

PREDICTED ENERGY ASSESSMENT

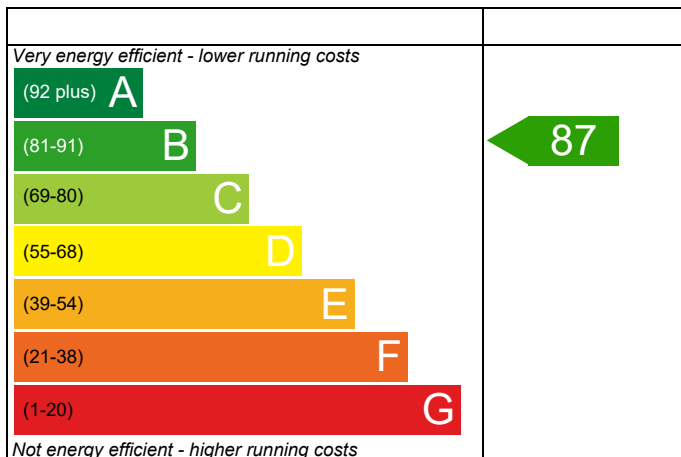
005 - PRJ012481

Dwelling type: House, Semi-Detached
Date of assessment: 16/09/2022
Produced by: Joanna Povey
Total floor area: 80.86 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

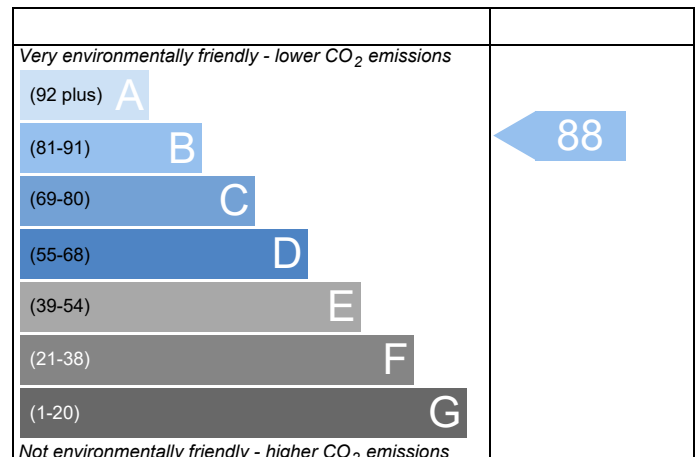


England

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	005 - PRJ012481	Issued on Date	16/09/2022
Assessment Reference	005 S	Prop Type Ref	2BAFF M4(2)
Property	005 - PRJ012481		

SAP Rating	87 B	DER	15.12	TER	27.46
Environmental	88 B	% DER<TER	44.93		
CO ₂ Emissions (t/year)	1.03	DFEE	48.34	TTEE	55.13
General Requirements Compliance	Pass	% DFEE<TTEE	12.31		

Assessor Details	Chris Nicholls, , Tel: ,	Assessor ID	W934-0001
Client			

CALCULATION OF HEAT DEMAND 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.4300 (1b)	x 2.5000 (2b)	= 101.0750 (1b) - (3b)
First floor	40.4300 (1c)	x 2.7300 (2c)	= 110.3739 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.8600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 211.4489 (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					0 * 10 = 0.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.0100
Infiltration rate					0.1505 (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) = 0.1392 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate	0.1462	0.1392	0.1392	0.1288	0.1288	0.1149	0.1183	0.1114	0.1149	0.1218	0.1218	0.1323 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Windows (Uw = 1.40)			13.0900	1.3258	17.3542		(27)
Solid Door			2.1500	1.4000	3.0100		(26)
Flr - Ground			40.4300	0.1000	4.0430	75.6000	3056.5080 (28a)
Wl - Brick	78.8500	13.3290	65.5210	0.2600	17.0355	87.3200	5721.2937 (29a)
Wl - Clad	15.1200	1.9020	13.2180	0.2600	3.4367	87.3200	1154.1958 (29a)
RF - Ins Joist	40.4300		40.4300	0.1000	4.0430	5.8200	235.3026 (30)
Total net area of external elements Aum(A, m ²)			174.8390				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.9223		(33)
Party Wall			48.2600	0.0000	0.0000	54.0300	2607.4878 (32)
Ground Floor Block			21.8400			54.0300	1180.0152 (32c)
Ground Floor Stud			63.7578			5.8200	371.0705 (32c)
1st Floor Stud			83.3535			5.8200	485.1173 (32c)
Internal Floor			40.4200			18.0000	727.5600 (32d)
Internal Ceiling			40.4200			5.8200	235.2444 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 15773.7953 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							195.0754 (35)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 11.1801 (36)
 Total fabric heat loss (33) + (36) = 60.1024 (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	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891
Average = Sum(39)m / 12 =	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915
HLP	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748
HLP (average)												1.1748 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.4790 (42)
 Average daily hot water use (litres/day) 93.0757 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content	102.3833	98.6602	94.9372	91.2142	87.4911	83.7681	83.7681	87.4911	91.2142	94.9372	98.6602	102.3833
Energy content (annual)	151.8314	132.7927	137.0302	119.4662	114.6307	98.9176	91.6617	105.1831	106.4393	124.0448	135.4046	147.0406
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1464.4429 (45)
Water storage loss:	22.7747	19.9189	20.5545	17.9199	17.1946	14.8376	13.7493	15.7775	15.9659	18.6067	20.3107	22.0561
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6588 (55)
Total storage loss	20.4228	18.4464	20.4228	19.7640	20.4228	19.7640	20.4228	20.4228	19.7640	20.4228	19.7640	20.4228
If cylinder contains dedicated solar storage	20.4228	18.4464	20.4228	19.7640	20.4228	19.7640	20.4228	20.4228	19.7640	20.4228	19.7640	20.4228
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624
Total heat required for water heating calculated for each month	195.5166	172.2503	180.7154	161.7422	158.3159	141.1936	135.3469	148.8683	148.7153	167.7300	177.6806	190.7258
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
Output from w/h	195.5166	172.2503	180.7154	161.7422	158.3159	141.1936	135.3469	148.8683	148.7153	167.7300	177.6806	190.7258
RHI water heating demand												Total per year (kWh/year) = Sum(64)m = 1978.8009 (64)
Heat gains from water heating, kWh/month	85.4321	75.7197	80.5107	73.5433	73.0629	66.7109	65.4257	69.9215	69.2119	76.1931	78.8428	83.8392
												1979 (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	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.0513	45.3433	36.8756	27.9172	20.8685	17.6180	19.0369	24.7449	33.2125	42.1710	49.2197	52.4702
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	330.1918	333.6182	324.9839	306.6025	283.3992	261.5914	247.0225	243.5961	252.2304	270.6119	293.8151	315.6229
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Losses e.g. evaporation (negative values) (Table 5)	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590
Water heating gains (Table 5)	114.8281	112.6781	108.2133	102.1435	98.2028	92.6540	87.9377	93.9806	96.1276	102.4100	109.5039	112.6870
Total internal gains	598.0036	593.5719	572.0052	538.5956	504.4028	473.7958	455.9295	464.2539	483.5029	517.1252	554.4711	582.7125

