

PREDICTED ENERGY ASSESSMENT



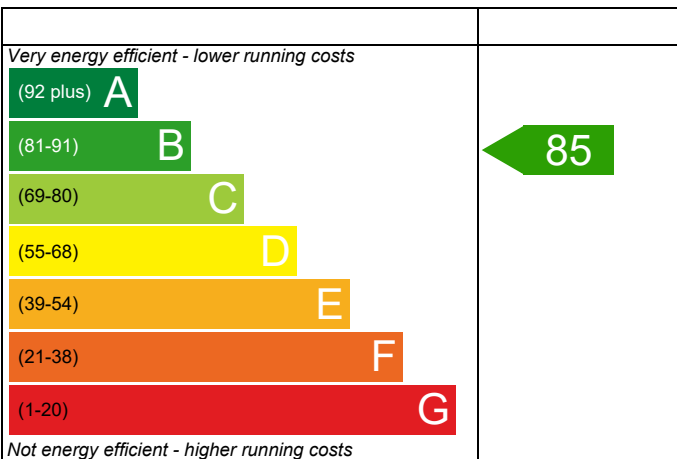
Plot 110

Dwelling type: House, Semi-Detached
 Date of assessment: 18/08/2022
 Produced by: Michael Juckes
 Total floor area: 107.4 m²

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 (CO₂) emissions.

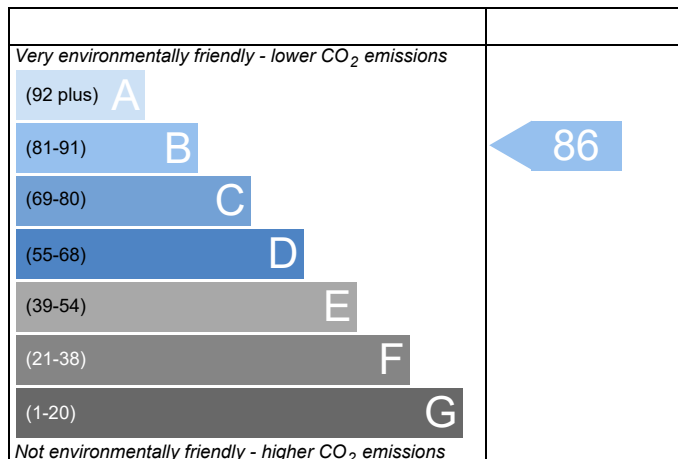
Energy Efficiency Rating



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 (CO₂) 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 (CO₂) emissions. The higher the rating the less impact it has on the environment.

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)



Property Reference	110 - PRJ012620	Issued on Date	18/08/2022
Assessment Reference	110 S	Prop Type Ref	Gardenia
Property	Plot 110		

SAP Rating	85 B	DER	16.28	TER	17.03
Environmental	86 B	% DER<TER	4.41		
CO ₂ Emissions (t/year)	1.46	DFEE	44.83	TFEE	51.32
General Requirements Compliance	Pass	% DFEE<TFEE	12.66		

Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	Assessor ID	T850-0001
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.03	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.28	kgCO ₂ /m ²	Pass
	-0.75 (-4.4%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.32	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.83	kWh/m ² /yr	
	-6.5 (-12.7%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.25 (max. 0.30)	0.25 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.37 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.01 (design value)	m ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 50 Pa	Pass

Limiting System Efficiencies

4 Heating efficiency

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)



Main heating system

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

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

7.65 m², No overhang

Windows facing East

0.66 m², No overhang

Windows facing South

5.45 m², No overhang

Air change rate

4.55 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/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.01 (design value) m³/(h.m²) @ 50 Pa

Maximum

10.0 m³/(h.m²) @ 50 Pa

Pass

10 Key features

Party wall U-value

0.00 W/m²K

Roof U-value

0.10 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	110 - PRJ012620	Issued on Date	18/08/2022
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Property	Plot 110		

SAP Rating	85 B	DER	16.28	TER	17.03
Environmental	86 B	% DER<TER	4.41		
CO ₂ Emissions (t/year)	1.46	DFEE	44.83	TTEE	51.32
General Requirements Compliance	Pass	% DFEE<TTEE	12.66		

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 ²)	Storey height (m)	Volume (m ³)
Ground floor	53.7000 (1b)	x 2.3900 (2b)	= 128.3430 (1b) - (3b)
First floor	53.7000 (1c)	x 2.6900 (2c)	= 144.4530 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.4000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 272.7960 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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) =	0.1100 (8)							
Pressure test				Yes								
Measured/design AP50					5.0100							
Infiltration rate					0.3605 (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) =		0.3334 (21)							
Wind speed	Jan 4.8000	Feb 4.5000	Mar 4.4000	Apr 3.9000	May 3.9000	Jun 3.6000	Jul 3.7000	Aug 3.5000	Sep 3.7000	Oct 4.0000	Nov 4.1000	Dec 4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infiltr rate	0.4001	0.3751	0.3668	0.3251	0.3251	0.3001	0.3084	0.2918	0.3084	0.3334	0.3418	0.3668 (22b)
Effective ac	0.5800	0.5704	0.5673	0.5528	0.5528	0.5450	0.5476	0.5426	0.5476	0.5556	0.5584	0.5673 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Windows (Uw = 1.40)			13.7600	1.3258	18.2424		(27)
Solid Door			2.0000	1.2000	2.4000		(26)
Flr - Ground			53.6990	0.1500	8.0549	75.6000	4059.6444 (28a)
Wl - Brick	7.5160	1.9950	5.5210	0.2500	1.3803	51.1800	282.5648 (29a)
Wl - Render	98.2040	13.7600	84.4440	0.2500	21.1110	51.1800	4321.8439 (29a)
Rf - Ins Joist	53.6990		53.6990	0.1000	5.3699	5.8200	312.5282 (30)
Total net area of external elements Aum(A, m ²)			213.1230				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.5584		(33)
Party Wall			47.0700	0.0000	0.0000	54.0300	2543.1921 (32)
Ground Floor Stud			93.6685			5.8200	545.1506 (32c)
1st Floor Stud			119.1872			5.8200	693.6692 (32c)
Internal Floor			53.7000			18.0000	966.6000 (32d)
Internal Ceiling			53.7000			5.8200	312.5340 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14037.7272 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							130.7051 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.8948 (36)
Total fabric heat loss						(33) + (36) =	67.4532 (37)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF HEAT DEMAND 09 Jan 2014

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	52.2176	51.3450	51.0666	49.7686	49.7686	49.0649	49.2932	48.8428	49.2932	50.0157	50.2691	51.0666 (38)
Heat transfer coeff	119.6708	118.7982	118.5198	117.2218	117.2218	116.5181	116.7464	116.2960	116.7464	117.4689	117.7223	118.5198 (39)
Average = Sum(39)m / 12 =												117.6209 (39)
HLP	1.1143	1.1061	1.1035	1.0915	1.0915	1.0849	1.0870	1.0828	1.0870	1.0938	1.0961	1.1035 (40)
HLP (average)												1.0952 (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 2.7983 (42)

