

PREDICTED ENERGY ASSESSMENT

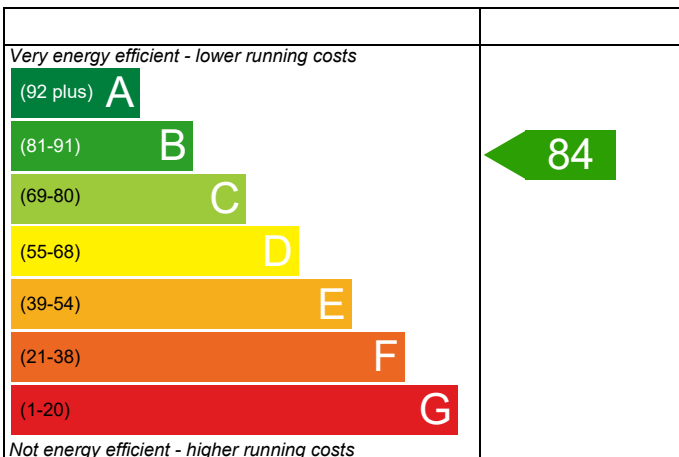
Southbourne,
PO10

Dwelling type: House, End-Terrace
 Date of assessment: 19/09/2023
 Produced by: Gary Nicholls
 Total floor area: 79 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.

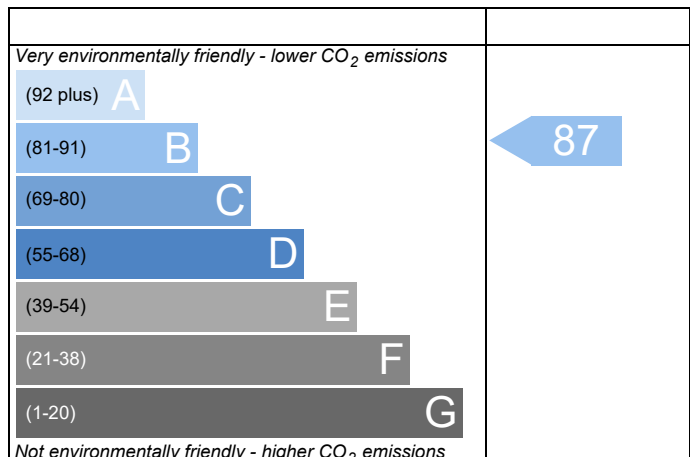
Energy Efficiency Rating



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	023 - PRJ012848	Issued on Date	19/09/2023
Assessment Reference	023	Prop Type Ref	NSS.860 SAV 4.3
Property	Southbourne, PO10		

SAP Rating	84 B	DER	17.33	TER	18.79
Environmental	87 B	% DER<TER	7.76		
CO ₂ Emissions (t/year)	1.12	DFEE	41.91	TTEE	50.94
General Requirements Compliance	Pass	% DFEE<TTEE	17.73		

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	39.5000 (1b)	x 2.3300 (2b)	= 92.0350 (1b) - (3b)
First floor	39.5000 (1c)	x 2.5300 (2c)	= 99.9350 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 191.9700 (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)							
Air changes per hour												
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)				30.0000 / (5) =	0.1563 (8)							
Pressure test				Yes								
Measured/design AP50				5.0100								
Infiltration rate				0.4068 (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) =		0.3763 (21)							
Wind speed	Jan 4.6000	Feb 4.2000	Mar 4.1000	Apr 4.0000	May 4.2000	Jun 3.7000	Jul 3.9000	Aug 3.7000	Sep 3.7000	Oct 4.0000	Nov 3.9000	Dec 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	0.4327	0.3951	0.3857	0.3763	0.3951	0.3480	0.3669	0.3480	0.3480	0.3763	0.3669	0.3857 (22b)
Effective ac	0.5936	0.5780	0.5744	0.5708	0.5780	0.5606	0.5673	0.5606	0.5606	0.5708	0.5673	0.5744 (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)			6.8000	1.2357	8.4030		(27)
Flr - Ground			39.5000	0.1600	6.3200	75.6000	2986.2000 (28a)
Brick	86.7650	10.8580	75.9070	0.2400	18.2177	38.9500	2956.5777 (29a)
Rf - Ins Joist	39.5020		39.5020	0.1100	4.3452	5.6000	221.2112 (30)
Total net area of external elements Aum(A, m ²)			165.7690				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.1579		(33)
Party Wall			39.3810	0.0000	0.0000	39.3700	1550.4300 (32)
Stud			52.9212			7.4000	391.6165 (32c)
Stud			85.3755			7.4000	631.7789 (32c)
Internal Floor			39.5020			7.4000	292.3148 (32d)
Internal Ceiling			39.5020			7.4000	292.3148 (32e)
Heat capacity Cm = Sum (A x k)				(28)...(30) + (32) + (32a)...(32e) =			9322.4439 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							118.0056 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.4340 (36)
Total fabric heat loss				(33) + (36) =			46.5920 (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 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	37.6057	36.6191	36.3865	36.1595	36.6191	35.5120	35.9381	35.5120	35.5120	36.1595	35.9381	36.3865 (38)
Average = Sum(39)m / 12 =	84.1977	83.2111	82.9785	82.7515	83.2111	82.1040	82.5300	82.1040	82.1040	82.7515	82.5300	82.9785 (39)
	82.7877 (39)											
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0658	1.0533	1.0504	1.0475	1.0533	1.0393	1.0447	1.0393	1.0393	1.0475	1.0447	1.0504 (40)
Days in month												1.0479 (40)
	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4436 (42)
Average daily hot water use (litres/day)													92.2358 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	101.4594	97.7700	94.0805	90.3911	86.7017	83.0122	83.0122	86.7017	90.3911	94.0805	97.7700	101.4594 (44)	
Energy conte	150.4613	131.5945	135.7937	118.3882	113.5963	98.0250	90.8346	104.2340	105.4789	122.9255	134.1828	145.7138 (45)	
Energy content (annual)												Total = Sum(45)m = 1451.2285 (45)	
Distribution loss (46)m = 0.15 x (45)m	22.5692	19.7392	20.3691	17.7582	17.0394	14.7037	13.6252	15.6351	15.8218	18.4388	20.1274	21.8571 (46)	
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Combi loss	14.6683	13.2271	14.6002	14.0793	14.5124	14.0024	14.4431	14.4880	14.0443	14.5639	14.1519	14.6541 (61)	
Total heat required for water heating calculated for each month	165.1296	144.8215	150.3939	132.4676	128.1087	112.0274	105.2777	118.7220	119.5232	137.4893	148.3346	160.3678 (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	165.1296	144.8215	150.3939	132.4676	128.1087	112.0274	105.2777	118.7220	119.5232	137.4893	148.3346	160.3678 (64)	
RHI water heating demand												Total per year (kWh/year) = Sum(64)m = 1622.6634 (64)	
Heat gains from water heating, kWh/month	53.6955	47.0619	48.8014	42.8839	41.3989	36.0939	33.8133	38.2798	38.5828	44.5137	48.1537	52.1133 (65)	
												1623 (64)	