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	FF Specific data or Table 6c	Access factor Table 6d	Gains W					
North	7.2350	11.9814	0.7300	0.7200	0.7700	31.5745 (74)						
East	2.3420	22.3313	0.7300	0.7200	0.7700	19.0498 (76)						
South	3.5080	50.9848	0.7300	0.7200	0.7700	65.1462 (78)						
Solar gains	115.7704	184.0506	267.6141	376.6046	443.3106	486.4860	457.5574	403.5982	326.2217	222.5277	143.3845	97.3144 (83)
Total gains	713.7740	777.6226	839.6193	915.2002	947.7134	960.2818	913.4869	867.8522	809.7246	739.6529	697.8556	680.0269 (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)

tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF HEAT DEMAND 09 Jan 2014

util living area	0.9746	0.9628	0.9319	0.8553	0.7060	0.4800	0.3202	0.3471	0.6277	0.8705	0.9550	0.9783 (86)
Tweekday	18.7394	18.8899	19.1929	19.5297	19.7596	19.8354	19.8426	19.8423	19.8134	19.5686	19.1106	18.6941
Tweekend	20.4048	20.4730	20.6118	20.7730	20.8955	20.9476	20.9557	20.9552	20.9281	20.7883	20.5718	20.3843
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	20.0815	20.1848	20.4008	20.6455	20.8387	20.9195	20.9317	20.9309	20.8878	20.6733	20.3314	20.0498 (87)
Th 2	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402 (88)
util rest of house	0.9682	0.9536	0.9146	0.8192	0.6383	0.3846	0.2119	0.2338	0.5323	0.8295	0.9419	0.9728 (89)
Tweekday	18.7394	18.8899	19.1929	19.5297	19.7596	19.8354	19.8426	19.8423	19.8134	19.5686	19.1106	18.6941
Tweekend	18.7394	18.8899	19.1929	19.5297	19.7596	19.8354	19.8426	19.8423	19.8134	19.5686	19.1106	18.6941
MIT 2	18.7394	18.8899	19.1929	19.5297	19.7596	19.8354	19.8426	19.8423	19.8134	19.5686	19.1106	18.6941 (90)
Living area fraction									fLA = Living area / (4) =			0.2232 (91)
MIT	19.0390	19.1790	19.4625	19.7788	20.0004	20.0774	20.0857	20.0853	20.0532	19.8152	19.3831	18.9967 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0390	19.1790	19.4625	19.7788	20.0004	20.0774	20.0857	20.0853	20.0532	19.8152	19.3831	18.9967 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9612	0.9453	0.9052	0.8129	0.6425	0.3973	0.2269	0.2495	0.5431	0.8239	0.9332	0.9664 (94)
Useful gains	686.0459	735.0904	759.9904	743.9455	608.8624	381.5463	207.2383	216.5122	439.8006	609.3731	651.2625	657.1456 (95)
Ext temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000 (96)
Heat loss rate W	1324.0859	1289.8856	1145.8392	938.3972	664.9830	387.3167	207.6216	217.0871	461.0151	780.3722	1081.3011	1320.0679 (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	474.7017	372.8224	287.0715	140.0052	41.7538	0.0000	0.0000	0.0000	0.0000	127.2233	309.6277	493.2142 (98)
Space heating RHI space heating demand												2246.4199 (98)
												2246 (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	40.4300 (1b)	2.5000 (2b)	101.0750 (1b) - (3b)
First floor	40.4300 (1c)	2.7300 (2c)	110.3739 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.8600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 211.4489 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)							
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)							
Number of intermittent fans				0 * 10 =	0.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) =	0.0000 (8)							
Pressure test					Yes							
Measured/design AP50					3.0100							
Infiltration rate					0.1505 (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) =		0.1392 (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	0.1775	0.1740	0.1705	0.1531	0.1497	0.1323	0.1323	0.1288	0.1392	0.1497	0.1566	0.1636 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (25)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Windows (Uw = 1.40)			13.0900	1.3258	17.3542		(27)
Solid Door			2.1500	1.4000	3.0100		(26)
Flr - Ground			40.4300	0.1000	4.0430	75.6000	3056.5080 (28a)
Wl - Brick	78.8500	13.3290	65.5210	0.2600	17.0355	87.3200	5721.2937 (29a)
Wl - Clad	15.1200	1.9020	13.2180	0.2600	3.4367	87.3200	1154.1958 (29a)
Rf - Ins Joist	40.4300		40.4300	0.1000	4.0430	5.8200	235.3026 (30)
Total net area of external elements Aum(A, m2)			174.8390				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.9223		(33)
Party Wall			48.2600	0.0000	0.0000	54.0300	2607.4878 (32)
Ground Floor Block			21.8400			54.0300	1180.0152 (32c)
Ground Floor Stud			63.7578			5.8200	371.0705 (32c)
1st Floor Stud			83.3535			5.8200	485.1173 (32c)
Internal Floor			40.4200			18.0000	727.5600 (32d)
Internal Ceiling			40.4200			5.8200	235.2444 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15773.7953 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							195.0754 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.1801 (36)
Total fabric heat loss						(33) + (36) =	60.1024 (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	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891 (38)
Average = Sum(39)m / 12 =	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915 (39)
HLP	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748 (40)
HLP (average)												1.1748 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.4790 (42)
Average daily hot water use (litres/day)	93.0757 (43)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	102.3833	98.6602	94.9372	91.2142	87.4911	83.7681	83.7681	87.4911	91.2142	94.9372	98.6602	102.3833 (44)
Energy content (annual)	151.8314	132.7927	137.0302	119.4662	114.6307	98.9176	91.6617	105.1831	106.4393	124.0448	135.4046	147.0406 (45)
Distribution loss (46)m = 0.15 x (45)m	22.7747	19.9189	20.5545	17.9199	17.1946	14.8376	13.7493	15.7775	15.9659	18.6067	20.3107	22.0561 (46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6588 (55)
Total storage loss	20.4228	18.4464	20.4228	19.7640	20.4228	19.7640	20.4228	20.4228	19.7640	20.4228	19.7640	20.4228 (56)
If cylinder contains dedicated solar storage	20.4228	18.4464	20.4228	19.7640	20.4228	19.7640	20.4228	20.4228	19.7640	20.4228	19.7640	20.4228 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	195.5166	172.2503	180.7154	161.7422	158.3159	141.1936	135.3469	148.8683	148.7153	167.7300	177.6806	190.7258 (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	195.5166	172.2503	180.7154	161.7422	158.3159	141.1936	135.3469	148.8683	148.7153	167.7300	177.6806	190.7258 (64)
Heat gains from water heating, kWh/month	85.4321	75.7197	80.5107	73.5433	73.0629	66.7109	65.4257	69.9215	69.2119	76.1931	78.8428	83.8392 (65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.0513	45.3433	36.8756	27.9172	20.8685	17.6180	19.0369	24.7449	33.2125	42.1710	49.2197	52.4702 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	330.1918	333.6182	324.9839	306.6025	283.3992	261.5914	247.0225	243.5961	252.2304	270.6119	293.8151	315.6229 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590 (71)
Water heating gains (Table 5)	114.8281	112.6781	108.2133	102.1435	98.2028	92.6540	87.9377	93.9806	96.1276	102.4100	109.5039	112.6870 (72)
Total internal gains	598.0036	593.5719	572.0052	538.5956	504.4028	473.7958	455.9295	464.2539	483.5029	517.1252	554.4711	582.7125 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	7.2350	10.6334	0.7300	0.7200	0.7700	28.0220 (74)						
East	2.3420	19.6403	0.7300	0.7200	0.7700	16.7542 (76)						
South	3.5080	46.7521	0.7300	0.7200	0.7700	59.7378 (78)						
Solar gains	104.5139	184.1612	269.5968	365.7370	440.1483	450.7955	428.8287	370.9239	302.3684	208.1603	126.2688	88.7573 (83)
Total gains	702.5175	777.7331	841.6020	904.3326	944.5511	924.5914	884.7582	835.1779	785.8713	725.2854	680.7400	671.4697 (84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature during heating periods in the living area from Table 9, Th1 (C)	18.6128	18.7955	19.0832	19.4234	19.6872	19.8110	19.8382	19.8353	19.7699	19.4547	18.9701	18.5559
Utilisation factor for gains for living area, nil,m (see Table 9a)	0.9795	0.9677	0.9431	0.8860	0.7752	0.6112	0.4604	0.5047	0.7243	0.9047	0.9663	0.9828 (86)
tau	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263
alpha	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751
util living area	18.6128	18.7955	19.0832	19.4234	19.6872	19.8110	19.8382	19.8353	19.7699	19.4547	18.9701	18.5559
Tweekday	20.3483	20.4306	20.5615	20.7211	20.8546	20.9281	20.9499	20.9466	20.8986	20.7322	20.5080	20.3227
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	19.9941	20.1192	20.3232	20.5645	20.7756	20.8895	20.9226	20.9176	20.8417	20.5867	20.2317	19.9547 (87)
Th 2	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402 (88)
util rest of house	0.9745	0.9599	0.9291	0.8575	0.7213	0.5261	0.3551	0.3967	0.6454	0.8746	0.9567	0.9785 (89)
Tweekday	18.6128	18.7955	19.0832	19.4234	19.6872	19.8110	19.8382	19.8353	19.7699	19.4547	18.9701	18.5559
Tweekend	18.6128	18.7955	19.0832	19.4234	19.6872	19.8110	19.8382	19.8353	19.7699	19.4547	18.9701	18.5559
MIT 2	18.6128	18.7955	19.0832	19.4234	19.6872	19.8110	19.8382	19.8353	19.7699	19.4547	18.9701	18.5559 (90)
Living area fraction										fLA = Living area / (4) =		0.2232 (91)
MIT	18.9212	19.0910	19.3600	19.6781	19.9302	20.0518	20.0803	20.0769	20.0091	19.7074	19.2517	18.8682 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9212	19.0910	19.3600	19.6781	19.9302	20.0518	20.0803	20.0769	20.0091	19.7074	19.2517	18.8682 (93)