Average daily hot water use (litres/day) 100.6593 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	110.7252	106.6988	102.6725	98.6461	94.6197	90.5933	90.5933	94.6197	98.6461	102.6725	106.6988	110.7252 (44)
Energy conte	164.2023	143.6124	148.1951	129.2001	123.9705	106.9772	99.1301	113.7532	115.1118	134.1517	146.4370	159.0211 (45)
Energy content (annual)										Total = Sum(45)m =		1583.7624 (45)
Distribution loss (46)m = $0.15 \times (45)m$	24.6303	21.5419	22.2293	19.3800	18.5956	16.0466	14.8695	17.0630	17.2668	20.1228	21.9656	23.8532 (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	14.7095	13.2719	14.6615	14.1407	14.5688	14.0490	14.4863	14.5398	14.0990	14.6194	14.1976	14.6940 (61)
Total heat required for water heating calculated for each month	178.9118	156.8843	162.8566	143.3407	138.5394	121.0262	113.6164	128.2930	129.2107	148.7710	160.6346	173.7151 (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	178.9118	156.8843	162.8566	143.3407	138.5394	121.0262	113.6164	128.2930	129.2107	148.7710	160.6346	173.7151 (64)
Total per year (kWh/year) = Sum(64)m =												1755.7999 (64)
RHI water heating demand												1756 (64)
Heat gains from water heating, kWh/month	58.2746	51.0691	52.9402	46.4942	44.8624	39.0822	36.5823	41.4579	41.7994	48.2603	52.2397	56.5480 (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	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.2866	57.9870	47.1582	35.7018	26.6875	22.5307	24.3452	31.6449	42.4737	53.9301	62.9444	67.1012 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	399.6511	403.7982	393.3476	371.0994	343.0151	316.6199	298.9862	294.8391	305.2897	327.5378	355.6221	382.0174 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880 (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)	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314 (71)
Water heating gains (Table 5)	78.3261	75.9957	71.1562	64.5753	60.2989	54.2808	49.1698	55.7230	58.0547	64.8660	72.5552	76.0054 (72)
Total internal gains	656.8175	651.3346	625.2157	584.9302	543.5553	506.9851	486.0549	495.7606	519.3718	559.8876	604.6754	638.6777 (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	7.6500	12.7054	0.5000	0.0000	0.7700	37.4205 (74)						
East	0.6610	23.7288	0.5000	0.0000	0.7700	6.0386 (76)						
South	5.4490	53.5774	0.5000	0.0000	0.7700	112.3981 (78)						
Solar gains	155.8572	237.9160	333.9380	460.5884	522.2941	567.7343	535.3763	474.4231	394.7538	283.4906	188.7583	128.9053 (83)
Total gains	812.6748	889.2506	959.1537	1045.5186	1065.8494	1074.7194	1021.4312	970.1837	914.1256	843.3781	793.4336	767.5829 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	32.5841	32.8235	32.9006	33.2649	33.2649	33.4658	33.4003	33.5297	33.4003	33.1949	33.1235	32.9006
alpha	3.1723	3.1882	3.1934	3.2177	3.2177	3.2311	3.2267	3.2353	3.2267	3.2130	3.2082	3.1934
util living area	0.9609	0.9475	0.9172	0.8494	0.7318	0.5530	0.3973	0.4045	0.6540	0.8505	0.9364	0.9650 (86)
MIT	19.3912	19.5625	19.9072	20.3428	20.7077	20.9167	20.9794	20.9791	20.8531	20.4643	19.8934	19.3887 (87)
Th 2	19.9892	19.9958	19.9979	20.0078	20.0078	20.0132	20.0114	20.0149	20.0114	20.0059	20.0040	19.9979 (88)
util rest of house												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF HEAT DEMAND 09 Jan 2014

	0.9539	0.9383	0.9020	0.8212	0.6798	0.4720	0.2942	0.2971	0.5757	0.8149	0.9230	0.9585 (89)
MIT 2	18.5439	18.7163	19.0535	19.4748	19.8024	19.9699	20.0052	20.0088	19.9273	19.5942	19.0496	18.5487 (90)
Living area fraction									fLA = Living area / (4) =			0.2155 (91)
MIT	18.7265	18.8986	19.2374	19.6618	19.9974	20.1739	20.2151	20.2179	20.1268	19.7817	19.2314	18.7297 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.5765	18.7486	19.0874	19.5118	19.8474	20.0239	20.0651	20.0679	19.9768	19.6317	19.0814	18.5797 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9412	0.9238	0.8853	0.8050	0.6705	0.4729	0.3000	0.3031	0.5727	0.7991	0.9075	0.9466 (94)
Useful gains	764.9073	821.4706	849.0956	841.5957	714.6170	508.2668	306.4397	294.0313	523.4896	673.9757	720.0185	726.5911 (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												
Month fracti	1624.7094	1585.7890	1420.7481	1173.6019	849.5575	538.7664	311.1416	298.6313	581.0200	931.7285	1292.7561	1585.7592 (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	639.6928	513.6220	425.3095	239.0445	100.3958	0.0000	0.0000	0.0000	0.0000	191.7681	412.3711	639.2210 (98)
RHI space heating demand												3161.4246 (98)
												3161 (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	53.7000 (1b)	2.3900 (2b)	128.3430 (1b) - (3b)
First floor	53.7000 (1c)	2.6900 (2c)	144.4530 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.4000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 272.7960 (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) =	0.1100 (8)
Pressure test				Yes	
Measured/design AP50					5.0100
Infiltration rate					0.3605 (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) =	0.3334 (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 inflt rate												
Effective ac	0.4251	0.4168	0.4085	0.3668	0.3584	0.3168	0.3168	0.3084	0.3334	0.3584	0.3751	0.3918 (22b)
	0.5904	0.5869	0.5834	0.5673	0.5642	0.5502	0.5502	0.5476	0.5556	0.5642	0.5704	0.5767 (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)			13.7600	1.3258	18.2424		(27)
Solid Door			2.0000	1.2000	2.4000		(26)
Flr - Ground			53.6990	0.1500	8.0549	75.6000	4059.6444 (28a)
Wl - Brick	7.5160	1.9950	5.5210	0.2500	1.3803	51.1800	282.5648 (29a)
Wl - Render	98.2040	13.7600	84.4440	0.2500	21.1110	51.1800	4321.8439 (29a)
Rf - Ins Joist	53.6990		53.6990	0.1000	5.3699	5.8200	312.5282 (30)
Total net area of external elements Aum(A, m2)			213.1230				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.5584		(33)
Party Wall			47.0700	0.0000	0.0000	54.0300	2543.1921 (32)
Ground Floor Stud			93.6685			5.8200	545.1506 (32c)
1st Floor Stud			119.1872			5.8200	693.6692 (32c)
Internal Floor			53.7000			18.0000	966.6000 (32d)
Internal Ceiling			53.7000			5.8200	312.5340 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 14037.7272 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							130.7051 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.8948 (36)
Total fabric heat loss							(33) + (36) = 67.4532 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	53.1466	52.8307	52.5210	51.0666	50.7945	49.5278	49.5278	49.2932	50.0157	50.7945	51.3450	51.9205 (38)
Average = Sum(39)m / 12 =	120.5998	120.2839	119.9742	118.5198	118.2477	116.9810	116.9810	116.7464	117.4689	118.2477	118.7982	119.3737 (39)
												118.5185 (39)
HLP	1.1229	1.1200	1.1171	1.1035	1.1010	1.0892	1.0892	1.0870	1.0938	1.1010	1.1061	1.1115 (40)
HLP (average)												1.1035 (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												2.7983 (42)
Average daily hot water use (litres/day)												100.6593 (43)
Daily hot water use	110.7252	106.6988	102.6725	98.6461	94.6197	90.5933	90.5933	94.6197	98.6461	102.6725	106.6988	110.7252 (44)
Energy conte	164.2023	143.6124	148.1951	129.2001	123.9705	106.9772	99.1301	113.7532	115.1118	134.1517	146.4370	159.0211 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

