

PREDICTED ENERGY ASSESSMENT

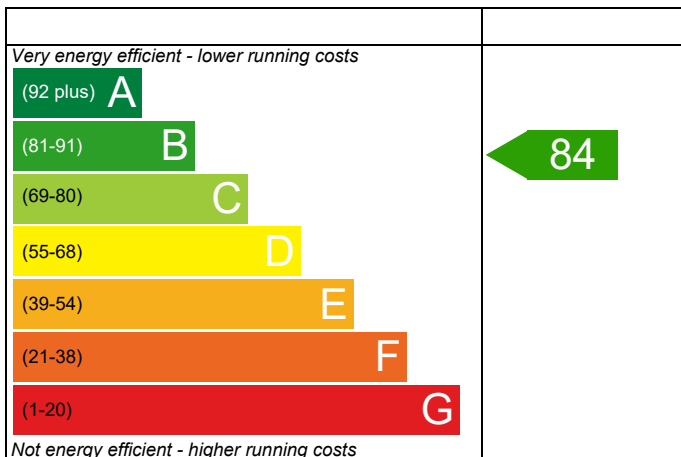
Southbourne,
PO10

Dwelling type: House, End-Terrace
 Date of assessment: 19/09/2023
 Produced by: Gary Nicholls
 Total floor area: 93.02 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.

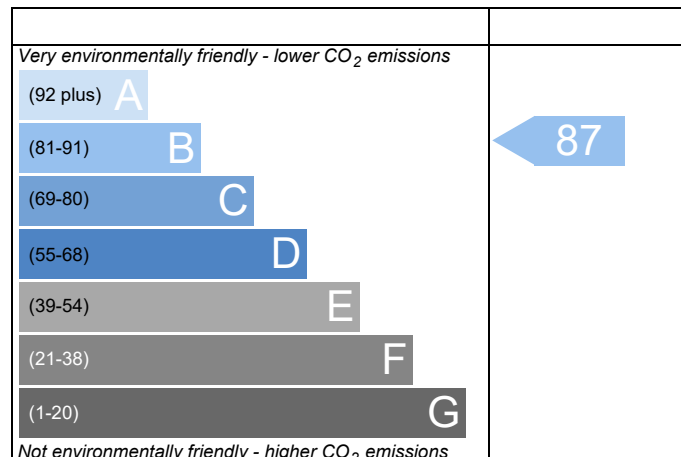
Energy Efficiency Rating



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.

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	020 - PRJ012848	Issued on Date	19/09/2023
Assessment Reference	020	Prop Type Ref	LS0011 SAS RE ET 4.4
Property	Southbourne, PO10		

SAP Rating	84 B	DER	16.42	TER	17.75
Environmental	87 B	% DER<TER	7.47		
CO ₂ Emissions (t/year)	1.23	DFEE	41.08	TTEE	49.91
General Requirements Compliance	Pass	% DFEE<TTEE	17.70		

Assessor Details	Mr. Michael Juckes, Michael Juckes, Tel: 02033971373, michael@briaryenergy.co.uk	Assessor ID	W947-0001
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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	46.5100 (1b)	x 2.3300 (2b)	= 108.3683 (1b) - (3b)
First floor	46.5100 (1c)	x 2.5300 (2c)	= 117.6703 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	93.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 226.0386 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					30.0000 / (5) = 0.1327 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.3832 (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) =	0.3545 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.6000	4.2000	4.1000	4.0000	4.2000	3.7000	3.9000	3.7000	3.7000	4.0000	3.9000	4.1000 (22)
Wind factor	1.1500	1.0500	1.0250	1.0000	1.0500	0.9250	0.9750	0.9250	0.9250	1.0000	0.9750	1.0250 (22a)
Adj infiltr rate	0.4077	0.3722	0.3633	0.3545	0.3722	0.3279	0.3456	0.3279	0.3279	0.3545	0.3456	0.3633 (22b)
Effective ac	0.5831	0.5693	0.5660	0.5628	0.5693	0.5538	0.5597	0.5538	0.5538	0.5628	0.5597	0.5660 (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
Solid Door			4.0600	1.2000	4.8720		(26)
Windows (Uw = 1.30)			7.9100	1.2357	9.7747		(27)
Flr - Ground			46.5100	0.1600	7.4416	75.6000	3516.1560 (28a)
Brick	62.9420	9.7250	53.2170	0.2400	12.7721	38.9500	2072.8022 (29a)
Render	31.3530	2.2440	29.1090	0.2300	6.6951	38.9500	1133.7956 (29a)
Rf - Ins Joist	46.5070		46.5070	0.1100	5.1158	5.6000	260.4392 (30)
Total net area of external elements Aum(A, m ²)			187.3130				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	46.6712		(33)
Party Wall			42.0580	0.0000	0.0000	39.3700	1655.8235 (32)
Stud			53.6190			7.4000	396.7802 (32c)
Stud			107.9433			7.4000	798.7807 (32c)
Block			19.7989			54.0300	1069.7352 (32c)
Internal Floor			46.5070			7.4000	344.1518 (32d)
Internal Ceiling			46.5070			7.4000	344.1518 (32e)
Heat capacity Cm = Sum(A x k)						(28)... (30) + (32) + (32a)... (32e) =	11592.6161 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							124.6250 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6743 (36)