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	57.3452	50.9335	41.4219	31.3590	23.4412	19.7901	21.3839	27.7956	37.3072	47.3700	55.2878	58.9390 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	324.3849	327.7510	319.2685	301.2103	278.4152	256.9909	242.6782	239.3121	247.7945	265.8527	288.6479	310.0721 (68)
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)	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445 (71)
Water heating gains (Table 5)	72.1713	70.0326	65.5933	59.5610	55.6436	50.1304	45.4479	51.4514	53.5872	59.8302	66.8802	70.0448 (72)
Total internal gains	557.8789	552.6946	530.2613	496.1079	461.4776	430.8890	413.4876	422.5366	442.6665	477.0305	514.7934	543.0335 (73)

6. Solar gains

[Jan]		Area	Solar flux	g	FF	Access	Gains					
		m2	Table 6a	Specific data	Specific data	factor data	W					
			W/m2	or Table 6b	or Table 6c	Table 6d						
North		3.4380	14.6401	0.7600	0.7200	0.7700	19.0866 (74)					
South		3.3610	61.3950	0.7600	0.7200	0.7700	78.2493 (78)					
Solar gains	97.3359	135.1915	184.8490	240.1991	267.9552	289.2481	276.7670	247.2525	214.4668	159.2145	111.4561	81.0628 (83)
Total gains	655.2148	687.8861	715.1103	736.3070	729.4328	720.1371	690.2546	669.7891	657.1333	636.2450	626.2496	624.0963 (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	30.7558	31.1205	31.2077	31.2933	31.1205	31.5401	31.3773	31.5401	31.5401	31.2933	31.3773	31.2077	
alpha	3.0504	3.0747	3.0805	3.0862	3.0747	3.1027	3.0918	3.1027	3.1027	3.0862	3.0918	3.0805	
util living area	0.9371	0.9246	0.8936	0.8315	0.7191	0.5389	0.3808	0.3789	0.6170	0.8111	0.9052	0.9415 (86)	
MIT	19.5164	19.6595	19.9691	20.3543	20.7030	20.9178	20.9799	20.9811	20.8679	20.5179	20.0020	19.5287 (87)	
Th 2	20.0289	20.0391	20.0416	20.0439	20.0391	20.0507	20.0463	20.0507	20.0507	20.0439	20.0463	20.0416 (88)	
util rest of house	0.9271	0.9129	0.8763	0.8023	0.6667	0.4568	0.2765	0.2722	0.5394	0.7721	0.8879	0.9320 (89)	
MIT 2	18.7030	18.8499	19.1522	19.5197	19.8299	20.0084	20.0405	20.0455	19.9754	19.6762	19.1915	18.7254 (90)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Living area fraction										FLA = Living area / (4) =	0.2267 (91)	
MIT	18.8874	19.0334	19.3374	19.7089	20.0278	20.2146	20.2534	20.2576	20.1778	19.8671	19.3752	18.9075 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.7374	18.8834	19.1874	19.5589	19.8778	20.0646	20.1034	20.1076	20.0278	19.7171	19.2252	18.7575 (93)