Energy content (annual)													Total = Sum(45)m =	1583.7624 (45)
Distribution loss (46)m = 0.15 x (45)m														
	24.6303	21.5419	22.2293	19.3800	18.5956	16.0466	14.8695	17.0630	17.2668	20.1228	21.9656	23.8532	(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	14.7095	13.2719	14.6615	14.1407	14.5688	14.0490	14.4863	14.5398	14.0990	14.6194	14.1976	14.6940	(61)	
Total heat required for water heating calculated for each month	178.9118	156.8843	162.8566	143.3407	138.5394	121.0262	113.6164	128.2930	129.2107	148.7710	160.6346	173.7151	(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	178.9118	156.8843	162.8566	143.3407	138.5394	121.0262	113.6164	128.2930	129.2107	148.7710	160.6346	173.7151	(64)	
Heat gains from water heating, kWh/month	58.2746	51.0691	52.9402	46.4942	44.8624	39.0822	36.5823	41.4579	41.7994	48.2603	52.2397	56.5480	(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	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.2866	57.9870	47.1582	35.7018	26.6875	22.5307	24.3452	31.6449	42.4737	53.9301	62.9444	67.1012	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	399.6511	403.7982	393.3476	371.0994	343.0151	316.6199	298.9862	294.8391	305.2897	327.5378	355.6221	382.0174	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	(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)	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	(71)
Water heating gains (Table 5)	78.3261	75.9957	71.1562	64.5753	60.2989	54.2808	49.1698	55.7230	58.0547	64.8660	72.5552	76.0054	(72)
Total internal gains	656.8175	651.3346	625.2157	584.9302	543.5553	506.9851	486.0549	495.7606	519.3718	559.8876	604.6754	638.6777	(73)

6. Solar gains

[Jan]		Area m ²	Solar flux Table 6a W/m ²	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W						
North		7.6500	10.6334	0.5000	0.0000	0.7700	31.3180 (74)						
East		0.6610	19.6403	0.5000	0.0000	0.7700	4.9982 (76)						
South		5.4490	46.7521	0.5000	0.0000	0.7700	98.0795 (78)						
Solar gains	134.3957	230.2567	322.4152	418.0975	489.8209	496.9532	474.5845	418.6434	354.7463	256.0992	161.1246	114.9682	(83)
Total gains	791.2132	881.5913	947.6309	1003.0277	1033.3762	1003.9382	960.6394	914.4040	874.1181	815.9867	765.7999	753.6459	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.3331	32.4180	32.5017	32.9006	32.9763	33.3334	33.3334	33.4003	33.1949	32.9763	32.8235	32.6652	
alpha	3.1555	3.1612	3.1668	3.1934	3.1984	3.2222	3.2222	3.2267	3.2130	3.1984	3.1882	3.1777	
util living area	0.9675	0.9529	0.9278	0.8764	0.7849	0.6420	0.4999	0.5387	0.7331	0.8897	0.9518	0.9717	(86)
MIT	19.2329	19.4468	19.7801	20.2100	20.5889	20.8511	20.9507	20.9364	20.7577	20.2823	19.6880	19.1919	(87)
Th 2	19.9822	19.9846	19.9869	19.9979	20.0000	20.0097	20.0097	20.0114	20.0059	20.0000	19.9958	19.9915	(88)
util rest of house	0.9618	0.9448	0.9147	0.8529	0.7418	0.5689	0.4006	0.4398	0.6684	0.8639	0.9420	0.9667	(89)
MIT 2	18.3824	18.5942	18.9218	19.3433	19.6939	19.9215	19.9895	19.9837	19.8496	19.4208	18.8428	18.3490	(90)
Living area fraction	18.5657	18.7779	19.1067	19.5301	19.8868	20.1218	20.1966	20.1889	20.0453	19.6064	19.0249	18.5306	(92)
Temperature adjustment	18.4157	18.6279	18.9567	19.3801	19.7368	19.9718	20.0466	20.0389	19.8953	19.4564	18.8749	-0.1500	
adjusted MIT												18.3806	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.9502	0.9308	0.8983	0.8357	0.7290	0.5659	0.4045	0.4428	0.6603	0.8469	0.9279	0.9561	(94)	
Ext temp.	751.8420	820.5942	851.2569	838.2527	753.3166	568.1134	388.5522	404.8782	577.1980	691.0353	710.6083	720.5650	(95)	
Heat loss rate W	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)	
Month fracti	1702.3466	1651.2397	1494.4804	1242.0953	950.3279	628.3981	403.1898	424.8312	680.7659	1047.2489	1398.8389	1692.7951	(97)	
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)	
Space heating per m ²	707.1755	558.1938	478.5583	290.7666	146.5764	0.0000	0.0000	0.0000	0.0000	265.0229	495.5260	723.3392	(98)	
												3665.1588	(98)	
													(98) / (4) =	34.1262 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

8c. Space cooling requirement

Not applicable

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													4049.8992 (211)
Space heating requirement	707.1755	558.1938	478.5583	290.7666	146.5764	0.0000	0.0000	0.0000	0.0000	265.0229	495.5260	723.3392	(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)	781.4093	616.7888	528.7937	321.2891	161.9629	0.0000	0.0000	0.0000	0.0000	292.8430	547.5426	799.2698	(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	178.9118	156.8843	162.8566	143.3407	138.5394	121.0262	113.6164	128.2930	129.2107	148.7710	160.6346	173.7151	(64)
Efficiency of water heater (217)m	89.8351	89.7780	89.6655	89.4177	88.9163	87.3000	87.3000	87.3000	87.3000	89.3228	89.6951	89.8621	(217)
Fuel for water heating, kWh/month	199.1557	174.7469	181.6268	160.3046	155.8087	138.6325	130.1448	146.9565	148.0077	166.5543	179.0896	193.3129	(219)
Water heating fuel used													1974.3411 (219)
Annual totals kWh/year													
Space heating fuel - main system													4049.8992 (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)													461.1930 (232)
Total delivered energy for all uses													6560.4333 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4049.8992	3.4800	140.9365 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1974.3411	3.4800	68.7071 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	461.1930	13.1900	60.8314 (250)
Additional standing charges			120.0000 (251)
Total energy cost			400.3674 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.1034 (257)
SAP value		84.6079
SAP rating (Section 12)		85 (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	4049.8992	0.2160	874.7782 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1974.3411	0.2160	426.4577 (264)
Space and water heating			1301.2359 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	461.1930	0.5190	239.3592 (268)
Total kg/year			1579.5201 (272)
CO2 emissions per m2			14.7100 (273)
EI value			86.1118
EI rating			86 (274)
EI band			B