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF HEAT DEMAND 09 Jan 2014

Total fabric heat loss												(33) + (36) =	51.3455 (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	43.4943	42.4632	42.2201	41.9829	42.4632	41.3062	41.7515	41.3062	41.3062	41.9829	41.7515	42.2201	(38)
Average = Sum(39)m / 12 =	94.8398	93.8088	93.5657	93.3284	93.8088	92.6518	93.0970	92.6518	92.6518	93.3284	93.0970	93.5657	(39)
													93.3662 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0196	1.0085	1.0059	1.0033	1.0085	0.9960	1.0008	0.9960	0.9960	1.0033	1.0008	1.0059	(40)
Days in month													1.0037 (40)
	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6648 (42)	
Average daily hot water use (litres/day)												97.4900 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	107.2390	103.3394	99.4398	95.5402	91.6406	87.7410	87.7410	91.6406	95.5402	99.4398	103.3394	107.2390	(44)
Energy content (annual)	159.0323	139.0907	143.5291	125.1322	120.0673	103.6090	96.0089	110.1716	111.4874	129.9279	141.8264	154.0143	(45)
Distribution loss (46)m = 0.15 x (45)m	23.8548	20.8636	21.5294	18.7698	18.0101	15.5413	14.4013	16.5257	16.7231	19.4892	21.2740	23.1021	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Combi loss	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	14.6940	13.2584	14.6451	14.1170	14.5470	14.0310	14.4696	14.5198	14.0778	14.6045	14.1838	14.6790	(61)
Solar input	173.7263	152.3490	158.1742	139.2491	134.6143	117.6400	110.4786	124.6914	125.5653	144.5324	156.0102	168.6933	(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)
								Solar input (sum of months) = Sum(63)m =					0.0000 (63)
Total per year (kWh/year) = Sum(64)m =	173.7263	152.3490	158.1742	139.2491	134.6143	117.6400	110.4786	124.6914	125.5653	144.5324	156.0102	168.6933	(64)
RHI water heating demand												1705.7242 (64)	
Heat gains from water heating, kWh/month												1706 (64)	
	56.5518	49.5622	51.3847	45.1357	43.5591	37.9577	35.5404	40.2620	40.5890	46.8521	50.7032	54.8795	(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	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	64.6717	57.4409	46.7141	35.3655	26.4362	22.3185	24.1159	31.3468	42.0736	53.4221	62.3515	66.4692	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	364.9632	368.7504	359.2068	338.8897	313.2430	289.1387	273.0356	269.2484	278.7920	299.1091	324.7558	348.8601	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	(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)	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	(71)
Water heating gains (Table 5)	76.0104	73.7533	69.0655	62.6885	58.5472	52.7191	47.7693	54.1156	56.3737	62.9733	70.4212	73.7628	(72)
Total internal gains	615.5961	609.8953	584.9371	546.8944	508.1771	474.1270	454.8716	464.6616	487.1900	525.4553	567.4792	599.0427	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m ²	Table 6a	Specific data	Specific data	factor	W						
		W/m ²	or Table 6b	or Table 6c	Table 6d							
East	3.8640	27.3735	0.7600	0.7200	0.7700	40.1094 (76)						
West	4.0460	27.3735	0.7600	0.7200	0.7700	41.9986 (80)						
Solar gains	82.1080	131.8395	215.6972	320.2572	377.3807	412.6501	392.9607	339.2982	266.3446	166.7307	98.1327	65.5056 (83)
Total gains	697.7041	741.7348	800.6343	867.1517	885.5578	886.7771	847.8323	803.9597	753.5345	692.1859	665.6119	664.5484 (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	
util living area	0.9534	0.9414	0.9067	0.8305	0.6999	0.5080	0.3542	0.3602	0.6186	0.8355	0.9272	0.9571	(86)
MIT	19.5654	19.7121	20.0441	20.4473	20.7716	20.9450	20.9879	20.9878	20.8913	20.5421	20.0263	19.5760 (87)	
Th 2	20.0671	20.0763	20.0784	20.0806	20.0763	20.0866	20.0826	20.0866	20.0866	20.0806	20.0826	20.0784 (88)	
util rest of house													

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF HEAT DEMAND 09 Jan 2014

	0.9456	0.9317	0.8908	0.8012	0.6471	0.4301	0.2593	0.2612	0.5421	0.7992	0.9130	0.9497 (89)
MIT 2	18.7771	18.9273	19.2511	19.6336	19.9176	20.0590	20.0792	20.0833	20.0252	19.7289	19.2419	18.7967 (90)
Living area fraction									fLA = Living area / (4) =			0.1971 (91)
MIT	18.9324	19.0819	19.4074	19.7940	20.0859	20.2336	20.2583	20.2616	20.1959	19.8891	19.3965	18.9502 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.7824	18.9319	19.2574	19.6440	19.9359	20.0836	20.1083	20.1116	20.0459	19.7391	19.2465	18.8002 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9319	0.9168	0.8739	0.7854	0.6383	0.4298	0.2620	0.2640	0.5384	0.7835	0.8969	0.9367 (94)
Useful gains	650.2169	680.0536	699.6750	681.0270	565.2434	381.1593	222.1668	212.2122	405.7180	542.3351	597.0154	622.5005 (95)
Ext temp.	5.3000	5.7000	7.4000	9.9000	13.0000	15.8000	17.7000	17.8000	15.3000	12.0000	8.4000	5.5000 (96)
Heat loss rate W												
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	467.5705	377.1385	304.8664	164.4204	63.5394	0.0000	0.0000	0.0000	0.0000	133.8780	297.1880	462.7262 (98)
Space heating												2271.3273 (98)
RHI space heating demand												2271 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	46.5100 (1b)	2.3300 (2b)	108.3683 (1b) - (3b)
First floor	46.5100 (1c)	2.5300 (2c)	117.6703 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.0200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 226.0386 (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) =	0.1327 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.3832 (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) =		0.3545 (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	0.4520	0.4431	0.4342	0.3899	0.3811	0.3368	0.3368	0.3279	0.3545	0.3811	0.3988	0.4165 (22b)
Effective ac	0.6021	0.5982	0.5943	0.5760	0.5726	0.5567	0.5567	0.5538	0.5628	0.5726	0.5795	0.5867 (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
Solid Door			4.0600	1.2000	4.8720		(26)
Windows (Uw = 1.30)			7.9100	1.2357	9.7747		(27)
Flr - Ground			46.5100	0.1600	7.4416	75.6000	3516.1560 (28a)
Brick	62.9420	9.7250	53.2170	0.2400	12.7721	38.9500	2072.8022 (29a)
Render	31.3530	2.2440	29.1090	0.2300	6.6951	38.9500	1133.7956 (29a)
Rf - Ins Joist	46.5070		46.5070	0.1100	5.1158	5.6000	260.4392 (30)
Total net area of external elements Aum(A, m ²)			187.3130				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	46.6712		(33)
Party Wall			42.0580	0.0000	0.0000	39.3700	1655.8235 (32)
Stud			53.6190			7.4000	396.7802 (32c)
Stud			107.9433			7.4000	798.7807 (32c)
Block			19.7989			54.0300	1069.7352 (32c)
Internal Floor			46.5070			7.4000	344.1518 (32d)
Internal Ceiling			46.5070			7.4000	344.1518 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11592.6161 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							124.6250 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6743 (36)
Total fabric heat loss						(33) + (36) =	51.3455 (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	44.9148	44.6190	44.3290	42.9670	42.7122	41.5259	41.5259	41.3062	41.9829	42.7122	43.2277	43.7667 (38)
Heat transfer coeff	96.2604	95.9646	95.6746	94.3126	94.0577	92.8715	92.8715	92.6518	93.3284	94.0577	94.5733	95.1122 (39)
Average = Sum(39)m / 12 =												94.3114 (39)
HLP	1.0348	1.0317	1.0285	1.0139	1.0112	0.9984	0.9984	0.9960	1.0033	1.0112	1.0167	1.0225 (40)
HLP (average)												1.0139 (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												2.6648 (42)
Average daily hot water use (litres/day)												97.4900 (43)
Daily hot water use	107.2390	103.3394	99.4398	95.5402	91.6406	87.7410	87.7410	91.6406	95.5402	99.4398	103.3394	107.2390 (44)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Energy conte	159.0323	139.0907	143.5291	125.1322	120.0673	103.6090	96.0089	110.1716	111.4874	129.9279	141.8264	154.0143 (45)
Energy content (annual)	Total = Sum(45)m = 1533.8973 (45)											
Distribution loss (46)m = 0.15 x (45)m	23.8548	20.8636	21.5294	18.7698	18.0101	15.5413	14.4013	16.5257	16.7231	19.4892	21.2740	23.1021 (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	14.6940	13.2584	14.6451	14.1170	14.5470	14.0310	14.4696	14.5198	14.0778	14.6045	14.1838	14.6790 (61)
Total heat required for water heating calculated for each month	173.7263	152.3490	158.1742	139.2491	134.6143	117.6400	110.4786	124.6914	125.5653	144.5324	156.0102	168.6933 (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	173.7263	152.3490	158.1742	139.2491	134.6143	117.6400	110.4786	124.6914	125.5653	144.5324	156.0102	168.6933 (64)
Heat gains from water heating, kWh/month	56.5518	49.5622	51.3847	45.1357	43.5591	37.9577	35.5404	40.2620	40.5890	46.8521	50.7032	54.8795 (65)
Solar input (sum of months) = Sum(63)m =											0.0000 (63)	
Total per year (kWh/year) = Sum(64)m =											1705.7242 (64)	