 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9107	0.8956	0.8580	0.7853	0.6569	0.4581	0.2830	0.2788	0.5373	0.7567	0.8699	0.9162 (94)
Useful gains	596.7060	616.0791	613.5362	578.2476	479.1792	329.8846	195.3465	186.7465	353.1000	481.4260	544.7825	571.8164 (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	1131.4012	1097.0083	978.0982	799.2902	572.3110	350.1374	198.3563	189.4630	388.1682	638.5985	893.4076	1100.0862 (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	397.8132	323.1845	271.2341	159.1507	69.2901	0.0000	0.0000	0.0000	0.0000	116.9363	251.0101	393.0327 (98)
RHI space heating demand												1981.6517 (98)
												1982 (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	39.5000 (1b)	2.3300 (2b)	92.0350 (1b) - (3b)
First floor	39.5000 (1c)	2.5300 (2c)	99.9350 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.0000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 191.9700 (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) =	0.1563 (8)							
Pressure test				Yes								
Measured/design AP50					5.0100							
Infiltration rate					0.4068 (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) =	0.3763 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4797	0.4703	0.4609	0.4139	0.4045	0.3575	0.3575	0.3480	0.3763	0.4045	0.4233	0.4421 (22b)
Effective ac	0.6151	0.6106	0.6062	0.5857	0.5818	0.5639	0.5639	0.5606	0.5708	0.5818	0.5896	0.5977 (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)			6.8000	1.2357	8.4030		(27)					
Flr - Ground			39.5000	0.1600	6.3200	75.6000	2986.2000 (28a)					
Brick	86.7650	10.8580	75.9070	0.2400	18.2177	38.9500	2956.5777 (29a)					
Rf - Ins Joist	39.5020		39.5020	0.1100	4.3452	5.6000	221.2112 (30)					
Total net area of external elements Aum(A, m2)			165.7690				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	42.1579	(33)					
Party Wall			39.3810	0.0000	0.0000	39.3700	1550.4300 (32)					
Stud			52.9212			7.4000	391.6165 (32c)					
Stud			85.3755			7.4000	631.7789 (32c)					
Internal Floor			39.5020			7.4000	292.3148 (32d)					
Internal Ceiling			39.5020			7.4000	292.3148 (32e)					
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9322.4439 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							118.0056 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.4340 (36)					
Total fabric heat loss							(33) + (36) = 46.5920 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 38.9651	Feb 38.6820	Mar 38.4045	Apr 37.1012	May 36.8574	Jun 35.7223	Jul 35.7223	Aug 35.5120	Sep 36.1595	Oct 36.8574	Nov 37.3507	Dec 37.8664 (38)
Heat transfer coeff	85.5570	85.2740	84.9965	83.6932	83.4494	82.3142	82.3142	82.1040	82.7515	83.4494	83.9426	84.4584 (39)
Average = Sum(39)m / 12 =												83.6920 (39)
HLP	Jan 1.0830	Feb 1.0794	Mar 1.0759	Apr 1.0594	May 1.0563	Jun 1.0420	Jul 1.0420	Aug 1.0393	Sep 1.0475	Oct 1.0563	Nov 1.0626	Dec 1.0691 (40)
HLP (average)												1.0594 (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												2.4436 (42)
Average daily hot water use (litres/day)												92.2358 (43)
Daily hot water use	101.4594	97.7700	94.0805	90.3911	86.7017	83.0122	83.0122	86.7017	90.3911	94.0805	97.7700	101.4594 (44)
Energy conte	150.4613	131.5945	135.7937	118.3882	113.5963	98.0250	90.8346	104.2340	105.4789	122.9255	134.1828	145.7138 (45)
Energy content (annual)												Total = Sum(45)m = 1451.2285 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Distribution loss (46)m = 0.15 x (45)m	22.5692	19.7392	20.3691	17.7582	17.0394	14.7037	13.6252	15.6351	15.8218	18.4388	20.1274	21.8571 (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	14.6683	13.2271	14.6002	14.0793	14.5124	14.0024	14.4431	14.4880	14.0443	14.5639	14.1519	14.6541 (61)
Total heat required for water heating calculated for each month	165.1296	144.8215	150.3939	132.4676	128.1087	112.0274	105.2777	118.7220	119.5232	137.4893	148.3346	160.3678 (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	165.1296	144.8215	150.3939	132.4676	128.1087	112.0274	105.2777	118.7220	119.5232	137.4893	148.3346	160.3678 (64)
Heat gains from water heating, kWh/month	53.6955	47.0619	48.8014	42.8839	41.3989	36.0939	33.8133	38.2798	38.5828	44.5137	48.1537	52.1133 (65)
												Total per year (kWh/year) = Sum(64)m = 1622.6634 (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	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	57.3452	50.9335	41.4219	31.3590	23.4412	19.7901	21.3839	27.7956	37.3072	47.3700	55.2878	58.9390 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	324.3849	327.7510	319.2685	301.2103	278.4152	256.9909	242.6782	239.3121	247.7945	265.8527	288.6479	310.0721 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053 (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)	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445 (71)
Water heating gains (Table 5)	72.1713	70.0326	65.5933	59.5610	55.6436	50.1304	45.4479	51.4514	53.5872	59.8302	66.8802	70.0448 (72)
Total internal gains	557.8789	552.6946	530.2613	496.1079	461.4776	430.8890	413.4876	422.5366	442.6665	477.0305	514.7934	543.0335 (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							
North	3.4380	10.6334	0.7600	0.7200	0.7700	13.8630 (74)						
South	3.3610	46.7521	0.7600	0.7200	0.7700	59.5866 (78)						
Solar gains	73.4496	124.0804	169.3271	212.8066	243.8145	245.1745	235.0213	210.9313	183.9817	136.7936	87.7322	63.0452 (83)
Total gains	631.3285	676.7750	699.5883	708.9146	705.2921	676.0635	648.5088	633.4679	626.6482	613.8241	602.5257	606.0787 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	30.2671	30.3676	30.4668	30.9412	31.0316	31.4595	31.4595	31.5401	31.2933	31.0316	30.8493	30.6609
alpha	3.0178	3.0245	3.0311	3.0627	3.0688	3.0973	3.0973	3.1027	3.0862	3.0688	3.0566	3.0441
util living area	0.9507	0.9366	0.9135	0.8685	0.7890	0.6551	0.5138	0.5412	0.7191	0.8662	0.9311	0.9556 (86)
MIT	19.2731	19.4580	19.7605	20.1663	20.5384	20.8228	20.9388	20.9264	20.7463	20.2933	19.7292	19.2420 (87)
Th 2	20.0147	20.0177	20.0206	20.0341	20.0367	20.0485	20.0485	20.0507	20.0439	20.0367	20.0315	20.0262 (88)
util rest of house	0.9431	0.9269	0.8995	0.8456	0.7490	0.5864	0.4180	0.4475	0.6577	0.8389	0.9190	0.9487 (89)
MIT 2	18.4535	18.6367	18.9345	19.3362	19.6848	19.9386	20.0215	20.0164	19.8758	19.4637	18.9159	18.4317 (90)
Living area fraction										fLA = Living area / (4) =		0.2267 (91)
MIT	18.6393	18.8229	19.1218	19.5244	19.8783	20.1391	20.2295	20.2227	20.0732	19.6518	19.1003	18.6154 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.4893	18.6729	18.9718	19.3744	19.7283	19.9891	20.0795	20.0727	19.9232	19.5018	18.9503	18.4654 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9281	0.9102	0.8813	0.8273	0.7345	0.5817	0.4213	0.4498	0.6490	0.8209	0.9020	0.9346 (94)
Ext temp.	585.9233	616.0287	616.5360	586.4601	518.0459	393.2900	273.2241	284.9618	406.6867	503.8587	543.4843	566.4174 (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	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	467.2853	375.2725	329.9791	208.9242	113.0218	0.0000	0.0000	0.0000	0.0000	177.8081	324.9064	474.9795 (98)
Space heating per m ²												2472.1769 (98)
												(98) / (4) = 31.2934 (99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