8. Space heating requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9683	0.9521	0.9197	0.8494	0.7207	0.5356	0.3694	0.4112	0.6510	0.8667	0.9488	0.9729	(94)	
Useful gains	680.2248	740.4669	774.0589	768.1305	680.7763	495.2090	326.8208	343.3844	511.6031	628.6305	645.8819	653.2597	(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														
1388.8874	1348.0242	1221.5875	1023.8312	781.7960	517.8712	330.5952	349.2770	561.3186	865.1218	1154.3089	1393.3504		(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														
527.2450	408.2785	332.9612	184.1045	75.1586	0.0000	0.0000	0.0000	0.0000	175.9496	366.0674	550.6275		(98)	
Space heating														
Space heating per m2													(98) / (4) = 32.4065	(99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													264.6128	(206)
Efficiency of secondary/supplementary heating system, %													100.0000	(208)
Space heating requirement													990.2741	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	527.2450	408.2785	332.9612	184.1045	75.1586	0.0000	0.0000	0.0000	0.0000	175.9496	366.0674	550.6275		(98)
Space heating efficiency (main heating system 1)	264.6128	264.6128	264.6128	264.6128	264.6128	0.0000	0.0000	0.0000	0.0000	264.6128	264.6128	264.6128		(210)
Space heating fuel (main heating system)	199.2515	154.2928	125.8296	69.5750	28.4032	0.0000	0.0000	0.0000	0.0000	66.4932	138.3408	208.0880		(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	195.5166	172.2503	180.7154	161.7422	158.3159	141.1936	135.3469	148.8683	148.7153	167.7300	177.6806	190.7258		(64)
Efficiency of water heater	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100		(216)
(217)m	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100		(217)
Fuel for water heating, kWh/month	69.5764	61.2969	64.3092	57.5575	56.3382	50.2450	48.1644	52.9762	52.9217	59.6883	63.2293	67.8715		(219)
Water heating fuel used												704.1746		(219)
Annual totals kWh/year														
Space heating fuel - main system													990.2741	(211)
Space heating fuel - secondary													0.0000	(215)
Electricity for pumps and fans:														
(MEV)Decentralised, Database: total watage = 6.9550, total flow = 29.0000, SFP = 0.2398)														
mechanical ventilation fans (SFP = 0.2398)													61.8678	(230a)
Total electricity for the above, kWh/year													61.8678	(231)
Electricity for lighting (calculated in Appendix L)													360.6326	(232)
Total delivered energy for all uses													2116.9490	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	990.2741	13.1900	130.6171	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	704.1746	13.1900	92.8806	(247)
Mechanical ventilation fans	61.8678	13.1900	8.1604	(249)
Pumps and fans for heating	0.0000	0.0000	0.0000	(249)
Energy for lighting	360.6326	13.1900	47.5674	(250)
Additional standing charges			0.0000	(251)
Total energy cost			279.2256	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.9318	(257)
SAP value		87.0016	
SAP rating (Section 12)		87	(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	990.2741	0.5190	513.9522	(261)
Space heating - secondary	0.0000	0.5190	0.0000	(263)
Water heating (other fuel)	704.1746	0.5190	365.4666	(264)
Space and water heating			879.4188	(265)
Pumps and fans	61.8678	0.5190	32.1094	(267)
Energy for lighting	360.6326	0.5190	187.1683	(268)
Total kg/year			1098.6965	(272)
CO2 emissions per m2			13.5900	(273)
EI value			88.3025	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

EI rating
EI band

88 (274)
B

Calculation of stars for heating and DHW

Main heating energy efficiency	$13.19 \times (1 + 0.29 \times 0.25) / 2.6461 = 5.346$, stars = 3
Main heating environmental impact	$0.519 \times (1 + 0.29 \times 0.25) / 2.6461 = 0.2104$, stars = 5
Water heating energy efficiency	$13.19 / 2.8101 = 4.694$, stars = 4
Water heating environmental impact	$0.519 / 2.8101 = 0.1847$, stars = 5