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	64.6717	57.4409	46.7141	35.3655	26.4362	22.3185	24.1159	31.3468	42.0736	53.4221	62.3515	66.4692 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	364.9632	368.7504	359.2068	338.8897	313.2430	289.1387	273.0356	269.2484	278.7920	299.1091	324.7558	348.8601 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539 (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)	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937 (71)
Water heating gains (Table 5)	76.0104	73.7533	69.0655	62.6885	58.5472	52.7191	47.7693	54.1156	56.3737	62.9733	70.4212	73.7628 (72)
Total internal gains	615.5961	609.8953	584.9371	546.8944	508.1771	474.1270	454.8716	464.6616	487.1900	525.4553	567.4792	599.0427 (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						
East	3.8640	19.6403	0.7600	0.7200	0.7700	28.7782 (76)						
West	4.0460	19.6403	0.7600	0.7200	0.7700	30.1337 (80)						
Solar gains	58.9119	115.2442	189.7908	276.7985	339.2270	347.2592	330.6049	283.9847	220.7345	136.7470	73.4562	48.4463 (83)
Total gains	674.5080	725.1395	774.7278	823.6930	847.4041	821.3862	785.4765	748.6463	707.9245	662.2022	640.9354	647.4890 (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	33.4527	33.5558	33.6575	34.1436	34.2361	34.6734	34.6734	34.7556	34.5037	34.2361	34.0495	33.8565
alpha	3.2302	3.2371	3.2438	3.2762	3.2824	3.3116	3.3116	3.3170	3.3002	3.2824	3.2700	3.2571
util living area	0.9640	0.9522	0.9271	0.8729	0.7785	0.6325	0.4897	0.5278	0.7299	0.8894	0.9487	0.9679 (86)
MIT	19.3409	19.5175	19.8383	20.2634	20.6246	20.8688	20.9580	20.9455	20.7773	20.3204	19.7686	19.3104 (87)
Th 2	20.0544	20.0570	20.0596	20.0718	20.0740	20.0847	20.0847	20.0866	20.0806	20.0740	20.0694	20.0646 (88)
util rest of house	0.9581	0.9444	0.9148	0.8504	0.7377	0.5647	0.3999	0.4372	0.6695	0.8653	0.9390	0.9627 (89)
MIT 2	18.5461	18.7217	19.0375	19.4556	19.7903	20.0048	20.0666	20.0617	19.9332	19.5186	18.9806	18.5239 (90)
Living area fraction	18.7028	18.8786	19.1953	19.6148	19.9547	20.1750	20.2422	20.2358	20.0996	19.6766	19.1359	0.1971 (91)
Temperature adjustment	18.5528	18.7286	19.0453	19.4648	19.8047	20.0250	20.0922	20.0858	19.9496	19.5266	18.9859	-0.1500 (92)
adjusted MIT	18.5528	18.7286	19.0453	19.4648	19.8047	20.0250	20.0922	20.0858	19.9496	19.5266	18.9859	18.5289 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9460	0.9305	0.8985	0.8332	0.7244	0.5599	0.3997	0.4372	0.6599	0.8481	0.9247	0.9515 (94)
Ext temp.	638.0991	674.7469	696.0738	686.2831	613.8853	459.8847	313.9235	327.2739	467.1734	561.6046	592.6711	616.0673 (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	1371.9755	1327.0515	1200.2680	996.3951	762.3116	503.8319	324.3288	341.4984	545.9295	839.6179	1124.0846	1362.8518 (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 per m2	546.0040	438.3487	375.1205	223.2806	110.4292	0.0000	0.0000	0.0000	0.0000	206.8419	382.6177	555.6077 (98)
											2838.2503 (98)	
											(98) / (4) = 30.5123 (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													3136.1882 (211)
Space heating requirement	546.0040	438.3487	375.1205	223.2806	110.4292	0.0000	0.0000	0.0000	0.0000	206.8419	382.6177	555.6077	(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)	603.3194	484.3632	414.4978	246.7189	122.0212	0.0000	0.0000	0.0000	0.0000	228.5546	422.7820	613.9312	(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	173.7263	152.3490	158.1742	139.2491	134.6143	117.6400	110.4786	124.6914	125.5653	144.5324	156.0102	168.6933	(64)
Efficiency of water heater (217)m	89.7063	89.6524	89.5267	89.2435	88.7136	87.3000	87.3000	87.3000	87.3000	89.1557	89.5493	89.7339	(217)
Fuel for water heating, kWh/month	193.6612	169.9330	176.6783	156.0328	151.7403	134.7537	126.5505	142.8310	143.8320	162.1122	174.2172	187.9928	(219)
Water heating fuel used													1920.3349 (219)
Annual totals kWh/year													
Space heating fuel - main system													3136.1882 (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)													456.8492 (232)
Total delivered energy for all uses													5588.3723 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3136.1882	3.4800	109.1394 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1920.3349	3.4800	66.8277 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	456.8492	13.1900	60.2584 (250)
Additional standing charges			120.0000 (251)
Total energy cost			366.1179 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.1141 (257)
SAP value		84.4582
SAP rating (Section 12)		84 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3136.1882	0.2160	677.4167 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1920.3349	0.2160	414.7923 (264)
Space and water heating			1092.2090 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	456.8492	0.5190	237.1047 (268)
Total kg/year			1368.2387 (272)
CO2 emissions per m2			14.7100 (273)
EI value			86.7161
EI rating			87 (274)
EI band			B