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													2731.6872 (211)
Space heating requirement	467.2853	375.2725	329.9791	208.9242	113.0218	0.0000	0.0000	0.0000	0.0000	177.8081	324.9064	474.9795	(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)	516.3374	414.6658	364.6178	230.8555	124.8859	0.0000	0.0000	0.0000	0.0000	196.4730	359.0126	524.8392	(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	165.1296	144.8215	150.3939	132.4676	128.1087	112.0274	105.2777	118.7220	119.5232	137.4893	148.3346	160.3678	(64)
Efficiency of water heater (217)m	89.6420	89.5856	89.4732	89.2309	88.7712	87.3000	87.3000	87.3000	87.3000	89.0762	89.4720	89.6704	(217)
Fuel for water heating, kWh/month	184.2101	161.6571	168.0881	148.4549	144.3133	128.3246	120.5930	135.9931	136.9109	154.3502	165.7888	178.8415	(219)
Water heating fuel used													1827.5257 (219)
Annual totals kWh/year													
Space heating fuel - main system													2731.6872 (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)													405.0935 (232)
Total delivered energy for all uses													5039.3063 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2731.6872	3.4800	95.0627 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1827.5257	3.4800	63.5979 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	405.0935	13.1900	53.4318 (250)
Additional standing charges			120.0000 (251)
Total energy cost			341.9849 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.1583 (257)
SAP value		83.8412
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	2731.6872	0.2160	590.0444 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1827.5257	0.2160	394.7456 (264)
Space and water heating			984.7900 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	405.0935	0.5190	210.2435 (268)
Total kg/year			1233.9585 (272)
CO2 emissions per m2			15.6200 (273)
EI value			86.6653
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	$3.48 / 0.8868 = 3.924$, stars = 4
Water heating environmental impact	$0.216 / 0.8868 = 0.2436$, 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	39.5000 (1b)	2.3300 (2b)	92.0350 (1b) - (3b)
First floor	39.5000 (1c)	2.5300 (2c)	99.9350 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.0000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 191.9700 (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) =	0.1563 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.4068 (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) =	0.3763 (21)							
Wind speed	Jan 4.6000	Feb 4.2000	Mar 4.1000	Apr 4.0000	May 4.2000	Jun 3.7000	Jul 3.9000	Aug 3.7000	Sep 3.7000	Oct 4.0000	Nov 3.9000	Dec 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	0.4327	0.3951	0.3857	0.3763	0.3951	0.3480	0.3669	0.3480	0.3480	0.3763	0.3669	0.3857 (22b)
Effective ac	0.5936	0.5780	0.5744	0.5708	0.5780	0.5606	0.5673	0.5606	0.5606	0.5708	0.5673	0.5744 (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)			6.8000	1.2357	8.4030		(27)					
Flr - Ground			39.5000	0.1600	6.3200	75.6000	2986.2000 (28a)					
Brick	86.7650	10.8580	75.9070	0.2400	18.2177	38.9500	2956.5777 (29a)					
Rf - Ins Joist	39.5020		39.5020	0.1100	4.3452	5.6000	221.2112 (30)					
Total net area of external elements Aum(A, m2)			165.7690				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	42.1579	(33)					
Party Wall			39.3810	0.0000	0.0000	39.3700	1550.4300 (32)					
Stud			52.9212			7.4000	391.6165 (32c)					
Stud			85.3755			7.4000	631.7789 (32c)					
Internal Floor			39.5020			7.4000	292.3148 (32d)					
Internal Ceiling			39.5020			7.4000	292.3148 (32e)					
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9322.4439 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							118.0056 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.4340 (36)					
Total fabric heat loss							(33) + (36) = 46.5920 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 37.6057	Feb 36.6191	Mar 36.3865	Apr 36.1595	May 36.6191	Jun 35.5120	Jul 35.9381	Aug 35.5120	Sep 35.5120	Oct 36.1595	Nov 35.9381	Dec 36.3865 (38)
Heat transfer coeff	84.1977	83.2111	82.9785	82.7515	83.2111	82.1040	82.5300	82.1040	82.1040	82.7515	82.5300	82.9785 (39)
Average = Sum(39)m / 12 =												82.7877 (39)
HLP	Jan 1.0658	Feb 1.0533	Mar 1.0504	Apr 1.0475	May 1.0533	Jun 1.0393	Jul 1.0447	Aug 1.0393	Sep 1.0393	Oct 1.0475	Nov 1.0447	Dec 1.0504 (40)
HLP (average)												1.0479 (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												2.4436 (42)
Average daily hot water use (litres/day)												92.2358 (43)
Daily hot water use	101.4594	97.7700	94.0805	90.3911	86.7017	83.0122	83.0122	86.7017	90.3911	94.0805	97.7700	101.4594 (44)
Energy conte	150.4613	131.5945	135.7937	118.3882	113.5963	98.0250	90.8346	104.2340	105.4789	122.9255	134.1828	145.7138 (45)
Energy content (annual)										Total = Sum(45)m =		1451.2285 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

Distribution loss (46)m = 0.15 x (45)m	22.5692	19.7392	20.3691	17.7582	17.0394	14.7037	13.6252	15.6351	15.8218	18.4388	20.1274	21.8571 (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	14.6683	13.2271	14.6002	14.0793	14.5124	14.0024	14.4431	14.4880	14.0443	14.5639	14.1519	14.6541 (61)
Total heat required for water heating calculated for each month	165.1296	144.8215	150.3939	132.4676	128.1087	112.0274	105.2777	118.7220	119.5232	137.4893	148.3346	160.3678 (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	165.1296	144.8215	150.3939	132.4676	128.1087	112.0274	105.2777	118.7220	119.5232	137.4893	148.3346	160.3678 (64)
Heat gains from water heating, kWh/month	53.6955	47.0619	48.8014	42.8839	41.3989	36.0939	33.8133	38.2798	38.5828	44.5137	48.1537	52.1133 (65)
												Total per year (kWh/year) = Sum(64)m = 1622.6634 (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	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	57.3452	50.9335	41.4219	31.3590	23.4412	19.7901	21.3839	27.7956	37.3072	47.3700	55.2878	58.9390 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	324.3849	327.7510	319.2685	301.2103	278.4152	256.9909	242.6782	239.3121	247.7945	265.8527	288.6479	310.0721 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053 (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)	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445 (71)
Water heating gains (Table 5)	72.1713	70.0326	65.5933	59.5610	55.6436	50.1304	45.4479	51.4514	53.5872	59.8302	66.8802	70.0448 (72)
Total internal gains	557.8789	552.6946	530.2613	496.1079	461.4776	430.8890	413.4876	422.5366	442.6665	477.0305	514.7934	543.0335 (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	3.4380	14.6401	0.7600	0.7200	0.7700	19.0866 (74)						
South	3.3610	61.3950	0.7600	0.7200	0.7700	78.2493 (78)						
Solar gains	97.3359	135.1915	184.8490	240.1991	267.9552	289.2481	276.7670	247.2525	214.4668	159.2145	111.4561	81.0628 (83)
Total gains	655.2148	687.8861	715.1103	736.3070	729.4328	720.1371	690.2546	669.7891	657.1333	636.2450	626.2496	624.0963 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	30.7558	31.1205	31.2077	31.2933	31.1205	31.5401	31.3773	31.5401	31.5401	31.2933	31.3773	31.2077
alpha	3.0504	3.0747	3.0805	3.0862	3.0747	3.1027	3.0918	3.1027	3.1027	3.0862	3.0918	3.0805
util living area	0.9371	0.9246	0.8936	0.8315	0.7191	0.5389	0.3808	0.3789	0.6170	0.8111	0.9052	0.9415 (86)
MIT	19.5164	19.6595	19.9691	20.3543	20.7030	20.9178	20.9799	20.9811	20.8679	20.5179	20.0020	19.5287 (87)
Th 2	20.0289	20.0391	20.0416	20.0439	20.0391	20.0507	20.0463	20.0507	20.0507	20.0439	20.0463	20.0416 (88)
util rest of house	0.9271	0.9129	0.8763	0.8023	0.6667	0.4568	0.2765	0.2722	0.5394	0.7721	0.8879	0.9320 (89)
MIT 2	18.7030	18.8499	19.1522	19.5197	19.8299	20.0084	20.0405	20.0455	19.9754	19.6762	19.1915	18.7254 (90)
Living area fraction	18.8874	19.0334	19.3374	19.7089	20.0278	20.2146	20.2534	20.2576	20.1778	19.8671	19.3752	18.9075 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.7374	18.8834	19.1874	19.5589	19.8778	20.0646	20.1034	20.1076	20.0278	19.7171	19.2252	18.7575 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9107	0.8956	0.8580	0.7853	0.6569	0.4581	0.2830	0.2788	0.5373	0.7567	0.8699	0.9162 (94)
Ext temp.	596.7060	616.0791	613.5362	578.2476	479.1792	329.8846	195.3465	186.7465	353.1000	481.4260	544.7825	571.8164 (95)
Heat loss rate W	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)
Month fracti	1131.4012	1097.0083	978.0982	799.2902	572.3110	350.1374	198.3563	189.4630	388.1682	638.5985	893.4076	1100.0862 (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	397.8132	323.1845	271.2341	159.1507	69.2901	0.0000	0.0000	0.0000	0.0000	116.9363	251.0101	393.0327 (98)
												1981.6517 (98)
												(98) / (4) = 25.0842 (99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