Calculation of stars for heating and DHW

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9050 = 3.845$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9050 = 0.2387$, stars = 4
Water heating energy efficiency	$3.48 / 0.8881 = 3.919$, stars = 4
Water heating environmental impact	$0.216 / 0.8881 = 0.2432$, stars = 4

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	53.7000 (1b)	2.3900 (2b)	128.3430 (1b) - (3b)
First floor	53.7000 (1c)	2.6900 (2c)	144.4530 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.4000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 272.7960 (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) =	0.1100 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.3605 (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) =	0.3334 (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	0.4001	0.3751	0.3668	0.3251	0.3251	0.3001	0.3084	0.2918	0.3084	0.3334	0.3418	0.3668 (22b)
Effective ac	0.5800	0.5704	0.5673	0.5528	0.5528	0.5450	0.5476	0.5426	0.5476	0.5556	0.5584	0.5673 (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)			13.7600	1.3258	18.2424		(27)
Solid Door			2.0000	1.2000	2.4000		(26)
Flr - Ground			53.6990	0.1500	8.0549	75.6000	4059.6444 (28a)
Wl - Brick	7.5160	1.9950	5.5210	0.2500	1.3803	51.1800	282.5648 (29a)
Wl - Render	98.2040	13.7600	84.4440	0.2500	21.1110	51.1800	4321.8439 (29a)
Rf - Ins Joist	53.6990		53.6990	0.1000	5.3699	5.8200	312.5282 (30a)
Total net area of external elements Aum(A, m2)			213.1230				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.5584		(33)
Party Wall			47.0700	0.0000	0.0000	54.0300	2543.1921 (32)
Ground Floor Stud			93.6685			5.8200	545.1506 (32c)
1st Floor Stud			119.1872			5.8200	693.6692 (32c)
Internal Floor			53.7000			18.0000	966.6000 (32d)
Internal Ceiling			53.7000			5.8200	312.5340 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 14037.7272 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							130.7051 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.8948 (36)
Total fabric heat loss							(33) + (36) = 67.4532 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	52.2176	51.3450	51.0666	49.7686	49.7686	49.0649	49.2932	48.8428	49.2932	50.0157	50.2691	51.0666 (38)
Average = Sum(39)m / 12 =	119.6708	118.7982	118.5198	117.2218	117.2218	116.5181	116.7464	116.2960	116.7464	117.4689	117.7223	118.5198 (39)
HLP	1.1143	1.1061	1.1035	1.0915	1.0915	1.0849	1.0870	1.0828	1.0870	1.0938	1.0961	1.1035 (40)
HLP (average)												1.0952 (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												2.7983 (42)
Average daily hot water use (litres/day)												100.6593 (43)
Daily hot water use	110.7252	106.6988	102.6725	98.6461	94.6197	90.5933	90.5933	94.6197	98.6461	102.6725	106.6988	110.7252 (44)
Energy conte	164.2023	143.6124	148.1951	129.2001	123.9705	106.9772	99.1301	113.7532	115.1118	134.1517	146.4370	159.0211 (45)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

Energy content (annual)													Total = Sum(45)m =	1583.7624 (45)
Distribution loss (46)m = 0.15 x (45)m														
	24.6303	21.5419	22.2293	19.3800	18.5956	16.0466	14.8695	17.0630	17.2668	20.1228	21.9656	23.8532	(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	14.7095	13.2719	14.6615	14.1407	14.5688	14.0490	14.4863	14.5398	14.0990	14.6194	14.1976	14.6940	(61)	
Total heat required for water heating calculated for each month	178.9118	156.8843	162.8566	143.3407	138.5394	121.0262	113.6164	128.2930	129.2107	148.7710	160.6346	173.7151	(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	178.9118	156.8843	162.8566	143.3407	138.5394	121.0262	113.6164	128.2930	129.2107	148.7710	160.6346	173.7151	(64)	
Heat gains from water heating, kWh/month	58.2746	51.0691	52.9402	46.4942	44.8624	39.0822	36.5823	41.4579	41.7994	48.2603	52.2397	56.5480	(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	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.2866	57.9870	47.1582	35.7018	26.6875	22.5307	24.3452	31.6449	42.4737	53.9301	62.9444	67.1012	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	399.6511	403.7982	393.3476	371.0994	343.0151	316.6199	298.9862	294.8391	305.2897	327.5378	355.6221	382.0174	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	(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)	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	(71)
Water heating gains (Table 5)	78.3261	75.9957	71.1562	64.5753	60.2989	54.2808	49.1698	55.7230	58.0547	64.8660	72.5552	76.0054	(72)
Total internal gains	656.8175	651.3346	625.2157	584.9302	543.5553	506.9851	486.0549	495.7606	519.3718	559.8876	604.6754	638.6777	(73)

6. Solar gains

[Jan]	Area	Solar flux	Specific data	FF	Access	Gains							
	m ²	Table 6a	g	Specific data	factor	W							
		W/m ²	or Table 6b	or Table 6c	Table 6d								
North	7.6500	12.7054	0.5000	0.0000	0.7700	37.4205 (74)							
East	0.6610	23.7288	0.5000	0.0000	0.7700	6.0386 (76)							
South	5.4490	53.5774	0.5000	0.0000	0.7700	112.3981 (78)							
Solar gains	155.8572	237.9160	333.9380	460.5884	522.2941	567.7343	535.3763	474.4231	394.7538	283.4906	188.7583	128.9053	(83)
Total gains	812.6748	889.2506	959.1537	1045.5186	1065.8494	1074.7194	1021.4312	970.1837	914.1256	843.3781	793.4336	767.5829	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.5841	32.8235	32.9006	33.2649	33.2649	33.4658	33.4003	33.5297	33.4003	33.1949	33.1235	32.9006	
alpha	3.1723	3.1882	3.1934	3.2177	3.2177	3.2311	3.2267	3.2353	3.2267	3.2130	3.2082	3.1934	
util living area	0.9609	0.9475	0.9172	0.8494	0.7318	0.5530	0.3973	0.4045	0.6540	0.8505	0.9364	0.9650	(86)
MIT	19.3912	19.5625	19.9072	20.3428	20.7077	20.9167	20.9794	20.9791	20.8531	20.4643	19.8934	19.3887	(87)
Th 2	19.9892	19.9958	19.9979	20.0078	20.0078	20.0132	20.0114	20.0149	20.0114	20.0059	20.0040	19.9979	(88)
util rest of house	0.9539	0.9383	0.9020	0.8212	0.6798	0.4720	0.2942	0.2971	0.5757	0.8149	0.9230	0.9585	(89)
MIT 2	18.5439	18.7163	19.0535	19.4748	19.8024	19.9699	20.0052	20.0088	19.9273	19.5942	19.0496	18.5487	(90)
Living area fraction	18.7265	18.8986	19.2374	19.6618	19.9974	20.1739	20.2151	20.2179	20.1268	19.7817	19.2314	18.7297	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.5765	18.7486	19.0874	19.5118	19.8474	20.0239	20.0651	20.0679	19.9768	19.6317	19.0814	18.5797	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	764.9073	821.4706	849.0956	841.5957	714.6170	508.2668	306.4397	294.0313	523.4896	673.9757	720.0185	726.5911	(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	1624.7094	1585.7890	1420.7481	1173.6019	849.5575	538.7664	311.1416	298.6313	581.0200	931.7285	1292.7561	1585.7592	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	639.6928	513.6220	425.3095	239.0445	100.3958	0.0000	0.0000	0.0000	0.0000	191.7681	412.3711	639.2210	(98)
Space heating													3161.4246 (98)
Space heating per m ²													(98) / (4) = 29.4360 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