Calculation of stars for heating and DHW

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9050 = 3.845$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9050 = 0.2387$, stars = 4
Water heating energy efficiency	$3.48 / 0.8871 = 3.923$, stars = 4
Water heating environmental impact	$0.216 / 0.8871 = 0.2435$, 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	46.5100 (1b)	x 2.3300 (2b)	= 108.3683 (1b) - (3b)
First floor	46.5100 (1c)	x 2.5300 (2c)	= 117.6703 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.0200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 226.0386 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1327 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.3832 (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) = 0.3545 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.6000	4.2000	4.1000	4.0000	4.2000	3.7000	3.9000	3.7000	3.7000	4.0000	3.9000	4.1000 (22)
Wind factor	1.1500	1.0500	1.0250	1.0000	1.0500	0.9250	0.9750	0.9250	0.9250	1.0000	0.9750	1.0250 (22a)
Adj infilt rate	0.4077	0.3722	0.3633	0.3545	0.3722	0.3279	0.3456	0.3279	0.3279	0.3545	0.3456	0.3633 (22b)
Effective ac	0.5831	0.5693	0.5660	0.5628	0.5693	0.5538	0.5597	0.5538	0.5538	0.5628	0.5597	0.5660 (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
Solid Door			4.0600	1.2000	4.8720		(26)
Windows (Uw = 1.30)			7.9100	1.2357	9.7747		(27)
Flr - Ground			46.5100	0.1600	7.4416	75.6000	3516.1560 (28a)
Brick	62.9420	9.7250	53.2170	0.2400	12.7721	38.9500	2072.8022 (29a)
Render	31.3530	2.2440	29.1090	0.2300	6.6951	38.9500	1133.7956 (29a)
Rf - Ins Joist	46.5070		46.5070	0.1100	5.1158	5.6000	260.4392 (30)
Total net area of external elements Aum(A, m2)			187.3130				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 46.6712		(33)
Party Wall			42.0580	0.0000	0.0000	39.3700	1655.8235 (32)
Stud			53.6190			7.4000	396.7802 (32c)
Stud			107.9433			7.4000	798.7807 (32c)
Block			19.7989			54.0300	1069.7352 (32c)
Internal Floor			46.5070			7.4000	344.1518 (32d)
Internal Ceiling			46.5070			7.4000	344.1518 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11592.6161 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							124.6250 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6743 (36)
Total fabric heat loss						(33) + (36) =	51.3455 (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	43.4943	42.4632	42.2201	41.9829	42.4632	41.3062	41.7515	41.3062	41.3062	41.9829	41.7515	42.2201 (38)
Heat transfer coeff	94.8398	93.8088	93.5657	93.3284	93.8088	92.6518	93.0970	92.6518	92.6518	93.3284	93.0970	93.5657 (39)
Average = Sum(39)m / 12 =												93.3662 (39)
HLP	1.0196	1.0085	1.0059	1.0033	1.0085	0.9960	1.0008	0.9960	0.9960	1.0033	1.0008	1.0059 (40)
HLP (average)												1.0037 (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												2.6648 (42)
Average daily hot water use (litres/day)												97.4900 (43)
Daily hot water use	107.2390	103.3394	99.4398	95.5402	91.6406	87.7410	87.7410	91.6406	95.5402	99.4398	103.3394	107.2390 (44)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

Energy conte	159.0323	139.0907	143.5291	125.1322	120.0673	103.6090	96.0089	110.1716	111.4874	129.9279	141.8264	154.0143 (45)	
Energy content (annual)												Total = Sum(45)m =	1533.8973 (45)
Distribution loss (46)m = 0.15 x (45)m	23.8548	20.8636	21.5294	18.7698	18.0101	15.5413	14.4013	16.5257	16.7231	19.4892	21.2740	23.1021 (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	14.6940	13.2584	14.6451	14.1170	14.5470	14.0310	14.4696	14.5198	14.0778	14.6045	14.1838	14.6790 (61)	
Total heat required for water heating calculated for each month	173.7263	152.3490	158.1742	139.2491	134.6143	117.6400	110.4786	124.6914	125.5653	144.5324	156.0102	168.6933 (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	173.7263	152.3490	158.1742	139.2491	134.6143	117.6400	110.4786	124.6914	125.5653	144.5324	156.0102	168.6933 (64)	
Heat gains from water heating, kWh/month	56.5518	49.5622	51.3847	45.1357	43.5591	37.9577	35.5404	40.2620	40.5890	46.8521	50.7032	54.8795 (65)	
											Solar input (sum of months) = Sum(63)m =	0.0000 (63)	
											Total per year (kWh/year) = Sum(64)m =	1705.7242 (64)	