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	40.4300 (1b)	2.5000 (2b)	101.0750 (1b) - (3b)
First floor	40.4300 (1c)	2.7300 (2c)	110.3739 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.8600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 211.4489 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				0 * 10 =	0.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) =	0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.0100
Infiltration rate					0.1505 (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) =		0.1392 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infltr rate	0.1462	0.1392	0.1392	0.1288	0.1288	0.1149	0.1183	0.1114	0.1149	0.1218	0.1218	0.1323 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Windows (Uw = 1.40)			13.0900	1.3258	17.3542		(27)
Solid Door			2.1500	1.4000	3.0100		(26)
Flr - Ground			40.4300	0.1000	4.0430	75.6000	3056.5080 (28a)
Wl - Brick	78.8500	13.3290	65.5210	0.2600	17.0355	87.3200	5721.2937 (29a)
Wl - Clad	15.1200	1.9020	13.2180	0.2600	3.4367	87.3200	1154.1958 (29a)
Rf - Ins Joist	40.4300		40.4300	0.1000	4.0430	5.8200	235.3026 (30)
Total net area of external elements Aum(A, m2)			174.8390				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.9223		(33)
Party Wall			48.2600	0.0000	0.0000	54.0300	2607.4878 (32)
Ground Floor Block			21.8400			54.0300	1180.0152 (32c)
Ground Floor Stud			63.7578			5.8200	371.0705 (32c)
1st Floor Stud			83.3535			5.8200	485.1173 (32c)
Internal Floor			40.4200			18.0000	727.5600 (32d)
Internal Ceiling			40.4200			5.8200	235.2444 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15773.7953 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							195.0754 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.1801 (36)
Total fabric heat loss						(33) + (36) =	60.1024 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891 (38)
Heat transfer coeff	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915 (39)
Average = Sum(39)m / 12 =												94.9915 (39)
HLP	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748 (40)
HLP (average)												1.1748 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.4790 (42)
Average daily hot water use (litres/day)	93.0757 (43)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	102.3833	98.6602	94.9372	91.2142	87.4911	83.7681	83.7681	87.4911	91.2142	94.9372	98.6602	102.3833 (44)
Energy conte	151.8314	132.7927	137.0302	119.4662	114.6307	98.9176	91.6617	105.1831	106.4393	124.0448	135.4046	147.0406 (45)
Energy content (annual)	Total = Sum(45)m = 1464.4429 (45)											
Distribution loss (46)m = 0.15 x (45)m	22.7747	19.9189	20.5545	17.9199	17.1946	14.8376	13.7493	15.7775	15.9659	18.6067	20.3107	22.0561 (46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6588 (55)
Total storage loss	20.4228	18.4464	20.4228	19.7640	20.4228	19.7640	20.4228	20.4228	19.7640	20.4228	19.7640	20.4228 (56)
If cylinder contains dedicated solar storage	20.4228	18.4464	20.4228	19.7640	20.4228	19.7640	20.4228	20.4228	19.7640	20.4228	19.7640	20.4228 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	195.5166	172.2503	180.7154	161.7422	158.3159	141.1936	135.3469	148.8683	148.7153	167.7300	177.6806	190.7258 (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	195.5166	172.2503	180.7154	161.7422	158.3159	141.1936	135.3469	148.8683	148.7153	167.7300	177.6806	190.7258 (64)
Heat gains from water heating, kWh/month	85.4321	75.7197	80.5107	73.5433	73.0629	66.7109	65.4257	69.9215	69.2119	76.1931	78.8428	83.8392 (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	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.0513	45.3433	36.8756	27.9172	20.8685	17.6180	19.0369	24.7449	33.2125	42.1710	49.2197	52.4702 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	330.1918	333.6182	324.9839	306.6025	283.3992	261.5914	247.0225	243.5961	252.2304	270.6119	293.8151	315.6229 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590 (71)
Water heating gains (Table 5)	114.8281	112.6781	108.2133	102.1435	98.2028	92.6540	87.9377	93.9806	96.1276	102.4100	109.5039	112.6870 (72)
Total internal gains	598.0036	593.5719	572.0052	538.5956	504.4028	473.7958	455.9295	464.2539	483.5029	517.1252	554.4711	582.7125 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	7.2350	11.9814	0.7300	0.7200	0.7700	31.5745 (74)						
East	2.3420	22.3313	0.7300	0.7200	0.7700	19.0498 (76)						
South	3.5080	50.9848	0.7300	0.7200	0.7700	65.1462 (78)						
Solar gains	115.7704	184.0506	267.6141	376.6046	443.3106	486.4860	457.5574	403.5982	326.2217	222.5277	143.3845	97.3144 (83)
Total gains	713.7740	777.6226	839.6193	915.2002	947.7134	960.2818	913.4869	867.8522	809.7246	739.6529	697.8556	680.0269 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263 (85)
tau	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751
alpha	0.9746	0.9628	0.9319	0.8553	0.7060	0.4800	0.3202	0.3471	0.6277	0.8705	0.9550	0.9783 (86)
util living area	18.7394	18.8899	19.1929	19.5297	19.7596	19.8354	19.8426	19.8423	19.8134	19.5686	19.1106	18.6941
Tweekday	20.4048	20.4730	20.6118	20.7730	20.8955	20.9476	20.9557	20.9552	20.9281	20.7883	20.5718	20.3843
Tweekend	0	0	0	0	0	0	0	0	0	0	0	0
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	20.0815	20.1848	20.4008	20.6455	20.8387	20.9195	20.9317	20.9309	20.8878	20.6733	20.3314	20.0498 (87)
Th 2	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402 (88)
util rest of house	0.9682	0.9536	0.9146	0.8192	0.6383	0.3846	0.2119	0.2338	0.5323	0.8295	0.9419	0.9728 (89)
Tweekday	18.7394	18.8899	19.1929	19.5297	19.7596	19.8354	19.8426	19.8423	19.8134	19.5686	19.1106	18.6941
Tweekend	18.7394	18.8899	19.1929	19.5297	19.7596	19.8354	19.8426	19.8423	19.8134	19.5686	19.1106	18.6941
MIT 2	18.7394	18.8899	19.1929	19.5297	19.7596	19.8354	19.8426	19.8423	19.8134	19.5686	19.1106	18.6941 (90)
Living area fraction	fLA = Living area / (4) =											0.2232 (91)
MIT	19.0390	19.1790	19.4625	19.7788	20.0004	20.0774	20.0857	20.0853	20.0532	19.8152	19.3831	18.9967 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0390	19.1790	19.4625	19.7788	20.0004	20.0774	20.0857	20.0853	20.0532	19.8152	19.3831	18.9967 (93)

8. Space heating requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9612	0.9453	0.9052	0.8129	0.6425	0.3973	0.2269	0.2495	0.5431	0.8239	0.9332	0.9664	(94)	
Useful gains	686.0459	735.0904	759.9904	743.9455	608.8624	381.5463	207.2383	216.5122	439.8006	609.3731	651.2625	657.1456	(95)	
Ext temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000	(96)	
Heat loss rate W	1324.0859	1289.8856	1145.8392	938.3972	664.9830	387.3167	207.6216	217.0871	461.0151	780.3722	1081.3011	1320.0679	(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	474.7017	372.8224	287.0715	140.0052	41.7538	0.0000	0.0000	0.0000	0.0000	127.2233	309.6277	493.2142	(98)	
Space heating												2246.4199	(98)	
Space heating per m2												(98) / (4) =	27.7816	(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 %)													264.6128	(206)
Efficiency of secondary/supplementary heating system, %													100.0000	(208)
Space heating requirement													848.9459	(211)
Space heating requirement	474.7017	372.8224	287.0715	140.0052	41.7538	0.0000	0.0000	0.0000	0.0000	127.2233	309.6277	493.2142	(98)	
Space heating efficiency (main heating system 1)	264.6128	264.6128	264.6128	264.6128	264.6128	0.0000	0.0000	0.0000	0.0000	264.6128	264.6128	264.6128	(210)	
Space heating fuel (main heating system)	179.3948	140.8935	108.4874	52.9095	15.7792	0.0000	0.0000	0.0000	0.0000	48.0790	117.0116	186.3909	(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	195.5166	172.2503	180.7154	161.7422	158.3159	141.1936	135.3469	148.8683	148.7153	167.7300	177.6806	190.7258	(64)	
Efficiency of water heater	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	(216)	
(217)m	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	(217)	
Fuel for water heating, kWh/month	69.5764	61.2969	64.3092	57.5575	56.3382	50.2450	48.1644	52.9762	52.9217	59.6883	63.2293	67.8715	(219)	
Water heating fuel used												704.1746	(219)	
Annual totals kWh/year														
Space heating fuel - main system													848.9459	(211)
Space heating fuel - secondary													0.0000	(215)
Electricity for pumps and fans:														
(MEV)Decentralised, Database: total watage = 6.9550, total flow = 29.0000, SFP = 0.2398)														
mechanical ventilation fans (SFP = 0.2398)													61.8678	(230a)
Total electricity for the above, kWh/year													61.8678	(231)
Electricity for lighting (calculated in Appendix L)													360.6326	(232)
Total delivered energy for all uses													1975.6208	(238)