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													2189.6704 (211)
Space heating requirement	397.8132	323.1845	271.2341	159.1507	69.2901	0.0000	0.0000	0.0000	0.0000	116.9363	251.0101	393.0327	(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)	439.5726	357.1099	299.7062	175.8571	76.5636	0.0000	0.0000	0.0000	0.0000	129.2114	277.3592	434.2903	(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	165.1296	144.8215	150.3939	132.4676	128.1087	112.0274	105.2777	118.7220	119.5232	137.4893	148.3346	160.3678	(64)
Efficiency of water heater (217)m	89.5373	89.4850	89.3320	89.0178	88.3972	87.3000	87.3000	87.3000	87.3000	88.7422	89.2844	89.5488	(216)
Fuel for water heating, kWh/month	184.4256	161.8389	168.3539	148.8102	144.9240	128.3246	120.5930	135.9931	136.9109	154.9312	166.1373	179.0843	(219)
Water heating fuel used													1830.3270 (219)
Annual totals kWh/year													
Space heating fuel - main system													2189.6704 (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)													405.0935 (232)
Total delivered energy for all uses													4500.0908 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2189.6704	10.2300	224.0033 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1830.3270	10.2300	187.2425 (247)
Pumps and fans for heating	75.0000	36.7200	27.5400 (249)
Energy for lighting	405.0935	36.7200	148.7503 (250)
Additional standing charges			103.0000 (251)
Total energy cost			690.5360 (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	2189.6704	0.2160	472.9688 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1830.3270	0.2160	395.3506 (264)
Space and water heating			868.3194 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	405.0935	0.5190	210.2435 (268)
Total kg/year			1117.4879 (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	2189.6704	1.2200	2671.3979 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1830.3270	1.2200	2232.9989 (264)
Space and water heating			4904.3968 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	405.0935	3.0700	1243.6369 (268)
Primary energy kWh/year			6378.2837 (272)
Primary energy kWh/m2/year			80.7378 (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	-£ 82	-187 kg (16.7%)
U Solar photovoltaic panels	+ 10.8	-£ 746	-1054 kg (113.3%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£82	2.36 kg/m ²	B 85 B 89
Solar photovoltaic panels	£746	13.35 kg/m ²	A 96 A 98
Total Savings	£828	15.71 kg/m²	

Potential energy efficiency rating: A 96
 Potential environmental impact rating: A 98

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	£176	£195	-£18
Mains gas	£514	£413	£101
Space heating	£355	£355	£0
Water heating	£187	£105	£82
Lighting	£149	£149	£0
Generated (PV)	-£0	-£746	£746
Total cost of fuels	£690	-£138	£829
Total cost of uses	£691	-£137	£828
Delivered energy	57 kWh/m ²	19 kWh/m ²	38 kWh/m ²
Carbon dioxide emissions	1.1 tonnes	-0.1 tonnes	1.2 tonnes
CO2 emissions per m ²	14 kg/m ²	-2 kg/m ²	16 kg/m ²
Primary energy	81 kWh/m ²	-11 kWh/m ²	92 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	39.5000 (1b)	2.3300 (2b)	92.0350 (1b) - (3b)
First floor	39.5000 (1c)	2.5300 (2c)	99.9350 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.0000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 191.9700 (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) =	0.1563 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.4068 (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) =	0.3763 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4797	0.4703	0.4609	0.4139	0.4045	0.3575	0.3575	0.3480	0.3763	0.4045	0.4233	0.4421 (22b)
Effective ac	0.6151	0.6106	0.6062	0.5857	0.5818	0.5639	0.5639	0.5606	0.5708	0.5818	0.5896	0.5977 (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)			6.8000	1.2357	8.4030		(27)					
Flr - Ground			39.5000	0.1600	6.3200	75.6000	2986.2000 (28a)					
Brick	86.7650	10.8580	75.9070	0.2400	18.2177	38.9500	2956.5777 (29a)					
Rf - Ins Joist	39.5020		39.5020	0.1100	4.3452	5.6000	221.2112 (30)					
Total net area of external elements Aum(A, m2)			165.7690				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	42.1579	(33)					
Party Wall			39.3810	0.0000	0.0000	39.3700	1550.4300 (32)					
Stud			52.9212			7.4000	391.6165 (32c)					
Stud			85.3755			7.4000	631.7789 (32c)					
Internal Floor			39.5020			7.4000	292.3148 (32d)					
Internal Ceiling			39.5020			7.4000	292.3148 (32e)					
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9322.4439 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							118.0056 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.4340 (36)					
Total fabric heat loss							(33) + (36) = 46.5920 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 38.9651	Feb 38.6820	Mar 38.4045	Apr 37.1012	May 36.8574	Jun 35.7223	Jul 35.7223	Aug 35.5120	Sep 36.1595	Oct 36.8574	Nov 37.3507	Dec 37.8664 (38)
Heat transfer coeff	85.5570	85.2740	84.9965	83.6932	83.4494	82.3142	82.3142	82.1040	82.7515	83.4494	83.9426	84.4584 (39)
Average = Sum(39)m / 12 =												83.6920 (39)
HLP	Jan 1.0830	Feb 1.0794	Mar 1.0759	Apr 1.0594	May 1.0563	Jun 1.0420	Jul 1.0420	Aug 1.0393	Sep 1.0475	Oct 1.0563	Nov 1.0626	Dec 1.0691 (40)
HLP (average)												1.0594 (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												2.4436 (42)
Average daily hot water use (litres/day)												92.2358 (43)
Daily hot water use	101.4594	97.7700	94.0805	90.3911	86.7017	83.0122	83.0122	86.7017	90.3911	94.0805	97.7700	101.4594 (44)
Energy conte	150.4613	131.5945	135.7937	118.3882	113.5963	98.0250	90.8346	104.2340	105.4789	122.9255	134.1828	145.7138 (45)
Energy content (annual)												Total = Sum(45)m = 1451.2285 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