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	64.6717	57.4409	46.7141	35.3655	26.4362	22.3185	24.1159	31.3468	42.0736	53.4221	62.3515	66.4692 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	364.9632	368.7504	359.2068	338.8897	313.2430	289.1387	273.0356	269.2484	278.7920	299.1091	324.7558	348.8601 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539 (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)	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937 (71)
Water heating gains (Table 5)	76.0104	73.7533	69.0655	62.6885	58.5472	52.7191	47.7693	54.1156	56.3737	62.9733	70.4212	73.7628 (72)
Total internal gains	615.5961	609.8953	584.9371	546.8944	508.1771	474.1270	454.8716	464.6616	487.1900	525.4553	567.4792	599.0427 (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						
East	3.8640	27.3735	0.7600	0.7200	0.7700	40.1094 (76)						
West	4.0460	27.3735	0.7600	0.7200	0.7700	41.9986 (80)						
Solar gains	82.1080	131.8395	215.6972	320.2572	377.3807	412.6501	392.9607	339.2982	266.3446	166.7307	98.1327	65.5056 (83)
Total gains	697.7041	741.7348	800.6343	867.1517	885.5578	886.7771	847.8323	803.9597	753.5345	692.1859	665.6119	664.5484 (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	33.9538	34.3270	34.4162	34.5037	34.3270	34.7556	34.5894	34.7556	34.7556	34.5037	34.5894	34.4162
alpha	3.2636	3.2885	3.2944	3.3002	3.2885	3.3170	3.3060	3.3170	3.3170	3.3002	3.3060	3.2944
util living area	0.9534	0.9414	0.9067	0.8305	0.6999	0.5080	0.3542	0.3602	0.6186	0.8355	0.9272	0.9571 (86)
MIT	19.5654	19.7121	20.0441	20.4473	20.7716	20.9450	20.9879	20.9878	20.8913	20.5421	20.0263	19.5760 (87)
Th 2	20.0671	20.0763	20.0784	20.0806	20.0763	20.0866	20.0826	20.0866	20.0866	20.0806	20.0826	20.0784 (88)
util rest of house	0.9456	0.9317	0.8908	0.8012	0.6471	0.4301	0.2593	0.2612	0.5421	0.7992	0.9130	0.9497 (89)
MIT 2	18.7771	18.9273	19.2511	19.6336	19.9176	20.0590	20.0792	20.0833	20.0252	19.7289	19.2419	18.7967 (90)
Living area fraction	18.9324	19.0819	19.4074	19.7940	20.0859	20.2336	20.2583	20.2616	20.1959	19.8891	19.3965	18.9502 (92)
Temperature adjustment	18.7824	18.9319	19.2574	19.6440	19.9359	20.0836	20.1083	20.1116	20.0459	19.7391	19.2465	-0.1500
adjusted MIT	18.7824	18.9319	19.2574	19.6440	19.9359	20.0836	20.1083	20.1116	20.0459	19.7391	19.2465	18.8002 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	650.2169	680.0536	699.6750	681.0270	565.2434	381.1593	222.1668	212.2122	405.7180	542.3351	597.0154	622.5005 (95)	
Ext temp.	5.3000	5.7000	7.4000	9.9000	13.0000	15.8000	17.7000	17.8000	15.3000	12.0000	8.4000	5.5000 (96)	
Heat loss rate W	1278.6719	1241.2716	1109.4416	909.3886	650.6458	396.8814	224.2035	214.1716	439.7169	722.2786	1009.7766	1244.4443 (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	467.5705	377.1385	304.8664	164.4204	63.5394	0.0000	0.0000	0.0000	0.0000	133.8780	297.1880	462.7262 (98)	
Space heating												2271.3273 (98)	
Space heating per m ²												(98) / (4) =	24.4176 (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													2509.7539 (211)
Space heating requirement	467.5705	377.1385	304.8664	164.4204	63.5394	0.0000	0.0000	0.0000	0.0000	133.8780	297.1880	462.7262	(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)	516.6525	416.7276	336.8689	181.6800	70.2092	0.0000	0.0000	0.0000	0.0000	147.9314	328.3846	511.2997	(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	173.7263	152.3490	158.1742	139.2491	134.6143	117.6400	110.4786	124.6914	125.5653	144.5324	156.0102	168.6933	(64)
Efficiency of water heater (217)m	89.6102	89.5555	89.3808	89.0040	88.3012	87.3000	87.3000	87.3000	87.3000	88.8100	89.3723	89.6223	(217)
Fuel for water heating, kWh/month	193.8690	170.1169	176.9666	156.4527	152.4491	134.7537	126.5505	142.8310	143.8320	162.7433	174.5622	188.2268	(219)
Water heating fuel used													1923.3537 (219)
Annual totals kWh/year													
Space heating fuel - main system													2509.7539 (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)													456.8492 (232)
Total delivered energy for all uses													4964.9568 (238)

10a. Fuel costs - using BEDF prices (526)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2509.7539	10.2300	256.7478 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1923.3537	10.2300	196.7591 (247)
Pumps and fans for heating	75.0000	36.7200	27.5400 (249)
Energy for lighting	456.8492	36.7200	167.7550 (250)
Additional standing charges			103.0000 (251)
Total energy cost			751.8019 (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	2509.7539	0.2160	542.1068 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1923.3537	0.2160	415.4444 (264)
Space and water heating			957.5512 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	456.8492	0.5190	237.1047 (268)
Total kg/year			1233.5810 (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	2509.7539	1.2200	3061.8998 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1923.3537	1.2200	2346.4915 (264)
Space and water heating			5408.3913 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	456.8492	3.0700	1402.5271 (268)
Primary energy kWh/year			7041.1684 (272)
Primary energy kWh/m2/year			75.6952 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 84
Current environmental impact rating: B 87

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

(For testing purposes):

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

Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 1.2	-£ 86	-194 kg (15.7%)
U Solar photovoltaic panels	+ 9.7	-£ 746	-1054 kg (101.4%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£86	2.08 kg/m ²	B 86 B 89
Solar photovoltaic panels	£746	11.33 kg/m ²	A 95 A 97
Total Savings	£832	13.42 kg/m ²	

Potential energy efficiency rating: A 95
 Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 526 TEST (30 Aug 2023)
 Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£195	£214	-£18
Mains gas	£557	£452	£104
Space heating	£387	£387	£0
Water heating	£197	£111	£86
Lighting	£168	£168	£0
Generated (PV)	-£0	-£746	£746
Total cost of fuels	£752	-£80	£832
Total cost of uses	£752	-£80	£832
Delivered energy	53 kWh/m ²	21 kWh/m ²	32 kWh/m ²
Carbon dioxide emissions	1.2 tonnes	0.0 tonnes	1.2 tonnes
CO2 emissions per m ²	13 kg/m ²	0 kg/m ²	13 kg/m ²
Primary energy	76 kWh/m ²	-3 kWh/m ²	79 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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	46.5100 (1b)	x 2.3300 (2b)	= 108.3683 (1b) - (3b)
First floor	46.5100 (1c)	x 2.5300 (2c)	= 117.6703 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.0200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 226.0386 (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) =	0.1327 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.3832 (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) =		0.3545 (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	0.4520	0.4431	0.4342	0.3899	0.3811	0.3368	0.3368	0.3279	0.3545	0.3811	0.3988	0.4165 (22b)
	0.6021	0.5982	0.5943	0.5760	0.5726	0.5567	0.5567	0.5538	0.5628	0.5726	0.5795	0.5867 (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
Solid Door			4.0600	1.2000	4.8720		(26)
Windows (Uw = 1.30)			7.9100	1.2357	9.7747		(27)
Flr - Ground			46.5100	0.1600	7.4416	75.6000	3516.1560 (28a)
Brick	62.9420	9.7250	53.2170	0.2400	12.7721	38.9500	2072.8022 (29a)
Render	31.3530	2.2440	29.1090	0.2300	6.6951	38.9500	1133.7956 (29a)
Rf - Ins Joist	46.5070		46.5070	0.1100	5.1158	5.6000	260.4392 (30)
Total net area of external elements Aum(A, m ²)			187.3130				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	46.6712		(33)
Party Wall			42.0580	0.0000	0.0000	39.3700	1655.8235 (32)
Stud			53.6190			7.4000	396.7802 (32c)
Stud			107.9433			7.4000	798.7807 (32c)
Block			19.7989			54.0300	1069.7352 (32c)
Internal Floor			46.5070			7.4000	344.1518 (32d)
Internal Ceiling			46.5070			7.4000	344.1518 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11592.6161 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							124.6250 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6743 (36)
Total fabric heat loss						(33) + (36) =	51.3455 (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	44.9148	44.6190	44.3290	42.9670	42.7122	41.5259	41.5259	41.3062	41.9829	42.7122	43.2277	43.7667 (38)
Heat transfer coeff	96.2604	95.9646	95.6746	94.3126	94.0577	92.8715	92.8715	92.6518	93.3284	94.0577	94.5733	95.1122 (39)
Average = Sum(39)m / 12 =												94.3114 (39)
HLP	1.0348	1.0317	1.0285	1.0139	1.0112	0.9984	0.9984	0.9960	1.0033	1.0112	1.0167	1.0225 (40)
HLP (average)												1.0139 (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												2.6648 (42)
Average daily hot water use (litres/day)												97.4900 (43)
Daily hot water use	107.2390	103.3394	99.4398	95.5402	91.6406	87.7410	87.7410	91.6406	95.5402	99.4398	103.3394	107.2390 (44)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

