0.5790	0.8343	0.9635	0.9901	0.9955 (89)
MIT 2	17.6462	17.8836	18.3002	18.8709	19.4006	19.7696	19.8853	19.8729	19.6337	18.9698	18.2152	17.6087 (90)
Living area fraction	17.9884	18.2104	18.6001	19.1341	19.6330	19.9855	20.1020	20.0880	19.8528	19.2259	18.5195	17.9526 (92)
MIT	17.9884	18.2104	18.6001	19.1341	19.6330	19.9855	20.1020	20.0880	19.8528	19.2259	18.5195	17.9526 (93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	444.0125	496.4619	537.3729	564.1220	547.3308	446.9276	321.0457	330.8747	426.6356	446.3361	427.1949	422.1772 (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	1355.9179	1315.6392	1193.4846	999.3979	773.2287	520.3240	338.3518	355.7414	557.7075	840.7699	1117.3023	1350.9117 (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	678.4576	550.4871	488.1470	313.3986	168.0681	0.0000	0.0000	0.0000	0.0000	293.4587	496.8773	690.9785 (98)
Space heating												3679.8729 (98)
Space heating per m2												(98) / (4) = 45.9984 (99)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 8c. Space cooling requirement  
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Not applicable

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 9a. Energy requirements - Individual heating systems, including micro-CHP  
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	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 %)													90.6000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													4061.6699 (211)
Space heating requirement	678.4576	550.4871	488.1470	313.3986	168.0681	0.0000	0.0000	0.0000	0.0000	293.4587	496.8773	690.9785	(98)
Space heating efficiency (main heating system 1)	90.6000	90.6000	90.6000	90.6000	90.6000	0.0000	0.0000	0.0000	0.0000	90.6000	90.6000	90.6000	(210)
Space heating fuel (main heating system)	748.8494	607.6017	538.7936	345.9146	185.5056	0.0000	0.0000	0.0000	0.0000	323.9059	548.4297	762.6694	(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	155.4578	136.0860	140.7174	123.0886	118.4101	102.6244	95.5355	109.0013	110.1153	127.7854	138.9614	150.6867	(64)
Efficiency of water heater (217)m	89.9264	89.8841	89.7926	89.5848	89.1198	87.1000	87.1000	87.1000	87.1000	89.5089	89.8113	89.9529	(217)
Fuel for water heating, kWh/month	172.8723	151.4017	156.7138	137.3989	132.8662	117.8237	109.6848	125.1450	126.4239	142.7628	154.7260	167.5174	(219)
Water heating fuel used													1695.3366 (219)
Annual totals kWh/year													
Space heating fuel - main system													4061.6699 (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)													370.5792 (232)
Total delivered energy for all uses													6202.5857 (238)

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 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP  
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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4061.6699	0.2160	877.3207 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1695.3366	0.2160	366.1927 (264)
Space and water heating			1243.5134 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	370.5792	0.5190	192.3306 (268)
Total CO2, kg/year			1474.7690 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			18.4300 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER		18.4300 ZC1
Total Floor Area	TFA	80.0000
Assumed number of occupants	N	2.4629
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		16.2545 ZC2
CO2 emissions from cooking, equation (L16)		2.2264 ZC3
Total CO2 emissions		36.9108 ZC4
Residual CO2 emissions offset from biofuel CHP		0.0000 ZC5
Additional allowable electricity generation, kWh/m <sup>2</sup> /year		0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 ZC7
Net CO2 emissions		36.9108 ZC8



# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

#### 1. Overall dwelling dimensions

	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	40.0000 (1b)	2.4500 (2b)	98.0000 (1b) - (3b)
First floor	40.0000 (1c)	2.7000 (2c)	108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 206.0000 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m <sup>3</sup> per hour							
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)							
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)							
Number of intermittent fans				3 * 10 =	30.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1456 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.3956 (18)							
Number of sides sheltered					2 (19)							
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)							
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3363 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4288	0.4204	0.4120	0.3699	0.3615	0.3195	0.3195	0.3111	0.3363	0.3615	0.3783	0.3951 (22b)
	0.5919	0.5884	0.5849	0.5684	0.5653	0.5510	0.5510	0.5484	0.5565	0.5653	0.5716	0.5781 (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					
TER Semi-glazed door			2.2700	1.2000	2.7240		(26a)					
TER Opening Type (Uw = 1.40)			11.2100	1.3258	14.8617		(27)					
Ground Floor			40.0000	0.1300	5.2000		(28a)					
Ext Wall	92.3000	13.4800	78.8200	0.1800	14.1876		(29a)					
Ceiling Roof	40.0000		40.0000	0.1300	5.2000		(30)					
Total net area of external elements Aum(A, m <sup>2</sup> )			172.3000				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =		42.1733 (33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.3412 (36)					
Total fabric heat loss							(33) + (36) = 51.5145 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
Heat transfer coeff	Jan 40.2387	Feb 39.9961	Mar 39.7582	Apr 38.6411	May 38.4321	Jun 37.4591	Jul 37.4591	Aug 37.2789	Sep 37.8339	Oct 38.4321	Nov 38.8549	Dec 39.2970 (38)
Average = Sum(39)m / 12 =	91.7532	91.5106	91.2728	90.1556	89.9466	88.9736	88.9736	88.7935	89.3484	89.9466	90.3695	90.8115 (39)
												90.1546 (39)
HLP	Jan 1.1469	Feb 1.1439	Mar 1.1409	Apr 1.1269	May 1.1243	Jun 1.1122	Jul 1.1122	Aug 1.1099	Sep 1.1169	Oct 1.1243	Nov 1.1296	Dec 1.1351 (40)
HLP (average)												1.1269 (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												2.4629 (42)
Average daily hot water use (litres/day)												92.6930 (43)
Daily hot water use	101.9622	98.2545	94.5468	90.8391	87.1314	83.4237	83.4237	87.1314	90.8391	94.5468	98.2545	101.9622 (44)
Energy content (annual)	151.2071	132.2467	136.4667	118.9750	114.1593	98.5108	91.2848	104.7506	106.0017	123.5347	134.8478	146.4360 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1458.4211 (45)
Water storage loss:	22.6811	19.8370	20.4700	17.8462	17.1239	14.7766	13.6927	15.7126	15.9002	18.5302	20.2272	21.9654 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Total heat required for water heating calculated for each month	50.9589	45.2240	48.1800	44.7974	44.4012	41.1404	42.5118	44.4012	44.7974	48.1800	48.4543	50.9589	61											
Solar input	202.1660	177.4707	184.6467	163.7723	158.5605	139.6513	133.7965	149.1518	150.7990	171.7147	183.3021	197.3949	(62)											
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)											
Heat gains from water heating, kWh/month	202.1660	177.4707	184.6467	163.7723	158.5605	139.6513	133.7965	149.1518	150.7990	171.7147	183.3021	197.3949	(64)											
	63.0161	55.2780	57.4202	50.7585	49.0583	43.0400	40.9801	45.9299	46.4449	53.1203	56.9505	61.4297	(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)
(66)m	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.9837	18.6376	15.1571	11.4749	8.5776	7.2416	7.8248	10.1710	13.6514	17.3336	20.2309	21.5669	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(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)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Water heating gains (Table 5)	84.6990	82.2590	77.1777	70.4979	65.9385	59.7777	55.0808	61.7337	64.5068	71.3982	79.0979	82.5668	(72)
Total internal gains	388.0662	385.5571	371.2571	348.6791	325.8019	303.8120	290.0160	296.7379	308.7297	331.5194	357.5368	376.8349	(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								
Northeast	0.8200	11.2829	0.6300	0.7000	0.7700	2.8275 (75)							
Southeast	5.4300	36.7938	0.6300	0.7000	0.7700	61.0586 (77)							
Northwest	4.9600	11.2829	0.6300	0.7000	0.7700	17.1031 (81)							
Solar gains	80.9893	144.5748	215.3979	296.3625	358.8533	368.0917	349.9551	301.5251	243.1511	164.5272	98.2120	68.5298	(83)
Total gains	469.0555	530.1319	586.6550	645.0417	684.6552	671.9037	639.9711	598.2630	551.8808	496.0465	455.7489	445.3647	(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	60.5489	60.7094	60.8676	61.6218	61.7650	62.4405	62.4405	62.5672	62.1786	61.7650	61.4760	61.1768	
alpha	5.0366	5.0473	5.0578	5.1081	5.1177	5.1627	5.1627	5.1711	5.1452	5.1177	5.0984	5.0785	
util living area	0.9982	0.9963	0.9908	0.9709	0.9078	0.7615	0.5920	0.6495	0.8799	0.9813	0.9964	0.9986	(86)
MIT	19.7501	19.8892	20.1273	20.4523	20.7465	20.9317	20.9851	20.9765	20.8454	20.4708	20.0549	19.7277	(87)
Th 2	19.9627	19.9652	19.9676	19.9789	19.9810	19.9909	19.9909	19.9927	19.9871	19.9810	19.9767	19.9722	(88)
util rest of house	0.9976	0.9950	0.9875	0.9592	0.8697	0.6729	0.4662	0.5234	0.8165	0.9717	0.9949	0.9982	(89)
MIT 2	18.2953	18.5001	18.8482	19.3226	19.7229	19.9432	19.9852	19.9825	19.8567	19.3560	18.7509	18.2693	(90)
Living area fraction									fLA = Living area / (4) =			0.2050	(91)
MIT	18.5936	18.7849	19.1104	19.5542	19.9327	20.1459	20.1901	20.1863	20.0594	19.5846	19.0183	18.5682	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5936	18.7849	19.1104	19.5542	19.9327	20.1459	20.1901	20.1863	20.0594	19.5846	19.0183	18.5682	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9964	0.9929	0.9835	0.9529	0.8675	0.6878	0.4921	0.5491	0.8219	0.9665	0.9928	0.9972	(94)
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	1311.4825	1270.6119	1150.9882	960.5356	740.5033	493.4355	319.4281	336.1989	532.4607	808.1326	1077.0470	1304.8013	(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	628.0316	500.1339	427.0656	249.0336	109.0461	0.0000	0.0000	0.0000	0.0000	244.5415	449.7067	640.3516	(98)
Space heating												3247.9108	(98)
Space heating per m2												40.5989	(99)