10a. Fuel costs - using BEDF prices (505)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	848.9459	20.4300	173.4396	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	704.1746	20.4300	143.8629	(247)
Mechanical ventilation fans	61.8678	20.4300	12.6396	(249)
Pumps and fans for heating	0.0000	0.0000	0.0000	(249)
Energy for lighting	360.6326	20.4300	73.6772	(250)
Additional standing charges			0.0000	(251)
Total energy cost			403.6193	(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	848.9459	0.5190	440.6029	(261)
Space heating - secondary	0.0000	0.5190	0.0000	(263)
Water heating (other fuel)	704.1746	0.5190	365.4666	(264)
Space and water heating			806.0695	(265)
Pumps and fans	61.8678	0.5190	32.1094	(267)
Energy for lighting	360.6326	0.5190	187.1683	(268)
Total kg/year			1025.3472	(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	848.9459	3.0700	2606.2639	(261)
Space heating - secondary	0.0000	3.0700	0.0000	(263)
Water heating (other fuel)	704.1746	3.0700	2161.8159	(264)
Space and water heating			4768.0798	(265)
Pumps and fans	61.8678	3.0700	189.9340	(267)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

Energy for lighting	360.6326	3.0700	1107.1422 (268)
Primary energy kWh/year			6065.1560 (272)
Primary energy kWh/m ² /year			75.0081 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating:	B 87
Current environmental impact rating:	B 88

(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	+ 1.7	-£ 57	-144 kg (14.1%)
U Solar photovoltaic panels	+ 10.6	-£ 373	-947 kg (107.5%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£57	1.78 kg/m ²	B 89 B 90
Solar photovoltaic panels	£373	11.71 kg/m ²	A 99 A 99
Total Savings	£429	13.49 kg/m²	

Potential energy efficiency rating:	A 99
Potential environmental impact rating:	A 99

Fuel prices for cost data on this page from database revision number 505 TEST (31 Aug 2022)
Recommendation texts revision number 4.9c (22 Feb 2014)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£404	£347	£57
Space heating	£186	£186	-£0
Water heating	£144	£87	£57
Lighting	£74	£74	£0
Generated (PV)	-£0	-£373	£373
Total cost of fuels	£404	-£26	£430
Total cost of uses	£404	-£26	£430
Delivered energy	24 kWh/m ²	-2 kWh/m ²	26 kWh/m ²
Carbon dioxide emissions	1.0 tonnes	-0.1 tonnes	1.1 tonnes
CO2 emissions per m ²	13 kg/m ²	-1 kg/m ²	13 kg/m ²
Primary energy	75 kWh/m ²	-5 kWh/m ²	80 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	40.4300 (1b)	2.5000 (2b)	101.0750 (1b) - (3b)
First floor	40.4300 (1c)	2.7300 (2c)	110.3739 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.8600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 211.4489 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)							
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)							
Number of intermittent fans				0 * 10 =	0.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) =	0.0000 (8)							
Pressure test					Yes							
Measured/design AP50					3.0100							
Infiltration rate					0.1505 (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) =		0.1392 (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	0.1775	0.1740	0.1705	0.1531	0.1497	0.1323	0.1323	0.1288	0.1392	0.1497	0.1566	0.1636 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (25)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Windows (Uw = 1.40)			13.0900	1.3258	17.3542		(27)
Solid Door			2.1500	1.4000	3.0100		(26)
Flr - Ground			40.4300	0.1000	4.0430	75.6000	3056.5080 (28a)
Wl - Brick	78.8500	13.3290	65.5210	0.2600	17.0355	87.3200	5721.2937 (29a)
Wl - Clad	15.1200	1.9020	13.2180	0.2600	3.4367	87.3200	1154.1958 (29a)
Rf - Ins Joist	40.4300		40.4300	0.1000	4.0430	5.8200	235.3026 (30)
Total net area of external elements Aum(A, m2)			174.8390				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.9223		(33)
Party Wall			48.2600	0.0000	0.0000	54.0300	2607.4878 (32)
Ground Floor Block			21.8400			54.0300	1180.0152 (32c)
Ground Floor Stud			63.7578			5.8200	371.0705 (32c)
1st Floor Stud			83.3535			5.8200	485.1173 (32c)
Internal Floor			40.4200			18.0000	727.5600 (32d)
Internal Ceiling			40.4200			5.8200	235.2444 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15773.7953 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							195.0754 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.1801 (36)
Total fabric heat loss						(33) + (36) =	60.1024 (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	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891 (38)
Average = Sum(39)m / 12 =	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915 (39)
HLP	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748 (40)
HLP (average)												1.1748 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.4790 (42)
Average daily hot water use (litres/day)	93.0757 (43)

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		
Daily hot water use	102.3833	98.6602	94.9372	91.2142	87.4911	83.7681	83.7681	87.4911	91.2142	94.9372	98.6602	102.3833	(44)	
Energy conte	151.8314	132.7927	137.0302	119.4662	114.6307	98.9176	91.6617	105.1831	106.4393	124.0448	135.4046	147.0406	(45)	
Energy content (annual)	Total = Sum(45)m =											1464.4429	(45)	
Distribution loss (46)m = 0.15 x (45)m	22.7747	19.9189	20.5545	17.9199	17.1946	14.8376	13.7493	15.7775	15.9659	18.6067	20.3107	22.0561	(46)	
Water storage loss:														
Store volume													200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.2200	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.6588	(55)
Total storage loss	20.4228	18.4464	20.4228	19.7640	20.4228	19.7640	20.4228	20.4228	19.7640	20.4228	19.7640	20.4228	(56)	
If cylinder contains dedicated solar storage	20.4228	18.4464	20.4228	19.7640	20.4228	19.7640	20.4228	20.4228	19.7640	20.4228	19.7640	20.4228	(57)	
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)	
Total heat required for water heating calculated for each month	195.5166	172.2503	179.3196	154.9886	145.5216	128.5869	122.3199	136.7719	143.3125	166.3342	177.6806	190.7258	(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													1.2384	(H8)
Utilisation factor													0.5540	(H9)
Collector performance factor													0.8793	(H10)
Dedicated solar storage volume													75.0000	(H11)
Effective solar volume													75.0000	(H13)
Daily hot water demand													93.0757	(H14)
Volume ratio Veff/V													0.8058	(H15)
Solar storage volume factor													0.9568	(H16)
Solar input	-24.5130	-40.9051	-69.6661	-93.3663	-115.3462	-113.4037	-111.9050	-97.7720	-76.5751	-52.2918	-29.0759	-845.3332	(H17)	
Solar input (sum of months) = Sum(63)m =													-845.3332	(63)
Output from w/h	171.0036	131.3452	109.6536	61.6223	30.1754	15.1832	10.4149	38.9999	66.7374	114.0425	148.6047	170.2126	(64)	
Total per year (kWh/year) = Sum(64)m =													1067.9953	(64)
Heat gains from water heating, kWh/month	85.4321	75.7197	79.3941	68.1404	62.8274	56.6255	55.0041	60.2444	64.8896	75.0765	78.8428	83.8392	(65)	