Energy content (annual)	159.0323	139.0907	143.5291	125.1322	120.0673	103.6090	96.0089	110.1716	111.4874	129.9279	141.8264	154.0143 (45)
Distribution loss (46)m = 0.15 x (45)m												1533.8973 (45)
Water storage loss:												
Total storage loss	23.8548	20.8636	21.5294	18.7698	18.0101	15.5413	14.4013	16.5257	16.7231	19.4892	21.2740	23.1021 (46)
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 (56)
Combi loss	14.6940	13.2584	14.6451	14.1170	14.5470	14.0310	14.4696	14.5198	14.0778	14.6045	14.1838	14.6790 (61)
Total heat required for water heating calculated for each month	173.7263	152.3490	158.1742	139.2491	134.6143	117.6400	110.4786	124.6914	125.5653	144.5324	156.0102	168.6933 (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												1.1823 (H8)
Utilisation factor												0.5708 (H9)
Collector performance factor												0.8793 (H10)
Dedicated solar storage volume												75.0000 (H11)
Effective solar volume												75.0000 (H13)
Daily hot water demand												97.4900 (H14)
Volume ratio Veff/V												0.7693 (H15)
Solar storage volume factor												0.9475 (H16)
Solar input												-862.4655 (H17)
Solar input	-25.0098	-41.7341	-71.0780	-95.2585	-117.6839	-115.7020	-114.1730	-99.7535	-78.1270	-53.3515	-29.6652	-20.9289 (63)
Solar input (sum of months) = Sum(63)m =												-862.4655 (63)
Output from w/h	148.7166	110.6149	87.0962	43.9906	16.9304	1.9380	0.0000	24.9379	47.4383	91.1808	126.3450	147.7644 (64)
Total per year (kWh/year) = Sum(64)m =												846.9531 (64)
Heat gains from water heating, kWh/month	56.5518	49.5622	51.3847	45.1357	43.5591	37.9577	35.5404	40.2620	40.5890	46.8521	50.7032	54.8795 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	64.6717	57.4409	46.7141	35.3655	26.4362	22.3185	24.1159	31.3468	42.0736	53.4221	62.3515	66.4692 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	364.9632	368.7504	359.2068	338.8897	313.2430	289.1387	273.0356	269.2484	278.7920	299.1091	324.7558	348.8601 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539 (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)	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937 (71)
Water heating gains (Table 5)	76.0104	73.7533	69.0655	62.6885	58.5472	52.7191	47.7693	54.1156	56.3737	62.9733	70.4212	73.7628 (72)
Total internal gains	615.5961	609.8953	584.9371	546.8944	508.1771	474.1270	454.8716	464.6616	487.1900	525.4553	567.4792	599.0427 (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	
East			3.8640	19.6403	0.7600	0.7200	0.7700	28.7782 (76)
West			4.0460	19.6403	0.7600	0.7200	0.7700	30.1337 (80)
Solar gains	58.9119	115.2442	189.7908	276.7985	339.2270	347.2592	330.6049	283.9847
Total gains	674.5080	725.1395	774.7278	823.6930	847.4041	821.3862	785.4765	748.6463