#### 8c. Space cooling requirement

Not applicable

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET EMISSIONS 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 %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3477.4205 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	628.0316	500.1339	427.0656	249.0336	109.0461	0.0000	0.0000	0.0000	0.0000	244.5415	449.7067	640.3516	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	672.4108	535.4753	457.2437	266.6313	116.7517	0.0000	0.0000	0.0000	0.0000	261.8218	481.4847	685.6013	(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	202.1660	177.4707	184.6467	163.7723	158.5605	139.6513	133.7965	149.1518	150.7990	171.7147	183.3021	197.3949	(64)
Efficiency of water heater (217)m	87.7134	87.5170	87.0934	86.1034	84.1302	80.3000	80.3000	80.3000	80.3000	85.9408	87.2232	80.3000	(216)
Fuel for water heating, kWh/month	230.4846	202.7843	212.0101	190.2042	188.4705	173.9119	166.6208	185.7432	187.7945	199.8057	210.1530	224.8285	(219)
Water heating fuel used													2372.8114 (219)
Annual totals kWh/year													
Space heating fuel - main system													3477.4205 (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)													370.5792 (232)
Total delivered energy for all uses													6295.8111 (238)

#### 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	3477.4205	0.2160	751.1228 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2372.8114	0.2160	512.5273 (264)
Space and water heating			1263.6501 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	370.5792	0.5190	192.3306 (268)
Total CO2, kg/m2/year			1494.9057 (272)
Emissions per m2 for space and water heating			15.7956 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4041 (272b)
Emissions per m2 for pumps and fans			0.4866 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.7956 * 1.00) + 2.4041 + 0.4866, rounded to 2 d.p.			18.6900 (273)

# BLOCK COMPLIANCE

## Calculation Type: New Build (As Designed)

Block Reference	4&5	Issued on Date	31/03/2020
Block Name			
Assessor Details	Mr. Malcolm Maclean, SRE Limited, Tel: 01730 710044, malcolm@sre.co.uk	Assessor ID	V497-0002
Client			

### Block Compliance Report - DER

Block Reference: 4&5		Block Name:		
Property-Assessment Reference	Multiplier	Floor Area (m <sup>2</sup> )	DER (kgCO <sub>2</sub> /m <sup>2</sup> )	TER (kgCO <sub>2</sub> /m <sup>2</sup> )
EXBU-WOOD-2166-C-04-DF	1	80	18.43	18.69
EXBU-WOOD-2166-D-05-DF semi	1	94	17.02	17.44
Totals:	2	174	35.45	36.12
Average DER = 17.67 kgCO <sub>2</sub> /m <sup>2</sup>			<b>PASS</b>	
Average TER = 18.01 kgCO <sub>2</sub> /m <sup>2</sup>				

### Block Compliance Report - DFEE

Block Reference: 4&5		Block Name:		
Property-Assessment Reference	Multiplier	Floor Area (m <sup>2</sup> )	DFEE (kWh/m <sup>2</sup> /yr)	TFEE (kWh/m <sup>2</sup> /yr)
EXBU-WOOD-2166-C-04-DF	1	80	50.92	52.78
EXBU-WOOD-2166-D-05-DF semi	1	94	48.22	51.29
Totals:	2	174	99.14	104.07
Average DFEE = 49.46 kWh/m <sup>2</sup> /yr			<b>PASS</b>	
Average TFEE = 51.97 kWh/m <sup>2</sup> /yr				