8c. Space cooling requirement

Not applicable

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3493.2868 (211)
Space heating requirement	639.6928	513.6220	425.3095	239.0445	100.3958	0.0000	0.0000	0.0000	0.0000	191.7681	412.3711	639.2210	(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)	706.8428	567.5381	469.9552	264.1375	110.9345	0.0000	0.0000	0.0000	0.0000	211.8984	455.6586	706.3216	(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	178.9118	156.8843	162.8566	143.3407	138.5394	121.0262	113.6164	128.2930	129.2107	148.7710	160.6346	173.7151	(64)
Efficiency of water heater (217)m	89.7807	89.7304	89.5907	89.2733	88.6166	87.3000	87.3000	87.3000	87.3000	89.0736	89.5795	89.7966	(217)
Fuel for water heating, kWh/month	199.2764	174.8396	181.7784	160.5639	156.3357	138.6325	130.1448	146.9565	148.0077	167.0203	179.3208	193.4539	(219)
Water heating fuel used													1976.3304 (219)
Annual totals kWh/year													
Space heating fuel - main system													3493.2868 (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)													461.1930 (232)
Total delivered energy for all uses													6005.8103 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3493.2868	3.6300	126.8063 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1976.3304	3.6300	71.7408 (247)
Pumps and fans for heating	75.0000	19.4400	14.5800 (249)
Energy for lighting	461.1930	19.4400	89.6559 (250)
Additional standing charges			95.0000 (251)
Total energy cost			397.7830 (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	3493.2868	0.2160	754.5500 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1976.3304	0.2160	426.8874 (264)
Space and water heating			1181.4373 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	461.1930	0.5190	239.3592 (268)
Total kg/year			1459.7215 (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	3493.2868	1.2200	4261.8099 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1976.3304	1.2200	2411.1231 (264)
Space and water heating			6672.9330 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	461.1930	3.0700	1415.8626 (268)
Primary energy kWh/year			8319.0457 (272)
Primary energy kWh/m2/year			77.4585 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 85
 Current environmental impact rating: B 86

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

(For testing purposes):

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

Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 1.1	-£ 27	-194 kg (13.3%)
U Solar photovoltaic panels	+ 8.8	-£ 375	-1000 kg (79.0%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£27	1.81 kg/m ²	B 86 B 88
Solar photovoltaic panels	£375	9.31 kg/m ²	A 94 A 96
Total Savings	£402	11.12 kg/m ²	

Potential energy efficiency rating: A 94
 Potential environmental impact rating: A 96

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

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

	Current	Potential	Saving
Electricity	£104	£114	-£10
Mains gas	£294	£257	£37
Space heating	£236	£236	£0
Water heating	£72	£44	£27
Lighting	£90	£90	£0
Generated (PV)	-£0	-£375	£375
Total cost of fuels	£398	-£4	£402
Total cost of uses	£398	-£5	£402
Delivered energy	56 kWh/m ²	29 kWh/m ²	27 kWh/m ²
Carbon dioxide emissions	1.5 tonnes	0.3 tonnes	1.2 tonnes
CO2 emissions per m ²	14 kg/m ²	2 kg/m ²	11 kg/m ²
Primary energy	77 kWh/m ²	12 kWh/m ²	65 kWh/m ²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	53.7000 (1b)	2.3900 (2b)	128.3430 (1b) - (3b)
First floor	53.7000 (1c)	2.6900 (2c)	144.4530 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.4000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 272.7960 (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) =	0.1100 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.3605 (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) =	0.3334 (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	0.4251	0.4168	0.4085	0.3668	0.3584	0.3168	0.3168	0.3084	0.3334	0.3584	0.3751	0.3918 (22b)
	0.5904	0.5869	0.5834	0.5673	0.5642	0.5502	0.5502	0.5476	0.5556	0.5642	0.5704	0.5767 (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)			13.7600	1.3258	18.2424		(27)
Solid Door			2.0000	1.2000	2.4000		(26)
Flr - Ground			53.6990	0.1500	8.0549	75.6000	4059.6444 (28a)
Wl - Brick	7.5160	1.9950	5.5210	0.2500	1.3803	51.1800	282.5648 (29a)
Wl - Render	98.2040	13.7600	84.4440	0.2500	21.1110	51.1800	4321.8439 (29a)
Rf - Ins Joist	53.6990		53.6990	0.1000	5.3699	5.8200	312.5282 (30)
Total net area of external elements Aum(A, m2)			213.1230				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.5584		(33)
Party Wall			47.0700	0.0000	0.0000	54.0300	2543.1921 (32)
Ground Floor Stud			93.6685			5.8200	545.1506 (32c)
1st Floor Stud			119.1872			5.8200	693.6692 (32c)
Internal Floor			53.7000			18.0000	966.6000 (32d)
Internal Ceiling			53.7000			5.8200	312.5340 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14037.7272 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							130.7051 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.8948 (36)
Total fabric heat loss						(33) + (36) =	67.4532 (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	53.1466	52.8307	52.5210	51.0666	50.7945	49.5278	49.5278	49.2932	50.0157	50.7945	51.3450	51.9205 (38)
Heat transfer coeff	120.5998	120.2839	119.9742	118.5198	118.2477	116.9810	116.9810	116.7464	117.4689	118.2477	118.7982	119.3737 (39)
Average = Sum(39)m / 12 =												118.5185 (39)
HLP	1.1229	1.1200	1.1171	1.1035	1.1010	1.0892	1.0892	1.0870	1.0938	1.1010	1.1061	1.1115 (40)
HLP (average)												1.1035 (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												2.7983 (42)
Average daily hot water use (litres/day)												100.6593 (43)
Daily hot water use	110.7252	106.6988	102.6725	98.6461	94.6197	90.5933	90.5933	94.6197	98.6461	102.6725	106.6988	110.7252 (44)
Energy conte	164.2023	143.6124	148.1951	129.2001	123.9705	106.9772	99.1301	113.7532	115.1118	134.1517	146.4370	159.0211 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