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)												
tau	33.4527	33.5558	33.6575	34.1436	34.2361	34.6734	34.6734	34.7556	34.5037	34.2361	34.0495	33.8565
alpha	3.2302	3.2371	3.2438	3.2762	3.2824	3.3116	3.3116	3.3170	3.3002	3.2824	3.2700	3.2571
util living area	0.9640	0.9522	0.9271	0.8729	0.7785	0.6325	0.4897	0.5278	0.7299	0.8894	0.9487	0.9679 (86)
MIT	19.3409	19.5175	19.8383	20.2634	20.6246	20.8688	20.9580	20.9455	20.7773	20.3204	19.7686	19.3104 (87)
Th 2	20.0544	20.0570	20.0596	20.0718	20.0740	20.0847	20.0847	20.0866	20.0806	20.0740	20.0694	20.0646 (88)
util rest of house	0.9581	0.9444	0.9148	0.8504	0.7377	0.5647	0.3989	0.4372	0.6695	0.8653	0.9390	0.9627 (89)
MIT 2	18.5461	18.7217	19.0375	19.4556	19.7903	20.0048	20.0666	20.0617	19.9332	19.5186	18.9806	18.5239 (90)
Living area fraction												0.1971 (91)
MIT	18.7028	18.8786	19.1953	19.6148	19.9547	20.1750	20.2422	20.2358	20.0996	19.6766	19.1359	18.6789 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.5528	18.7286	19.0453	19.4648	19.8047	20.0250	20.0922	20.0858	19.9496	19.5266	18.9859	18.5289 (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	0.9460	0.9305	0.8985	0.8332	0.7244	0.5599	0.3997	0.4372	0.6599	0.8481	0.9247	0.9515	(94)
Useful gains	638.0991	674.7469	696.0738	686.2831	613.8853	459.8847	313.9235	327.2739	467.1734	561.6046	592.6711	616.0673	(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	1371.9755	1327.0515	1200.2680	996.3951	762.3116	503.8319	324.3288	341.4984	545.9295	839.6179	1124.0846	1362.8518	(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	546.0040	438.3487	375.1205	223.2806	110.4292	0.0000	0.0000	0.0000	0.0000	206.8419	382.6177	555.6077	(98)
Space heating													2838.2503 (98)
Space heating per m2													(98) / (4) = 30.5123 (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													3136.1882 (211)
Space heating requirement	546.0040	438.3487	375.1205	223.2806	110.4292	0.0000	0.0000	0.0000	0.0000	206.8419	382.6177	555.6077	(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)	603.3194	484.3632	414.4978	246.7189	122.0212	0.0000	0.0000	0.0000	0.0000	228.5546	422.7820	613.9312	(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	148.7166	110.6149	87.0962	43.9906	16.9304	1.9380	0.0000	24.9379	47.4383	91.1808	126.3450	147.7644	(64)
Efficiency of water heater (217)m	89.7954	89.8365	89.8792	89.9573	90.0612	87.3000	87.3000	87.3000	87.3000	89.4963	89.6839	89.8084	(216)
Fuel for water heating, kWh/month	165.6171	123.1292	96.9036	48.9017	18.7988	2.2199	0.0000	28.5658	54.3394	101.8822	140.8781	164.5328	(219)
Water heating fuel used													945.7686 (219)
Annual totals kWh/year													
Space heating fuel - main system													3136.1882 (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)													456.8492 (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													2936.5667 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3136.1882	3.4800	109.1394	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	945.7686	3.4800	32.9127	(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	456.8492	13.1900	60.2584	(250)
Additional standing charges			120.0000	(251)
Energy saving/generation technologies				
PV Unit		-1727.2394	13.1900	-227.8229 (252)
Total energy cost			110.9751	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200	(256)
Energy cost factor (ECF)		0.3377	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	95.2891	
SAP rating (Section 12)		95	(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	3136.1882	0.2160	677.4167 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	945.7686	0.2160	204.2860 (264)
Space and water heating			881.7027 (265)
Pumps and fans	125.0000	0.5190	64.8750 (267)
Energy for lighting	456.8492	0.5190	237.1047 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			287.2452 (272)
CO2 emissions per m2			3.0900 (273)
EI value			97.2112
EI rating			97 (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	46.5100 (1b)	x 2.3300 (2b)	= 108.3683 (1b) - (3b)
First floor	46.5100 (1c)	x 2.5300 (2c)	= 117.6703 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.0200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 226.0386 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1327 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.3832 (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) = 0.3545 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.6000	4.2000	4.1000	4.0000	4.2000	3.7000	3.9000	3.7000	3.7000	4.0000	3.9000	4.1000 (22)
Wind factor	1.1500	1.0500	1.0250	1.0000	1.0500	0.9250	0.9750	0.9250	0.9250	1.0000	0.9750	1.0250 (22a)
Adj infilt rate	0.4077	0.3722	0.3633	0.3545	0.3722	0.3279	0.3456	0.3279	0.3279	0.3545	0.3456	0.3633 (22b)
Effective ac	0.5831	0.5693	0.5660	0.5628	0.5693	0.5538	0.5597	0.5538	0.5538	0.5628	0.5597	0.5660 (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
Solid Door			4.0600	1.2000	4.8720		(26)
Windows (Uw = 1.30)			7.9100	1.2357	9.7747		(27)
Flr - Ground			46.5100	0.1600	7.4416	75.6000	3516.1560 (28a)
Brick	62.9420	9.7250	53.2170	0.2400	12.7721	38.9500	2072.8022 (29a)
Render	31.3530	2.2440	29.1090	0.2300	6.6951	38.9500	1133.7956 (29a)
Rf - Ins Joist	46.5070		46.5070	0.1100	5.1158	5.6000	260.4392 (30)
Total net area of external elements Aum(A, m2)			187.3130				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 46.6712		(33)
Party Wall			42.0580	0.0000	0.0000	39.3700	1655.8235 (32)
Stud			53.6190			7.4000	396.7802 (32c)
Stud			107.9433			7.4000	798.7807 (32c)
Block			19.7989			54.0300	1069.7352 (32c)
Internal Floor			46.5070			7.4000	344.1518 (32d)
Internal Ceiling			46.5070			7.4000	344.1518 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11592.6161 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							124.6250 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6743 (36)
Total fabric heat loss						(33) + (36) =	51.3455 (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	43.4943	42.4632	42.2201	41.9829	42.4632	41.3062	41.7515	41.3062	41.3062	41.9829	41.7515	42.2201 (38)
Heat transfer coeff	94.8398	93.8088	93.5657	93.3284	93.8088	92.6518	93.0970	92.6518	92.6518	93.3284	93.0970	93.5657 (39)
Average = Sum(39)m / 12 =												93.3662 (39)
HLP	1.0196	1.0085	1.0059	1.0033	1.0085	0.9960	1.0008	0.9960	0.9960	1.0033	1.0008	1.0059 (40)
HLP (average)												1.0037 (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												2.6648 (42)
Average daily hot water use (litres/day)												97.4900 (43)
Daily hot water use	107.2390	103.3394	99.4398	95.5402	91.6406	87.7410	87.7410	91.6406	95.5402	99.4398	103.3394	107.2390 (44)