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.0513	45.3433	36.8756	27.9172	20.8685	17.6180	19.0369	24.7449	33.2125	42.1710	49.2197	52.4702	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	330.1918	333.6182	324.9839	306.6025	283.3992	261.5914	247.0225	243.5961	252.2304	270.6119	293.8151	315.6229	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	(71)
Water heating gains (Table 5)	114.8281	112.6781	106.7125	94.6395	84.4454	78.6466	73.9303	80.9736	90.1244	100.9092	109.5039	112.6870	(72)
Total internal gains	598.0036	593.5719	570.5044	531.0916	490.6455	459.7884	441.9220	451.2470	477.4997	515.6244	554.4711	582.7125	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor data Table 6d	Gains W							
North	7.2350	10.6334	0.7300	0.7200	0.7700	28.0220	(74)						
East	2.3420	19.6403	0.7300	0.7200	0.7700	16.7542	(76)						
South	3.5080	46.7521	0.7300	0.7200	0.7700	59.7378	(78)						
Solar gains	104.5139	184.1612	269.5968	365.7370	440.1483	450.7955	428.8287	370.9239	302.3684	208.1603	126.2688	88.7573	(83)
Total gains	702.5175	777.7331	840.1012	896.8286	930.7937	910.5839	870.7507	822.1710	779.8681	723.7846	680.7400	671.4697	(84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
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	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263		
alpha	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751		
util living area	0.9795	0.9677	0.9434	0.8884	0.7814	0.6186	0.4672	0.5117	0.7278	0.9052	0.9663	0.9828	(86)	
Tweekday	18.6128	18.7955	19.0815	19.4173	19.6816	19.8095	19.8379	19.8349	19.7684	19.4533	18.9701	18.5559		
Tweekend	20.3483	20.4306	20.5607	20.7180	20.8513	20.9268	20.9495	20.9461	20.8975	20.7315	20.5080	20.3227		
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0		
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0		

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

16 / 9	0	0	0	0	0	0	0	0	0	0	0	0	0
MIT	19.9941	20.1192	20.3220	20.5597	20.7705	20.8875	20.9221	20.9168	20.8400	20.5857	20.2317	19.9547	(87)
Th 2	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	(88)
util rest of house													
	0.9745	0.9599	0.9294	0.8603	0.7281	0.5331	0.3606	0.4026	0.6491	0.8753	0.9567	0.9785	(89)
Tweekday	18.6128	18.7955	19.0815	19.4173	19.6816	19.8095	19.8379	19.8349	19.7684	19.4533	18.9701	18.5559	
Tweekend	18.6128	18.7955	19.0815	19.4173	19.6816	19.8095	19.8379	19.8349	19.7684	19.4533	18.9701	18.5559	
MIT 2	18.6128	18.7955	19.0815	19.4173	19.6816	19.8095	19.8379	19.8349	19.7684	19.4533	18.9701	18.5559	(90)
Living area fraction													
MIT	18.9212	19.0910	19.3584	19.6723	19.9247	20.0501	20.0799	20.0764	20.0076	19.7061	19.2517	18.8682	(92)
Temperature adjustment													
adjusted MIT	18.9212	19.0910	19.3584	19.6723	19.9247	20.0501	20.0799	20.0764	20.0076	19.7061	19.2517	18.8682	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9683	0.9521	0.9201	0.8521	0.7272	0.5425	0.3750	0.4172	0.6546	0.8674	0.9488	0.9729	(94)
Useful gains	680.2248	740.4669	772.9876	764.1565	676.8604	493.9932	326.5721	343.0154	510.4665	627.7761	645.8819	653.2597	(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													
	1388.8874	1348.0242	1221.4378	1023.2812	781.2752	517.7151	330.5619	349.2282	561.1693	865.0034	1154.3089	1393.3504	(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													
	527.2450	408.2785	333.6469	186.5698	77.6846	0.0000	0.0000	0.0000	0.0000	176.4971	366.0674	550.6275	(98)
Space heating													
Space heating per m2													(98) / (4) = 32.4835 (99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													264.6128 (206)
Efficiency of secondary/supplementary heating system, %													100.0000 (208)
Space heating requirement													992.6264 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	527.2450	408.2785	333.6469	186.5698	77.6846	0.0000	0.0000	0.0000	0.0000	176.4971	366.0674	550.6275	(98)
Space heating efficiency (main heating system 1)	264.6128	264.6128	264.6128	264.6128	264.6128	0.0000	0.0000	0.0000	0.0000	264.6128	264.6128	264.6128	(210)
Space heating fuel (main heating system)	199.2515	154.2928	126.0887	70.5067	29.3579	0.0000	0.0000	0.0000	0.0000	66.7001	138.3408	208.0880	(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													
	171.0036	131.3452	109.6536	61.6223	30.1754	15.1832	10.4149	38.9999	66.7374	114.0425	148.6047	170.2126	(64)
Efficiency of water heater	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	(216)
(217)m	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	(217)
Fuel for water heating, kWh/month	60.8532	46.7404	39.0212	21.9289	10.7382	5.4031	3.7062	13.8785	23.7491	40.5831	52.8823	60.5717	(219)
Water heating fuel used													
Annual totals kWh/year													380.0560 (219)
Space heating fuel - main system													992.6264 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 6.9550, total flow = 29.0000, SFP = 0.2398)													
mechanical ventilation fans (SFP = 0.2398)													61.8678 (230a)
pump for solar water heating													50.0000 (230g)
Total electricity for the above, kWh/year													111.8678 (231)
Electricity for lighting (calculated in Appendix L)													360.6326 (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													117.9433 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	992.6264	13.1900	130.9274	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	380.0560	13.1900	50.1294	(247)
Mechanical ventilation fans	61.8678	13.1900	8.1604	(249)
Pumps and fans for heating	0.0000	0.0000	0.0000	(249)
Pump for solar water heating	50.0000	13.1900	6.5950	(249)
Energy for lighting	360.6326	13.1900	47.5674	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit		-1727.2394	-227.8229	(252)
Total energy cost			15.5567	(255)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