Distribution loss (46)m = 0.15 x (45)m	22.5692	19.7392	20.3691	17.7582	17.0394	14.7037	13.6252	15.6351	15.8218	18.4388	20.1274	21.8571 (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	14.6683	13.2271	14.6002	14.0793	14.5124	14.0024	14.4431	14.4880	14.0443	14.5639	14.1519	14.6541 (61)
Total heat required for water heating calculated for each month	165.1296	144.8215	150.3939	132.4676	128.1087	112.0274	105.2777	118.7220	119.5232	137.4893	148.3346	160.3678 (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												1.2497 (H8)
Utilisation factor												0.5508 (H9)
Collector performance factor												0.8793 (H10)
Dedicated solar storage volume												75.0000 (H11)
Effective solar volume												75.0000 (H13)
Daily hot water demand												92.2358 (H14)
Volume ratio Veff/V												0.8131 (H15)
Solar storage volume factor												0.9586 (H16)
Solar input												-841.9491 (H17)
Solar input	-24.4148	-40.7414	-69.3872	-92.9925	-114.8844	-112.9497	-111.4570	-97.3806	-76.2685	-52.0824	-28.9595	-20.4311 (63)
Solar input (sum of months) = Sum(63)m =												-841.9491 (63)
Output from w/h	140.7148	104.0802	81.0067	39.4750	13.2243	0.0000	0.0000	21.3415	43.2547	85.4069	119.3751	139.9368 (64)
Total per year (kWh/year) = Sum(64)m =												787.8159 (64)
Heat gains from water heating, kWh/month	53.6955	47.0619	48.8014	42.8839	41.3989	36.0939	33.8133	38.2798	38.5828	44.5137	48.1537	52.1133 (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	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	57.3452	50.9335	41.4219	31.3590	23.4412	19.7901	21.3839	27.7956	37.3072	47.3700	55.2878	58.9390 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	324.3849	327.7510	319.2685	301.2103	278.4152	256.9909	242.6782	239.3121	247.7945	265.8527	288.6479	310.0721 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053 (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)	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445 (71)
Water heating gains (Table 5)	72.1713	70.0326	65.5933	59.5610	55.6436	50.1304	45.4479	51.4514	53.5872	59.8302	66.8802	70.0448 (72)
Total internal gains	557.8789	552.6946	530.2613	496.1079	461.4776	430.8890	413.4876	422.5366	442.6665	477.0305	514.7934	543.0335 (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							
North	3.4380	10.6334	0.7600	0.7200	0.7700	13.8630 (74)						
South	3.3610	46.7521	0.7600	0.7200	0.7700	59.5866 (78)						
Solar gains	73.4496	124.0804	169.3271	212.8066	243.8145	245.1745	235.0213	210.9313	183.9817	136.7936	87.7322	63.0452 (83)
Total gains	631.3285	676.7750	699.5883	708.9146	705.2921	676.0635	648.5088	633.4679	626.6482	613.8241	602.5257	606.0787 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	30.2671	30.3676	30.4668	30.9412	31.0316	31.4595	31.4595	31.5401	31.2933	31.0316	30.8493	30.6609
alpha	3.0178	3.0245	3.0311	3.0627	3.0688	3.0973	3.0973	3.1027	3.0862	3.0688	3.0566	3.0441
util living area	0.9507	0.9366	0.9135	0.8685	0.7890	0.6551	0.5138	0.5412	0.7191	0.8662	0.9311	0.9556 (86)
MIT	19.2731	19.4580	19.7605	20.1663	20.5384	20.8228	20.9388	20.9264	20.7463	20.2933	19.7292	19.2420 (87)
Th 2	20.0147	20.0177	20.0206	20.0341	20.0367	20.0485	20.0485	20.0507	20.0439	20.0367	20.0315	20.0262 (88)
util rest of house	0.9431	0.9269	0.8995	0.8456	0.7490	0.5864	0.4180	0.4475	0.6577	0.8389	0.9190	0.9487 (89)
MIT 2	18.4535	18.6367	18.9345	19.3362	19.6848	19.9386	20.0215	20.0164	19.8758	19.4637	18.9159	18.4317 (90)
Living area fraction												fLA = Living area / (4) =
MIT	18.6393	18.8229	19.1218	19.5244	19.8783	20.1391	20.2295	20.2227	20.0732	19.6518	19.1003	18.6154 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.4893	18.6729	18.9718	19.3744	19.7283	19.9891	20.0795	20.0727	19.9232	19.5018	18.9503	18.4654 (93)

8. Space heating requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9281	0.9102	0.8813	0.8273	0.7345	0.5817	0.4213	0.4498	0.6490	0.8209	0.9020	0.9346 (94)
Useful gains	585.9233	616.0287	616.5360	586.4601	518.0459	393.2900	273.2241	284.9618	406.6867	503.8587	543.4843	566.4174 (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	1213.9949	1174.4700	1060.0564	876.6326	669.9568	443.5988	286.4102	301.5427	481.8759	742.8481	994.7432	1204.8306 (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	467.2853	375.2725	329.9791	208.9242	113.0218	0.0000	0.0000	0.0000	0.0000	177.8081	324.9064	474.9795 (98)
Space heating per m2											(98) / (4) =	31.2934 (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												2731.6872 (211)
Space heating requirement	467.2853	375.2725	329.9791	208.9242	113.0218	0.0000	0.0000	0.0000	0.0000	177.8081	324.9064	474.9795 (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)	516.3374	414.6658	364.6178	230.8555	124.8859	0.0000	0.0000	0.0000	0.0000	196.4730	359.0126	524.8392 (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	140.7148	104.0802	81.0067	39.4750	13.2243	0.0000	0.0000	21.3415	43.2547	85.4069	119.3751	139.9368 (64)
Efficiency of water heater (217)m	89.7387	89.7854	89.8508	89.9759	90.1538	87.3000	87.3000	87.3000	87.3000	89.4363	89.6174	87.3000 (216)
Fuel for water heating, kWh/month	156.8050	115.9210	90.1568	43.8729	14.6686	0.0000	0.0000	24.4461	49.5472	95.4947	133.2053	155.9161 (219)
Water heating fuel used												880.0338 (219)
Annual totals kWh/year												
Space heating fuel - main system												2731.6872 (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)												405.0935 (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												2414.5750 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2731.6872	3.4800	95.0627 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	880.0338	3.4800	30.6252 (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	405.0935	13.1900	53.4318 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit		-1727.2394	-227.8229 (252)
Total energy cost		13.1900	87.7843 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)		0.2973 (257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	95.8522
SAP rating (Section 12)		96 (258)
SAP band		A