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)	159.0323	139.0907	143.5291	125.1322	120.0673	103.6090	96.0089	110.1716	111.4874	129.9279	141.8264	154.0143 (45)
Distribution loss (46)m = 0.15 x (45)m	23.8548	20.8636	21.5294	18.7698	18.0101	15.5413	14.4013	16.5257	16.7231	19.4892	21.2740	23.1021 (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	14.6940	13.2584	14.6451	14.1170	14.5470	14.0310	14.4696	14.5198	14.0778	14.6045	14.1838	14.6790 (61)
Total heat required for water heating calculated for each month	173.7263	152.3490	158.1742	139.2491	134.6143	117.6400	110.4786	124.6914	125.5653	144.5324	156.0102	168.6933 (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												1269.6808 (H5)
Overshading factor												0.8000 (H6)
Solar energy available												2133.0637 (H7)
Adjustment factor for showers												1.0000 (H7a)
Solar-to-load ratio												1.3906 (H8)
Utilisation factor												0.5128 (H9)
Collector performance factor												0.8793 (H10)
Dedicated solar storage volume												75.0000 (H11)
Effective solar volume												75.0000 (H13)
Daily hot water demand												97.4900 (H14)
Volume ratio Veff/V												0.7693 (H15)
Solar storage volume factor												0.9475 (H16)
Solar input												-911.3746 (H17)
Solar input	-30.6944	-42.1224	-71.5642	-98.1554	-117.0318	-123.0846	-121.4143	-106.3239	-83.6910	-57.4691	-34.9136	-24.9100 (63)
Solar input (sum of months) = Sum(63)m =												-911.3746 (63)
Output from w/h	143.0320	110.2267	86.6100	41.0937	17.5825	0.0000	0.0000	18.3675	41.8743	87.0633	121.0966	143.7833 (64)
Total per year (kWh/year) = Sum(64)m =												810.7300 (64)
Heat gains from water heating, kWh/month	56.5518	49.5622	51.3847	45.1357	43.5591	37.9577	35.5404	40.2620	40.5890	46.8521	50.7032	54.8795 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905	159.8905 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	64.6717	57.4409	46.7141	35.3655	26.4362	22.3185	24.1159	31.3468	42.0736	53.4221	62.3515	66.4692 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	364.9632	368.7504	359.2068	338.8897	313.2430	289.1387	273.0356	269.2484	278.7920	299.1091	324.7558	348.8601 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539	53.6539 (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)	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937	-106.5937 (71)
Water heating gains (Table 5)	76.0104	73.7533	69.0655	62.6885	58.5472	52.7191	47.7693	54.1156	56.3737	62.9733	70.4212	73.7628 (72)
Total internal gains	615.5961	609.8953	584.9371	546.8944	508.1771	474.1270	454.8716	464.6616	487.1900	525.4553	567.4792	599.0427 (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					
East			3.8640	27.3735	0.7600	0.7200	0.7700	40.1094 (76)				
West			4.0460	27.3735	0.7600	0.7200	0.7700	41.9986 (80)				
Solar gains	82.1080	131.8395	215.6972	320.2572	377.3807	412.6501	392.9607	339.2982	266.3446	166.7307	98.1327	65.5056 (83)
Total gains	697.7041	741.7348	800.6343	867.1517	885.5578	886.7771	847.8323	803.9597	753.5345	692.1859	665.6119	664.5484 (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)												
tau	33.9538	34.3270	34.4162	34.5037	34.3270	34.7556	34.5894	34.7556	34.7556	34.5037	34.5894	34.4162
alpha	3.2636	3.2885	3.2944	3.3002	3.2885	3.3170	3.3060	3.3170	3.3170	3.3002	3.3060	3.2944
util living area	0.9534	0.9414	0.9067	0.8305	0.6999	0.5080	0.3542	0.3602	0.6186	0.8355	0.9272	0.9571 (86)
MIT	19.5654	19.7121	20.0441	20.4473	20.7716	20.9450	20.9879	20.9878	20.8913	20.5421	20.0263	19.5760 (87)
Th 2	20.0671	20.0763	20.0784	20.0806	20.0763	20.0866	20.0826	20.0866	20.0866	20.0806	20.0826	20.0784 (88)
util rest of house	0.9456	0.9317	0.8908	0.8012	0.6471	0.4301	0.2593	0.2612	0.5421	0.7992	0.9130	0.9497 (89)
MIT 2	18.7771	18.9273	19.2511	19.6336	19.9176	20.0590	20.0792	20.0833	20.0252	19.7289	19.2419	18.7967 (90)
Living area fraction										fLA = Living area / (4) =		0.1971 (91)
MIT	18.9324	19.0819	19.4074	19.7940	20.0859	20.2336	20.2583	20.2616	20.1959	19.8891	19.3965	18.9502 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.7824	18.9319	19.2574	19.6440	19.9359	20.0836	20.1083	20.1116	20.0459	19.7391	19.2465	18.8002 (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	0.9319	0.9168	0.8739	0.7854	0.6383	0.4298	0.2620	0.2640	0.5384	0.7835	0.8969	0.9367	(94)
Useful gains	650.2169	680.0536	699.6750	681.0270	565.2434	381.1593	222.1668	212.2122	405.7180	542.3351	597.0154	622.5005	(95)
Ext temp.	5.3000	5.7000	7.4000	9.9000	13.0000	15.8000	17.7000	17.8000	15.3000	12.0000	8.4000	5.5000	(96)
Heat loss rate W	1278.6719	1241.2716	1109.4416	909.3886	650.6458	396.8814	224.2035	214.1716	439.7169	722.2786	1009.7766	1244.4443	(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	467.5705	377.1385	304.8664	164.4204	63.5394	0.0000	0.0000	0.0000	0.0000	133.8780	297.1880	462.7262	(98)
Space heating per m2												(98) / (4) =	24.4176 (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													2509.7539 (211)
Space heating requirement	467.5705	377.1385	304.8664	164.4204	63.5394	0.0000	0.0000	0.0000	0.0000	133.8780	297.1880	462.7262	(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)	516.6525	416.7276	336.8689	181.6800	70.2092	0.0000	0.0000	0.0000	0.0000	147.9314	328.3846	511.2997	(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	143.0320	110.2267	86.6100	41.0937	17.5825	0.0000	0.0000	18.3675	41.8743	87.0633	121.0966	143.7833	(64)
Efficiency of water heater (217)m	89.7295	89.7559	89.7720	89.8415	89.7867	87.3000	87.3000	87.3000	87.3000	89.2114	89.5497	89.7204	(216)
Fuel for water heating, kWh/month	159.4034	122.8072	96.4778	45.7402	19.5825	0.0000	0.0000	21.0395	47.9660	97.5921	135.2284	160.2572	(219)
Water heating fuel used													906.0944 (219)
Annual totals kWh/year													
Space heating fuel - main system													2509.7539 (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)													456.8492 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 2.50 * 1270 * 0.80) =										-2031.4892			-2031.4892 (233)
Total delivered energy for all uses													1966.2083 (238)

10a. Fuel costs - using BEDF prices (526)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2509.7539	10.2300	256.7478	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	906.0944	10.2300	92.6935	(247)
Pumps and fans for heating	75.0000	36.7200	27.5400	(249)
Pump for solar water heating	50.0000	36.7200	18.3600	(249)
Energy for lighting	456.8492	36.7200	167.7550	(250)
Additional standing charges			103.0000	(251)
Energy saving/generation technologies				
PV Unit	-2031.4892	36.7200	-745.9628	(252)
Total energy cost			-79.8665	(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	2509.7539	0.2160	542.1068	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	906.0944	0.2160	195.7164	(264)
Space and water heating			737.8232	(265)
Pumps and fans	125.0000	0.5190	64.8750	(267)
Energy for lighting	456.8492	0.5190	237.1047	(268)
Energy saving/generation technologies				
PV Unit	-2031.4892	0.5190	-1054.3429	(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 -14.5399 (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	2509.7539	1.2200	3061.8998 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	906.0944	1.2200	1105.4351 (264)
Space and water heating			4167.3349 (265)
Pumps and fans	125.0000	3.0700	383.7500 (267)
Energy for lighting	456.8492	3.0700	1402.5271 (268)
Energy saving/generation technologies			
PV Unit	-2031.4892	3.0700	-6236.6719 (269)
Primary energy kWh/year			-283.0598 (272)
Primary energy kWh/m2/year			-3.0430 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Property Reference	020 - PRJ012848		Issued on Date	19/09/2023	
Assessment Reference	020	Prop Type Ref	LS0011 SAS RE ET 4.4		
Property	Southbourne, PO10				
SAP Rating	84 B	DER	16.42	TER	17.75
Environmental	87 B	% DER<TER	7.47		
CO₂ Emissions (t/year)	1.23	DFEE	41.08	TFEE	49.91
General Requirements Compliance	Pass	% DFEE<TFEE	17.70		
Assessor Details	Mr. Michael Jukes, Michael Jukes, Tel: 02033971373, michael@briaryenergy.co.uk			Assessor ID	W947-0001
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)	17.75	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.42	kgCO ₂ /m ²	Pass
	-1.33 (-7.5%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	49.91	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	41.08	kWh/m ² /yr	
	-8.8 (-17.6%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	Pass
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	Pass
Openings	1.27 (max. 2.00)	1.30 (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

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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	
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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 (Southern England)	Not significant	Pass
Based on:		
Overshading	Average	
Windows facing East	3.86 m ² , No overhang	
Windows facing West	4.05 m ² , No overhang	
Air change rate	4.66 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	0.11	W/m ² K
Thermal bridging y-value	0.025	W/m ² K