Energy content (annual)													Total = Sum(45)m =	1583.7624 (45)
Distribution loss (46)m = 0.15 x (45)m														
	24.6303	21.5419	22.2293	19.3800	18.5956	16.0466	14.8695	17.0630	17.2668	20.1228	21.9656	23.8532	(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	14.7095	13.2719	14.6615	14.1407	14.5688	14.0490	14.4863	14.5398	14.0990	14.6194	14.1976	14.6940	(61)	
Total heat required for water heating calculated for each month	178.9118	156.8843	162.8566	143.3407	138.5394	121.0262	113.6164	128.2930	129.2107	148.7710	160.6346	173.7151	(62)	
Aperture area of solar collector													3.0000 (H1)	
Zero-loss collector efficiency													0.7000 (H2)	
Collector heat loss coefficient													1.8000 (H3)	
Collector 2nd order heat loss coefficient													0.0050 (H3a)	
Collector effective heat loss coefficient													1.8063 (H3b)	
Collector performance ratio													2.5804 (H4)	
Annual solar radiation per m2													1079.5246 (H5)	
Overshading factor													0.8000 (H6)	
Solar energy available													1813.6014 (H7)	
Adjustment factor for showers													1.0000 (H7a)	
Solar-to-load ratio													1.1451 (H8)	
Utilisation factor													0.5824 (H9)	
Collector performance factor													0.8793 (H10)	
Dedicated solar storage volume													75.0000 (H11)	
Effective solar volume													75.0000 (H13)	
Daily hot water demand													100.6593 (H14)	
Volume ratio Veff/V													0.7451 (H15)	
Solar storage volume factor													0.9411 (H16)	
Solar input	-25.3475	-42.2977	-72.0379	-96.5450	-119.2732	-117.2645	-115.7148	-101.1006	-79.1821	-54.0720	-30.0658	-874.1127	(H17)	
Solar input (sum of months) = Sum(63)m =													-874.1127 (63)	
Output from w/h	153.5643	114.5865	90.8187	46.7958	19.2662	3.7617	0.0000	27.1924	50.0287	94.6990	130.5688	152.5036	(64)	
Total per year (kWh/year) = Sum(64)m =													883.7856 (64)	
Heat gains from water heating, kWh/month	58.2746	51.0691	52.9402	46.4942	44.8624	39.0822	36.5823	41.4579	41.7994	48.2603	52.2397	56.5480	(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	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.2866	57.9870	47.1582	35.7018	26.6875	22.5307	24.3452	31.6449	42.4737	53.9301	62.9444	67.1012	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	399.6511	403.7982	393.3476	371.0994	343.0151	316.6199	298.9862	294.8391	305.2897	327.5378	355.6221	382.0174	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	(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)	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	(71)
Water heating gains (Table 5)	78.3261	75.9957	71.1562	64.5753	60.2989	54.2808	49.1698	55.7230	58.0547	64.8660	72.5552	76.0054	(72)
Total internal gains	656.8175	651.3346	625.2157	584.9302	543.5553	506.9851	486.0549	495.7606	519.3718	559.8876	604.6754	638.6777	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W							
North	7.6500	10.6334	0.5000	0.0000	0.7700	31.3180 (74)							
East	0.6610	19.6403	0.5000	0.0000	0.7700	4.9982 (76)							
South	5.4490	46.7521	0.5000	0.0000	0.7700	98.0795 (78)							
Solar gains	134.3957	230.2567	322.4152	418.0975	489.8209	496.9532	474.5845	418.6434	354.7463	256.0992	161.1246	114.9682	(83)
Total gains	791.2132	881.5913	947.6309	1003.0277	1033.3762	1003.9382	960.6394	914.4040	874.1181	815.9867	765.7999	753.6459	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, T _{hl} (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	32.3331	32.4180	32.5017	32.9006	32.9763	33.3334	33.3334	33.4003	33.1949	32.9763	32.8235	32.6652	
alpha	3.1555	3.1612	3.1668	3.1934	3.1984	3.2222	3.2222	3.2267	3.2130	3.1984	3.1882	3.1777	
util living area	0.9675	0.9529	0.9278	0.8764	0.7849	0.6420	0.4999	0.5387	0.7331	0.8897	0.9518	0.9717	(86)
MIT	19.2329	19.4468	19.7801	20.2100	20.5889	20.8511	20.9507	20.9364	20.7577	20.2823	19.6880	19.1919	(87)
Th 2	19.9822	19.9846	19.9869	19.9979	20.0000	20.0097	20.0097	20.0114	20.0059	20.0000	19.9958	19.9915	(88)
util rest of house	0.9618	0.9448	0.9147	0.8529	0.7418	0.5689	0.4006	0.4398	0.6684	0.8639	0.9420	0.9667	(89)
MIT 2	18.3824	18.5942	18.9218	19.3433	19.6939	19.9215	19.9895	19.9837	19.8496	19.4208	18.8428	18.3490	(90)
Living area fraction													fLA = Living area / (4) =
MIT	18.5657	18.7779	19.1067	19.5301	19.8868	20.1218	20.1966	20.1889	20.0453	19.6064	19.0249	18.5306	(92)
Temperature adjustment													-0.1500
adjusted MIT	18.4157	18.6279	18.9567	19.3801	19.7368	19.9718	20.0466	20.0389	19.8953	19.4564	18.8749	18.3806	(93)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9502	0.9308	0.8983	0.8357	0.7290	0.5659	0.4045	0.4428	0.6603	0.8469	0.9279	0.9561	(94)
Useful gains	751.8420	820.5942	851.2569	838.2527	753.3166	568.1134	388.5522	404.8782	577.1980	691.0353	710.6083	720.5650	(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	1702.3466	1651.2397	1494.4804	1242.0953	950.3279	628.3981	403.1898	424.8312	680.7659	1047.2489	1398.8389	1692.7951	(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	707.1755	558.1938	478.5583	290.7666	146.5764	0.0000	0.0000	0.0000	0.0000	265.0229	495.5260	723.3392	(98)
Space heating													
Space heating per m2													(98) / (4) = 34.1262 (99)

8c. Space cooling requirement

Not applicable

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													4049.8992 (211)
Space heating requirement	707.1755	558.1938	478.5583	290.7666	146.5764	0.0000	0.0000	0.0000	0.0000	265.0229	495.5260	723.3392	(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)	781.4093	616.7888	528.7937	321.2891	161.9629	0.0000	0.0000	0.0000	0.0000	292.8430	547.5426	799.2698	(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	153.5643	114.5865	90.8187	46.7958	19.2662	3.7617	0.0000	27.1924	50.0287	94.6990	130.5688	152.5036	(64)
Efficiency of water heater (217)m	89.9120	89.9385	89.9739	90.0425	90.1163	87.3000	87.3000	87.3000	87.3000	89.6350	89.8134	89.9260	(216)
Fuel for water heating, kWh/month	170.7940	127.4054	100.9389	51.9708	21.3793	4.3089	0.0000	31.1482	57.3066	105.6495	145.3778	169.5877	(219)
Water heating fuel used													985.8671 (219)
Annual totals kWh/year													
Space heating fuel - main system													4049.8992 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
pump for solar water heating													50.0000 (230g)
Total electricity for the above, kWh/year													125.0000 (231)
Electricity for lighting (calculated in Appendix L)													461.1930 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 2.50 * 1080 * 0.80) =										-1727.2394			-1727.2394 (233)
Total delivered energy for all uses													3894.7200 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	4049.8992	3.4800	140.9365	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	985.8671	3.4800	34.3082	(247)
Pumps and fans for heating	75.0000	13.1900	9.8925	(249)
Pump for solar water heating	50.0000	13.1900	6.5950	(249)
Energy for lighting	461.1930	13.1900	60.8314	(250)
Additional standing charges			120.0000	(251)
Energy saving/generation technologies				
PV Unit	-1727.2394	13.1900	-227.8229	(252)
Total energy cost			144.7407	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200	(256)
Energy cost factor (ECF)		0.3989	(257)
SAP value	[(255) x (256)] / [(4) + 45.0] =	94.4355	
SAP rating (Section 12)		94	(258)
SAP band		A	