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

Space heating - main system 1	2731.6872	0.2160	590.0444 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	880.0338	0.2160	190.0873 (264)
Space and water heating			780.1317 (265)
Pumps and fans	125.0000	0.5190	64.8750 (267)
Energy for lighting	405.0935	0.5190	210.2435 (268)
Energy saving/generation technologies			
PV Unit			
Total kg/year	-1727.2394	0.5190	-896.4372 (269)
CO2 emissions per m2			158.8130 (272)
EI value			2.0100 (273)
EI rating			98.2838
EI band			98 (274)
			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	39.5000 (1b)	x 2.3300 (2b)	= 92.0350 (1b) - (3b)
First floor	39.5000 (1c)	x 2.5300 (2c)	= 99.9350 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 191.9700 (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) = 0.1563 (8)							
Pressure test					Yes							
Measured/design AP50					5.0100							
Infiltration rate					0.4068 (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) =	0.3763 (21)							
Wind speed	Jan 4.6000	Feb 4.2000	Mar 4.1000	Apr 4.0000	May 4.2000	Jun 3.7000	Jul 3.9000	Aug 3.7000	Sep 3.7000	Oct 4.0000	Nov 3.9000	Dec 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												
Effective ac	0.4327	0.3951	0.3857	0.3763	0.3951	0.3480	0.3669	0.3480	0.3480	0.3763	0.3669	0.3857 (22b)
	0.5936	0.5780	0.5744	0.5708	0.5780	0.5606	0.5673	0.5606	0.5606	0.5708	0.5673	0.5744 (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)			6.8000	1.2357	8.4030		(27)
Flr - Ground			39.5000	0.1600	6.3200	75.6000	2986.2000 (28a)
Brick	86.7650	10.8580	75.9070	0.2400	18.2177	38.9500	2956.5777 (29a)
Rf - Ins Joist	39.5020		39.5020	0.1100	4.3452	5.6000	221.2112 (30)
Total net area of external elements Aum(A, m2)			165.7690				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	42.1579	(33)
Party Wall			39.3810	0.0000	0.0000	39.3700	1550.4300 (32)
Stud			52.9212			7.4000	391.6165 (32c)
Stud			85.3755			7.4000	631.7789 (32c)
Internal Floor			39.5020			7.4000	292.3148 (32d)
Internal Ceiling			39.5020			7.4000	292.3148 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9322.4439 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							118.0056 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.4340 (36)
Total fabric heat loss						(33) + (36) =	46.5920 (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	37.6057	36.6191	36.3865	36.1595	36.6191	35.5120	35.9381	35.5120	35.5120	36.1595	35.9381	36.3865 (38)
Average = Sum(39)m / 12 =	84.1977	83.2111	82.9785	82.7515	83.2111	82.1040	82.5300	82.1040	82.1040	82.7515	82.5300	82.9785 (39)
HLP	1.0658	1.0533	1.0504	1.0475	1.0533	1.0393	1.0447	1.0393	1.0393	1.0475	1.0447	1.0504 (40)
HLP (average)												1.0479 (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												2.4436 (42)
Average daily hot water use (litres/day)												92.2358 (43)
Daily hot water use	101.4594	97.7700	94.0805	90.3911	86.7017	83.0122	83.0122	86.7017	90.3911	94.0805	97.7700	101.4594 (44)
Energy conte	150.4613	131.5945	135.7937	118.3882	113.5963	98.0250	90.8346	104.2340	105.4789	122.9255	134.1828	145.7138 (45)
Energy content (annual)										Total = Sum(45)m =		1451.2285 (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

Distribution loss (46)m = 0.15 x (45)m	22.5692	19.7392	20.3691	17.7582	17.0394	14.7037	13.6252	15.6351	15.8218	18.4388	20.1274	21.8571 (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	14.6683	13.2271	14.6002	14.0793	14.5124	14.0024	14.4431	14.4880	14.0443	14.5639	14.1519	14.6541 (61)
Total heat required for water heating calculated for each month	165.1296	144.8215	150.3939	132.4676	128.1087	112.0274	105.2777	118.7220	119.5232	137.4893	148.3346	160.3678 (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												1.4698 (H8)
Utilisation factor												0.4936 (H9)
Collector performance factor												0.8793 (H10)
Dedicated solar storage volume												75.0000 (H11)
Effective solar volume												75.0000 (H13)
Daily hot water demand												92.2358 (H14)
Volume ratio Veff/V												0.8131 (H15)
Solar storage volume factor												0.9586 (H16)
Solar input												-887.4168 (H17)
Solar input	-29.8875	-41.0151	-69.6829	-95.5751	-113.9554	-119.8490	-118.2226	-103.5289	-81.4909	-55.9584	-33.9958	-24.2551 (63)
Solar input (sum of months) = Sum(63)m =												-887.4168 (63)
Output from w/h												
	135.2422	103.8064	80.7109	36.8924	14.1533	0.0000	0.0000	15.1931	38.0323	81.5309	114.3388	136.1127 (64)
Total per year (kWh/year) = Sum(64)m =												756.0131 (64)
Heat gains from water heating, kWh/month												
	53.6955	47.0619	48.8014	42.8839	41.3989	36.0939	33.8133	38.2798	38.5828	44.5137	48.1537	52.1133 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168	146.6168 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	57.3452	50.9335	41.4219	31.3590	23.4412	19.7901	21.3839	27.7956	37.3072	47.3700	55.2878	58.9390 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	324.3849	327.7510	319.2685	301.2103	278.4152	256.9909	242.6782	239.3121	247.7945	265.8527	288.6479	310.0721 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053	52.1053 (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)	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445	-97.7445 (71)
Water heating gains (Table 5)	72.1713	70.0326	65.5933	59.5610	55.6436	50.1304	45.4479	51.4514	53.5872	59.8302	66.8802	70.0448 (72)
Total internal gains	557.8789	552.6946	530.2613	496.1079	461.4776	430.8890	413.4876	422.5366	442.6665	477.0305	514.7934	543.0335 (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						
North		3.4380	14.6401	0.7600	0.7200	0.7700	19.0866 (74)					
South		3.3610	61.3950	0.7600	0.7200	0.7700	78.2493 (78)					
Solar gains	97.3359	135.1915	184.8490	240.1991	267.9552	289.2481	276.7670	247.2525	214.4668	159.2145	111.4561	81.0628 (83)
Total gains	655.2148	687.8861	715.1103	736.3070	729.4328	720.1371	690.2546	669.7891	657.1333	636.2450	626.2496	624.0963 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	30.7558	31.1205	31.2077	31.2933	31.1205	31.5401	31.3773	31.5401	31.5401	31.2933	31.3773	31.2077
alpha	3.0504	3.0747	3.0805	3.0862	3.0747	3.1027	3.0918	3.1027	3.1027	3.0862	3.0918	3.0805
util living area	0.9371	0.9246	0.8936	0.8315	0.7191	0.5389	0.3808	0.3789	0.6170	0.8111	0.9052	0.9415 (86)
MIT	19.5164	19.6595	19.9691	20.3543	20.7030	20.9178	20.9799	20.9811	20.8679	20.5179	20.0020	19.5287 (87)
Th 2	20.0289	20.0391	20.0416	20.0439	20.0391	20.0507	20.0463	20.0507	20.0507	20.0439	20.0463	20.0416 (88)
util rest of house	0.9271	0.9129	0.8763	0.8023	0.6667	0.4568	0.2765	0.2722	0.5394	0.7721	0.8879	0.9320 (89)
MIT 2	18.7030	18.8499	19.1522	19.5197	19.8299	20.0084	20.0405	20.0455	19.9754	19.6762	19.1915	18.7254 (90)
Living area fraction									fLA = Living area / (4) =			0.2267 (91)
MIT	18.8874	19.0334	19.3374	19.7089	20.0278	20.2146	20.2534	20.2576	20.1778	19.8671	19.3752	18.9075 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.7374	18.8834	19.1874	19.5589	19.8778	20.0646	20.1034	20.1076	20.0278	19.7171	19.2252	18.7575 (93)