 11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.0519 (257)
SAP value		99.2758
SAP rating (Section 12)		99 (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
Space heating - main system 1	992.6264	0.5190	515.1731 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	380.0560	0.5190	197.2491 (264)
Space and water heating			712.4221 (265)
Pumps and fans	111.8678	0.5190	58.0594 (267)
Energy for lighting	360.6326	0.5190	187.1683 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			61.2126 (272)
CO2 emissions per m2			0.7600 (273)
EI value			99.3483
EI rating			99 (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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.4300 (1b)	2.5000 (2b)	101.0750 (1b) - (3b)
First floor	40.4300 (1c)	2.7300 (2c)	110.3739 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.8600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 211.4489 (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				0 * 10 =	0.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) =	0.0000 (8)							
Pressure test					Yes							
Measured/design AP50					3.0100							
Infiltration rate					0.1505 (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) =		0.1392 (21)							
Wind speed	Jan 4.2000	Feb 4.0000	Mar 4.0000	Apr 3.7000	May 3.7000	Jun 3.3000	Jul 3.4000	Aug 3.2000	Sep 3.3000	Oct 3.5000	Nov 3.5000	Dec 3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate	0.1462	0.1392	0.1392	0.1288	0.1288	0.1149	0.1183	0.1114	0.1149	0.1218	0.1218	0.1323 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (25)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Windows (Uw = 1.40)			13.0900	1.3258	17.3542		(27)
Solid Door			2.1500	1.4000	3.0100		(26)
Flr - Ground			40.4300	0.1000	4.0430	75.6000	3056.5080 (28a)
Wl - Brick	78.8500	13.3290	65.5210	0.2600	17.0355	87.3200	5721.2937 (29a)
Wl - Clad	15.1200	1.9020	13.2180	0.2600	3.4367	87.3200	1154.1958 (29a)
Rf - Ins Joist	40.4300		40.4300	0.1000	4.0430	5.8200	235.3026 (30)
Total net area of external elements Aum(A, m ²)			174.8390				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.9223		(33)
Party Wall			48.2600	0.0000	0.0000	54.0300	2607.4878 (32)
Ground Floor Block			21.8400			54.0300	1180.0152 (32c)
Ground Floor Stud			63.7578			5.8200	371.0705 (32c)
1st Floor Stud			83.3535			5.8200	485.1173 (32c)
Internal Floor			40.4200			18.0000	727.5600 (32d)
Internal Ceiling			40.4200			5.8200	235.2444 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15773.7953 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							195.0754 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.1801 (36)
Total fabric heat loss						(33) + (36) =	60.1024 (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	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891	34.8891 (38)
Average = Sum(39)m / 12 =	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915	94.9915 (39)
HLP	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748	1.1748 (40)
HLP (average)												1.1748 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.4790 (42)
Average daily hot water use (litres/day)	93.0757 (43)

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	
Daily hot water use	102.3833	98.6602	94.9372	91.2142	87.4911	83.7681	83.7681	87.4911	91.2142	94.9372	98.6602	102.3833	(44)
Energy conte	151.8314	132.7927	137.0302	119.4662	114.6307	98.9176	91.6617	105.1831	106.4393	124.0448	135.4046	147.0406	(45)
Energy content (annual)	Total = Sum(45)m =											1464.4429 (45)	
Distribution loss (46)m = 0.15 x (45)m	22.7747	19.9189	20.5545	17.9199	17.1946	14.8376	13.7493	15.7775	15.9659	18.6067	20.3107	22.0561	(46)
Water storage loss:													
Store volume												200.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.2200 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.6588 (55)	
Total storage loss	20.4228	18.4464	20.4228	19.7640	20.4228	19.7640	20.4228	20.4228	19.7640	20.4228	19.7640	20.4228	(56)
If cylinder contains dedicated solar storage	20.4228	18.4464	20.4228	19.7640	20.4228	19.7640	20.4228	20.4228	19.7640	20.4228	19.7640	20.4228	(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month	195.5166	172.2503	179.3196	154.9886	145.5216	128.5869	122.3199	136.7719	143.3125	166.3342	177.6806	190.7258	(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												1140.0998 (H5)	
Overshading factor												0.8000 (H6)	
Solar energy available												1915.3676 (H7)	
Adjustment factor for showers												1.0000 (H7a)	
Solar-to-load ratio												1.3079 (H8)	
Utilisation factor												0.5345 (H9)	
Collector performance factor												0.8793 (H10)	
Dedicated solar storage volume												75.0000 (H11)	
Effective solar volume												75.0000 (H13)	
Daily hot water demand												93.0757 (H14)	
Volume ratio Veff/V												0.8058 (H15)	
Solar storage volume factor												0.9568 (H16)	
Solar input	-26.5093	-39.8434	-67.1013	-92.7545	-111.7076	-117.5674	-114.7444	-102.4674	-79.9762	-54.4063	-32.2227	-861.2635	(H17)
Solar input (sum of months) = Sum(63)m =												-21.9631 (63)	
Output from w/h	169.0073	132.4070	112.2184	62.2341	33.8140	11.0195	7.5756	34.3044	63.3363	111.9279	145.4579	168.7627	(64)
Heat gains from water heating, kWh/month	85.4321	75.7197	79.3941	68.1404	62.8274	56.6255	55.0041	60.2444	64.8896	75.0765	78.8428	83.8392	(65)
Total per year (kWh/year) = Sum(64)m =												1052.0651 (64)	

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	(66)
(66)m	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	148.7386	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.0513	45.3433	36.8756	27.9172	20.8685	17.6180	19.0369	24.7449	33.2125	42.1710	49.2197	52.4702	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	330.1918	333.6182	324.9839	306.6025	283.3992	261.5914	247.0225	243.5961	252.2304	270.6119	293.8151	315.6229	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	52.3528	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	-99.1590	(71)
Water heating gains (Table 5)	114.8281	112.6781	106.7125	94.6395	84.4454	78.6466	73.9303	80.9736	90.1244	100.9092	109.5039	112.6870	(72)
Total internal gains	598.0036	593.5719	570.5044	531.0916	490.6455	459.7884	441.9220	451.2470	477.4997	515.6244	554.4711	582.7125	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b g	Specific data or Table 6c FF	Access factor Table 6d	Gains W							
North	7.2350	11.9814	0.7300	0.7200	0.7700	31.5745 (74)							
East	2.3420	22.3313	0.7300	0.7200	0.7700	19.0498 (76)							
South	3.5080	50.9848	0.7300	0.7200	0.7700	65.1462 (78)							
Solar gains	115.7704	184.0506	267.6141	376.6046	443.3106	486.4860	457.5574	403.5982	326.2217	222.5277	143.3845	97.3144	(83)
Total gains	713.7740	777.6226	838.1185	907.6962	933.9561	946.2744	899.4795	854.8452	803.7214	738.1521	697.8556	680.0269	(84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	46.1263	
alpha	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	4.0751	
util living area	0.9746	0.9628	0.9322	0.8581	0.7128	0.4864	0.3250	0.3522	0.6312	0.8712	0.9550	0.9783	(86)
Tweekday	18.7394	18.8899	19.1913	19.5246	19.7561	19.8350	19.8425	19.8423	19.8127	19.5675	19.1106	18.6941	
Tweekend	20.4048	20.4730	20.6110	20.7703	20.8932	20.9471	20.9557	20.9551	20.9275	20.7877	20.5718	20.3843	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