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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4049.8992	0.2160	874.7782 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	985.8671	0.2160	212.9473 (264)
Space and water heating			1087.7255 (265)
Pumps and fans	125.0000	0.5190	64.8750 (267)
Energy for lighting	461.1930	0.5190	239.3592 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			495.5225 (272)
CO2 emissions per m2			4.6100 (273)
EI value			95.6430
EI rating			96 (274)
EI band			A

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	53.7000 (1b)	2.3900 (2b)	128.3430 (1b) - (3b)
First floor	53.7000 (1c)	2.6900 (2c)	144.4530 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.4000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 272.7960 (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) =	0.1100 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.3605 (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) =	0.3334 (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												
Effective ac	0.4001	0.3751	0.3668	0.3251	0.3251	0.3001	0.3084	0.2918	0.3084	0.3334	0.3418	0.3668 (22b)
	0.5800	0.5704	0.5673	0.5528	0.5528	0.5450	0.5476	0.5426	0.5476	0.5556	0.5584	0.5673 (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)			13.7600	1.3258	18.2424		(27)
Solid Door			2.0000	1.2000	2.4000		(26)
Flr - Ground			53.6990	0.1500	8.0549	75.6000	4059.6444 (28a)
Wl - Brick	7.5160	1.9950	5.5210	0.2500	1.3803	51.1800	282.5648 (29a)
Wl - Render	98.2040	13.7600	84.4440	0.2500	21.1110	51.1800	4321.8439 (29a)
Rf - Ins Joist	53.6990		53.6990	0.1000	5.3699	5.8200	312.5282 (30)
Total net area of external elements Aum(A, m2)			213.1230				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.5584		(33)
Party Wall			47.0700	0.0000	0.0000	54.0300	2543.1921 (32)
Ground Floor Stud			93.6685			5.8200	545.1506 (32c)
1st Floor Stud			119.1872			5.8200	693.6692 (32c)
Internal Floor			53.7000			18.0000	966.6000 (32d)
Internal Ceiling			53.7000			5.8200	312.5340 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 14037.7272 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							130.7051 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.8948 (36)
Total fabric heat loss							(33) + (36) = 67.4532 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	52.2176	51.3450	51.0666	49.7686	49.7686	49.0649	49.2932	48.8428	49.2932	50.0157	50.2691	51.0666 (38)
Average = Sum(39)m / 12 =	119.6708	118.7982	118.5198	117.2218	117.2218	116.5181	116.7464	116.2960	116.7464	117.4689	117.7223	118.5198 (39)
HLP	1.1143	1.1061	1.1035	1.0915	1.0915	1.0849	1.0870	1.0828	1.0870	1.0938	1.0961	1.1035 (40)
HLP (average)												1.0952 (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												2.7983 (42)
Average daily hot water use (litres/day)												100.6593 (43)
Daily hot water use	110.7252	106.6988	102.6725	98.6461	94.6197	90.5933	90.5933	94.6197	98.6461	102.6725	106.6988	110.7252 (44)
Energy conte	164.2023	143.6124	148.1951	129.2001	123.9705	106.9772	99.1301	113.7532	115.1118	134.1517	146.4370	159.0211 (45)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

Energy content (annual)													Total = Sum(45)m =	1583.7624 (45)
Distribution loss (46)m = 0.15 x (45)m														
	24.6303	21.5419	22.2293	19.3800	18.5956	16.0466	14.8695	17.0630	17.2668	20.1228	21.9656	23.8532	(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	14.7095	13.2719	14.6615	14.1407	14.5688	14.0490	14.4863	14.5398	14.0990	14.6194	14.1976	14.6940	(61)	
Total heat required for water heating calculated for each month	178.9118	156.8843	162.8566	143.3407	138.5394	121.0262	113.6164	128.2930	129.2107	148.7710	160.6346	173.7151	(62)	
Aperture area of solar collector													3.0000 (H1)	
Zero-loss collector efficiency													0.7000 (H2)	
Collector heat loss coefficient													1.8000 (H3)	
Collector 2nd order heat loss coefficient													0.0050 (H3a)	
Collector effective heat loss coefficient													1.8063 (H3b)	
Collector performance ratio													2.5804 (H4)	
Annual solar radiation per m2													1204.7564 (H5)	
Overshading factor													0.8000 (H6)	
Solar energy available													2023.9908 (H7)	
Adjustment factor for showers													1.0000 (H7a)	
Solar-to-load ratio													1.2780 (H8)	
Utilisation factor													0.5427 (H9)	
Collector performance factor													0.8793 (H10)	
Dedicated solar storage volume													75.0000 (H11)	
Effective solar volume													75.0000 (H13)	
Daily hot water demand													100.6593 (H14)	
Volume ratio Veff/V													0.7451 (H15)	
Solar storage volume factor													0.9411 (H16)	
Solar input													-909.0541 (H17)	
Solar input	-28.0318	-41.6398	-70.7235	-99.9069	-118.6714	-124.7101	-121.6335	-107.2889	-83.2349	-56.9489	-33.5870	-22.6774	(63)	
													Solar input (sum of months) = Sum(63)m =	-909.0541 (63)
Output from w/h	150.8799	115.2445	92.1331	43.4338	19.8679	0.0000	0.0000	21.0041	45.9759	91.8221	127.0477	151.0377	(64)	
													Total per year (kWh/year) = Sum(64)m =	858.4467 (64)
Heat gains from water heating, kWh/month	58.2746	51.0691	52.9402	46.4942	44.8624	39.0822	36.5823	41.4579	41.7994	48.2603	52.2397	56.5480	(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	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	167.8971	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.2866	57.9870	47.1582	35.7018	26.6875	22.5307	24.3452	31.6449	42.4737	53.9301	62.9444	67.1012	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	399.6511	403.7982	393.3476	371.0994	343.0151	316.6199	298.9862	294.8391	305.2897	327.5378	355.6221	382.0174	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	54.5880	(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)	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	-111.9314	(71)
Water heating gains (Table 5)	78.3261	75.9957	71.1562	64.5753	60.2989	54.2808	49.1698	55.7230	58.0547	64.8660	72.5552	76.0054	(72)
Total internal gains	656.8175	651.3346	625.2157	584.9302	543.5553	506.9851	486.0549	495.7606	519.3718	559.8876	604.6754	638.6777	(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		7.6500	12.7054	0.5000	0.0000	0.7700	37.4205 (74)						
East		0.6610	23.7288	0.5000	0.0000	0.7700	6.0386 (76)						
South		5.4490	53.5774	0.5000	0.0000	0.7700	112.3981 (78)						
Solar gains	155.8572	237.9160	333.9380	460.5884	522.2941	567.7343	535.3763	474.4231	394.7538	283.4906	188.7583	128.9053	(83)
Total gains	812.6748	889.2506	959.1537	1045.5186	1065.8494	1074.7194	1021.4312	970.1837	914.1256	843.3781	793.4336	767.5829	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, T _{hl} (C)													21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	32.5841	32.8235	32.9006	33.2649	33.2649	33.4658	33.4003	33.5297	33.4003	33.1949	33.1235	32.9006		
alpha	3.1723	3.1882	3.1934	3.2177	3.2177	3.2311	3.2267	3.2353	3.2267	3.2130	3.2082	3.1934		
util living area	0.9609	0.9475	0.9172	0.8494	0.7318	0.5530	0.3973	0.4045	0.6540	0.8505	0.9364	0.9650	(86)	
MIT	19.3912	19.5625	19.9072	20.3428	20.7077	20.9167	20.9794	20.9791	20.8531	20.4643	19.8934	19.3887	(87)	
Th 2	19.9892	19.9958	19.9979	20.0078	20.0078	20.0132	20.0114	20.0149	20.0114	20.0059	20.0040	19.9979	(88)	
util rest of house	0.9539	0.9383	0.9020	0.8212	0.6798	0.4720	0.2942	0.2971	0.5757	0.8149	0.9230	0.9585	(89)	
MIT 2	18.5439	18.7163	19.0535	19.4748	19.8024	19.9699	20.0052	20.0088	19.9273	19.5942	19.0496	18.5487	(90)	
Living area fraction													fLA = Living area / (4) =	0.2155 (91)
MIT	18.7265	18.8986	19.2374	19.6618	19.9974	20.1739	20.2151	20.2179	20.1268	19.7817	19.2314	18.7297	(92)	
Temperature adjustment													-0.1500	
adjusted MIT	18.5765	18.7486	19.0874	19.5118	19.8474	20.0239	20.0651	20.0679	19.9768	19.6317	19.0814	18.5797	(93)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9412	0.9238	0.8853	0.8050	0.6705	0.4729	0.3000	0.3031	0.5727	0.7991	0.9075	0.9466	(94)
Useful gains	764.9073	821.4706	849.0956	841.5957	714.6170	508.2668	306.4397	294.0313	523.4896	673.9757	720.0185	726.5911	(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	1624.7094	1585.7890	1420.7481	1173.6019	849.5575	538.7664	311.1416	298.6313	581.0200	931.7285	1292.7561	1585.7592	(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	639.6928	513.6220	425.3095	239.0445	100.3958	0.0000	0.0000	0.0000	0.0000	191.7681	412.3711	639.2210	(98)
Space heating per m2													(98) / (4) = 29.4360 (99)