8. Space heating requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9107	0.8956	0.8580	0.7853	0.6569	0.4581	0.2830	0.2788	0.5373	0.7567	0.8699	0.9162	(94)	
Useful gains	596.7060	616.0791	613.5362	578.2476	479.1792	329.8846	195.3465	186.7465	353.1000	481.4260	544.7825	571.8164	(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	1131.4012	1097.0083	978.0982	799.2902	572.3110	350.1374	198.3563	189.4630	388.1682	638.5985	893.4076	1100.0862	(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	397.8132	323.1845	271.2341	159.1507	69.2901	0.0000	0.0000	0.0000	0.0000	116.9363	251.0101	393.0327	(98)	
Space heating												1981.6517	(98)	
Space heating per m2												(98) / (4) =	25.0842	(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													2189.6704	(211)
Space heating requirement	397.8132	323.1845	271.2341	159.1507	69.2901	0.0000	0.0000	0.0000	0.0000	116.9363	251.0101	393.0327	(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)	439.5726	357.1099	299.7062	175.8571	76.5636	0.0000	0.0000	0.0000	0.0000	129.2114	277.3592	434.2903	(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	135.2422	103.8064	80.7109	36.8924	14.1533	0.0000	0.0000	15.1931	38.0323	81.5309	114.3388	136.1127	(64)	
Efficiency of water heater (217)m	89.6661	89.7007	89.7456	89.8800	89.9408	87.3000	87.3000	87.3000	87.3000	89.1575	89.4736	87.3000	(216)	
Fuel for water heating, kWh/month	150.8286	115.7254	89.9330	41.0463	15.7363	0.0000	0.0000	17.4033	43.5650	91.4460	127.7906	151.8189	(219)	
Water heating fuel used												845.2934	(219)	
Annual totals kWh/year														
Space heating fuel - main system													2189.6704	(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)													405.0935	(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													1533.5681	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year		
Space heating - main system 1	2189.6704	10.2300	224.0033	(240)	
Space heating - secondary	0.0000	0.0000	0.0000	(242)	
Water heating (other fuel)	845.2934	10.2300	86.4735	(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	405.0935	36.7200	148.7503	(250)	
Additional standing charges			103.0000	(251)	
Energy saving/generation technologies					
PV Unit		-2031.4892	36.7200	-745.9628	(252)
Total energy cost				-137.8357	(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	2189.6704	0.2160	472.9688	(261)	
Space heating - secondary	0.0000	0.0000	0.0000	(263)	
Water heating (other fuel)	845.2934	0.2160	182.5834	(264)	
Space and water heating			655.5522	(265)	
Pumps and fans	125.0000	0.5190	64.8750	(267)	
Energy for lighting	405.0935	0.5190	210.2435	(268)	
Energy saving/generation technologies					
PV Unit		-2031.4892	0.5190	-1054.3429	(269)
Total kg/year				-123.6722	(272)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

 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	2189.6704	1.2200	2671.3979 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	845.2934	1.2200	1031.2580 (264)
Space and water heating			3702.6558 (265)
Pumps and fans	125.0000	3.0700	383.7500 (267)
Energy for lighting	405.0935	3.0700	1243.6369 (268)
Energy saving/generation technologies			
PV Unit	-2031.4892	3.0700	-6236.6719 (269)
Primary energy kWh/year			-906.6291 (272)
Primary energy kWh/m2/year			-11.4763 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Property Reference	023 - PRJ012848		Issued on Date	19/09/2023	
Assessment Reference	023	Prop Type Ref	NSS.860 SAV 4.3		
Property	Southbourne, PO10				
SAP Rating	84 B	DER	17.33	TER	18.79
Environmental	87 B	% DER<TER	7.76		
CO₂ Emissions (t/year)	1.12	DFEE	41.91	TFEE	50.94
General Requirements Compliance	Pass	% DFEE<TFEE	17.73		
Assessor Details	Mr. Michael Juckes, Michael Juckes, 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)	18.79	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	17.33	kgCO ₂ /m ²	Pass
	-1.46 (-7.8%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	50.94	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	41.91	kWh/m ² /yr	
	-9.0 (-17.7%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (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	1.26 (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

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

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 (Southern England)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North

3.44 m², No overhang

Windows facing South

3.36 m², No overhang

Air change rate

4.68 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)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Roof U-value

0.11

W/m²K

Thermal bridging γ -value

0.027

W/m²K