16 / 9	0	0	0	0	0	0	0	0	0	0	0	0	0	
MIT	20.0815	20.1848	20.3997	20.6414	20.8352	20.9188	20.9316	20.9307	20.8868	20.6724	20.3314	20.0498	(87)	
Th 2	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	19.9402	(88)	
util rest of house														
	0.9682	0.9536	0.9150	0.8223	0.6453	0.3900	0.2151	0.2373	0.5357	0.8303	0.9419	0.9728	(89)	
Tweekday	18.7394	18.8899	19.1913	19.5246	19.7561	19.8350	19.8425	19.8423	19.8127	19.5675	19.1106	18.6941		
Tweekend	18.7394	18.8899	19.1913	19.5246	19.7561	19.8350	19.8425	19.8423	19.8127	19.5675	19.1106	18.6941		
MIT 2	18.7394	18.8899	19.1913	19.5246	19.7561	19.8350	19.8425	19.8423	19.8127	19.5675	19.1106	18.6941	(90)	
Living area fraction									fLA = Living area / (4) =				0.2232	(91)
MIT	19.0390	19.1790	19.4611	19.7739	19.9970	20.0769	20.0856	20.0853	20.0525	19.8142	19.3831	18.9967	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.0390	19.1790	19.4611	19.7739	19.9970	20.0769	20.0856	20.0853	20.0525	19.8142	19.3831	18.9967	(93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9612	0.9453	0.9056	0.8159	0.6492	0.4028	0.2304	0.2532	0.5465	0.8246	0.9332	0.9664	(94)	
Useful gains	686.0459	735.0904	758.9828	740.5811	606.3679	381.2054	207.2109	216.4727	439.2552	608.6687	651.2625	657.1456	(95)	
Ext temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000	(96)	
Heat loss rate W														
	1324.0859	1289.8856	1145.6986	937.9363	664.6579	387.2723	207.6172	217.0809	460.9443	780.2756	1081.3011	1320.0679	(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														
	474.7017	372.8224	287.7165	142.0958	43.3677	0.0000	0.0000	0.0000	0.0000	127.6755	309.6277	493.2142	(98)	
Space heating												2251.2217	(98)	
Space heating per m2												(98) / (4) =	27.8410	(99)

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)	
Fraction of space heat from main system(s)														1.0000	(202)
Efficiency of main space heating system 1 (in %)														264.6128	(206)
Efficiency of secondary/supplementary heating system, %														100.0000	(208)
Space heating requirement														850.7605	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement	474.7017	372.8224	287.7165	142.0958	43.3677	0.0000	0.0000	0.0000	0.0000	127.6755	309.6277	493.2142	(98)		
Space heating efficiency (main heating system 1)	264.6128	264.6128	264.6128	264.6128	264.6128	0.0000	0.0000	0.0000	0.0000	264.6128	264.6128	264.6128	(210)		
Space heating fuel (main heating system)	179.3948	140.8935	108.7311	53.6995	16.3891	0.0000	0.0000	0.0000	0.0000	48.2499	117.0116	186.3909	(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	169.0073	132.4070	112.2184	62.2341	33.8140	11.0195	7.5756	34.3044	63.3363	111.9279	145.4579	168.7627	(64)		
Efficiency of water heater	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	(216)		
(217)m	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	281.0100	(217)		
Fuel for water heating, kWh/month	60.1428	47.1182	39.9339	22.1466	12.0330	3.9214	2.6958	12.2076	22.5388	39.8306	51.7625	60.0558	(219)		
Water heating fuel used												374.3871	(219)		
Annual totals kWh/year															
Space heating fuel - main system													850.7605	(211)	
Space heating fuel - secondary													0.0000	(215)	
Electricity for pumps and fans:															
(MEV)Decentralised, Database: total watage = 6.9550, total flow = 29.0000, SFP = 0.2398)															
mechanical ventilation fans (SFP = 0.2398)													61.8678	(230a)	
pump for solar water heating													50.0000	(230g)	
Total electricity for the above, kWh/year													111.8678	(231)	
Electricity for lighting (calculated in Appendix L)													360.6326	(232)	
Energy saving/generation technologies (Appendices M ,N and Q)															
PV Unit 0 (0.80 * 2.50 * 1140 * 0.80) =										-1824.1596			-1824.1596	(233)	
Total delivered energy for all uses													-126.5117	(238)	

10a. Fuel costs - using BEDF prices (505)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year		
Space heating - main system 1	850.7605	20.4300	173.8104	(240)	
Space heating - secondary	0.0000	0.0000	0.0000	(242)	
Water heating (other fuel)	374.3871	20.4300	76.4873	(247)	
Mechanical ventilation fans	61.8678	20.4300	12.6396	(249)	
Pumps and fans for heating	0.0000	0.0000	0.0000	(249)	
Pump for solar water heating	50.0000	20.4300	10.2150	(249)	
Energy for lighting	360.6326	20.4300	73.6772	(250)	
Additional standing charges			0.0000	(251)	
Energy saving/generation technologies					
PV Unit		-1824.1596	20.4300	-372.6758	(252)
Total energy cost				-25.8463	(255)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

 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	850.7605	0.5190	441.5447 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	374.3871	0.5190	194.3069 (264)
Space and water heating			635.8516 (265)
Pumps and fans	111.8678	0.5190	58.0594 (267)
Energy for lighting	360.6326	0.5190	187.1683 (268)
Energy saving/generation technologies			
PV Unit	-1824.1596	0.5190	-946.7389 (269)
Total kg/year			-65.6596 (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	850.7605	3.0700	2611.8348 (261)
Space heating - secondary	0.0000	3.0700	0.0000 (263)
Water heating (other fuel)	374.3871	3.0700	1149.3683 (264)
Space and water heating			3761.2031 (265)
Pumps and fans	111.8678	3.0700	343.4340 (267)
Energy for lighting	360.6326	3.0700	1107.1422 (268)
Energy saving/generation technologies			
PV Unit	-1824.1596	3.0700	-5600.1701 (269)
Primary energy kWh/year			-388.3908 (272)
Primary energy kWh/m2/year			-4.8033 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Property Reference	005 - PRJ012481	Issued on Date	16/09/2022
Assessment Reference	005 S	Prop Type Ref	2BAFF M4(2)
Property	005 - PRJ012481		

SAP Rating	87 B	DER	15.12	TER	27.46
Environmental	88 B	% DER<TER	44.93		
CO₂ Emissions (t/year)	1.03	DFEE	48.34	TFEE	55.13
General Requirements Compliance	Pass	% DFEE<TFEE	12.31		

Assessor Details	Chris Nicholls, , Tel: ,	Assessor ID	W934-0001
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	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	27.46	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	15.12	kgCO ₂ /m ²	Pass
	-12.34 (-44.9%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	55.13	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	48.34	kWh/m ² /yr	
	-6.8 (-12.3%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.26 (max. 0.30)	0.26 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.01 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Vaillant aroTHERM 5kW VWL 55/5 AS230v S2 +VWL 57/5IS	
Secondary heating system	None	

5 Cylinder insulation

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Hot water storage	Measured cylinder loss: 1.22 kWh/day Permitted by DBSCG 2.24	Pass
Primary pipework insulated	Yes	Pass

6 Controls

Space heating controls	Time and temperature zone control	Pass
Hot water controls	Cylinderstat	Pass
	Independent timer for DHW	Pass

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system (decentralised)		
Specific fan power	0.1900 0.1800	
Maximum	0.7	Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)	Slight	Pass
Based on:		
Overshading	Average	
Windows facing North	7.24 m ² , No overhang	
Windows facing East	2.34 m ² , No overhang	
Windows facing South	3.51 m ² , No overhang	
Air change rate	4.21 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		Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals	3.01 (design value)	
Maximum	10.0	Pass

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.10	W/m ² K
Air permeability	3.0	m ³ /m ² h