8c. Space cooling requirement

Not applicable

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3493.2868 (211)
Space heating requirement	639.6928	513.6220	425.3095	239.0445	100.3958	0.0000	0.0000	0.0000	0.0000	191.7681	412.3711	639.2210	(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)	706.8428	567.5381	469.9552	264.1375	110.9345	0.0000	0.0000	0.0000	0.0000	211.8984	455.6586	706.3216	(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	150.8799	115.2445	92.1331	43.4338	19.8679	0.0000	0.0000	21.0041	45.9759	91.8221	127.0477	151.0377	(64)
Efficiency of water heater (217)m	89.8713	89.8961	89.9132	89.9928	89.9553	87.3000	87.3000	87.3000	87.3000	89.4385	89.7254	89.8704	(216)
Fuel for water heating, kWh/month	167.8845	128.1974	102.4690	48.2636	22.0865	0.0000	0.0000	24.0597	52.6642	102.6651	141.5961	168.0617	(219)
Water heating fuel used													957.9477 (219)
Annual totals kWh/year													
Space heating fuel - main system													3493.2868 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
pump for solar water heating													50.0000 (230g)
Total electricity for the above, kWh/year													125.0000 (231)
Electricity for lighting (calculated in Appendix L)													461.1930 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 2.50 * 1205 * 0.80) =									-1927.6103				-1927.6103 (233)
Total delivered energy for all uses													3109.8173 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3493.2868	3.6300	126.8063	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	957.9477	3.6300	34.7735	(247)
Pumps and fans for heating	75.0000	19.4400	14.5800	(249)
Pump for solar water heating	50.0000	19.4400	9.7200	(249)
Energy for lighting	461.1930	19.4400	89.6559	(250)
Additional standing charges			95.0000	(251)
Energy saving/generation technologies				
PV Unit	-1927.6103	19.4400	-374.7274	(252)
Total energy cost			-4.1917	(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	3493.2868	0.2160	754.5500	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	957.9477	0.2160	206.9167	(264)
Space and water heating			961.4667	(265)
Pumps and fans	125.0000	0.5190	64.8750	(267)
Energy for lighting	461.1930	0.5190	239.3592	(268)
Energy saving/generation technologies				
PV Unit	-1927.6103	0.5190	-1000.4297	(269)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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

Total kg/year 265.2711 (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	3493.2868	1.2200	4261.8099 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	957.9477	1.2200	1168.6962 (264)
Space and water heating			5430.5062 (265)
Pumps and fans	125.0000	3.0700	383.7500 (267)
Energy for lighting	461.1930	3.0700	1415.8626 (268)
Energy saving/generation technologies			
PV Unit	-1927.6103	3.0700	-5917.7636 (269)
Primary energy kWh/year			1312.3553 (272)
Primary energy kWh/m2/year			12.2193 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	110 - PRJ012620		Issued on Date	18/08/2022	
Assessment Reference	110 S	Prop Type Ref	Gardenia		
Property	Plot 110				
SAP Rating	85 B	DER	16.28	TER	17.03
Environmental	86 B	% DER<TER	4.41		
CO₂ Emissions (t/year)	1.46	DFEE	44.83	TFEE	51.32
General Requirements Compliance	Pass	% DFEE<TFEE	12.66		
Assessor Details	Mr. Michael Jukes, Michael Jukes, Tel: 02033971373, michael@briaryenergy.co.uk			Assessor ID	T850-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.03	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.28	kgCO ₂ /m ²	Pass
	-0.75 (-4.4%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.32	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.83	kWh/m ² /yr	
	-6.5 (-12.7%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.25 (max. 0.30)	0.25 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.37 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.01 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal LOGIC COMBI ESP1 30 Combi boiler Efficiency: 89.6% SEDBUK2009 Minimum: 88.0%	Pass
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Secondary heating system	None	
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5 Cylinder insulation

Hot water storage	No cylinder	
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6 Controls

Space heating controls	Programmer, room thermostat and TRVs	Pass
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Hot water controls	No cylinder	
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Boiler interlock	Yes	Pass
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7 Low energy lights

Percentage of fixed lights with low-energy fittings	100	%	
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Minimum	75	%	Pass
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8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)	Slight	Pass
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Based on:

Overshading	Average
Windows facing North	7.65 m ² , No overhang
Windows facing East	0.66 m ² , No overhang
Windows facing South	5.45 m ² , No overhang
Air change rate	4.55 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	W/m ² K	
Filled Cavity with Edge Sealing	0.00	W/m ² 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 ² K
Roof U-value	0.10	W/m ² K