

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	057 - PRJ013014			Issued on Date	27/01/2025
Assessment Reference	057	Prop Type Ref	2B		
Property	21 Erwood Close, Netley Abbey, Southampton, SO31 5TJ				
SAP Rating	86 B	DER	13.61	TER	16.83
Environmental	89 B	% DER<TER	19.13		
CO ₂ Emissions (t/year)	0.93	DFEE	38.11	TFEE	42.86
General Requirements Compliance	Pass	% DFEE<TFEE	11.08		
Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk			Assessor ID	U903-0001
Client					

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

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DWELLING AS BUILT

Mid-Terrace House, total floor area 82 m²

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

1a TER and DER

Fuel for main heating: Mains gas
Fuel factor: 1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 16.83 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 13.61 kgCO₂/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 42.9 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 38.1 kWh/m²/yr OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.21 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	OK
Roof	0.08 (max. 0.20)	0.08 (max. 0.35)	OK
Openings	1.36 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 3.75 (measured in this dwelling)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoFIT sustain 835 VUW 356/6-3 (H-GB)
Combi boiler
Efficiency: 89.3% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage: No cylinder

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls: No cylinder

Boiler interlock: Yes OK

7 Low energy lights

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

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Southern England): Slight OK
Based on:
Overshading: Average
Windows facing East: 6.36 m², No overhang
Windows facing West: 2.72 m², No overhang
Air change rate: 4.66 ach
Blinds/curtains: Dark-coloured curtain or roller blind, closed 100% of daylight hours

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.08 W/m²K
Air permeability 3.8 m³/m²h

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)					30.0000 / (5) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					3.7500
Infiltration rate					0.3345 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)]	=	0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20)	=	0.2843 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3625	0.3554	0.3483	0.3127	0.3056	0.2701	0.2701	0.2630	0.2843	0.3056	0.3198	0.3340 (22b)
Effective ac	0.5657	0.5631	0.5606	0.5489	0.5467	0.5365	0.5365	0.5346	0.5404	0.5467	0.5511	0.5558 (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			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1600	6.5456	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	44.1670	11.1690	32.9980	0.2100	6.9296	7.4000	244.1852 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			125.9900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2940		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 5452.2404 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							66.6370 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.4340 (36)
Total fabric heat loss							(33) + (36) = 45.7280 (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	38.1087	37.9368	37.7684	36.9772	36.8292	36.1401	36.1401	36.0125	36.4055	36.8292	37.1286	37.4417 (38)
Heat transfer coeff	83.8367	83.6648	83.4964	82.7052	82.5572	81.8681	81.8681	81.7405	82.1336	82.5572	82.8567	83.1697 (39)
Average = Sum(39)m / 12 =												82.7045 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0246	1.0225	1.0205	1.0108	1.0090	1.0006	1.0006	0.9990	1.0038	1.0090	1.0127	1.0165 (40)
HLP (average)												1.0108 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	102.8407	99.1011	95.3614	91.6217	87.8821	84.1424	84.1424	87.8821	91.6217	95.3614	99.1011	102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)												Total = Sum(45)m = 1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												

	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (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	0.6702	0.5948	0.5907	0.4948	0.4554	0.3762	0.3486	0.4178	0.4408	0.5347	0.6065	0.6490 (61)
Total heat required for water heating calculated for each month	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (62)
WWHRS	-49.4854	-43.5394	-44.4384	-36.5722	-33.9630	-28.0213	-23.7216	-28.7193	-29.5543	-36.5280	-42.3034	-47.8278 eq. (G10)
Total of WWHRS savings												-444.6741
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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189 (64)
Heat gains from water heating, kWh/month	50.8771	44.4996	45.9138	40.0237	38.3989	33.1311	30.7008	35.2341	35.6594	41.5629	45.3748	49.2717 (65)

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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 %)												90.2000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												2788.9119 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	458.1214	373.2080	330.9232	216.1273	125.7679	0.0000	0.0000	0.0000	0.0000	206.8899	338.2487	466.3121 (98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000 (210)
Space heating fuel (main heating system)	507.8951	413.7561	366.8771	239.6090	139.4323	0.0000	0.0000	0.0000	0.0000	229.3680	374.9985	516.9757 (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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189 (64)
Efficiency of water heater (217)m	87.2899	87.1300	86.7399	85.8622	84.2128	76.4000	76.4000	76.4000	76.4000	85.5656	86.7823	76.4000 (216)
Fuel for water heating, kWh/month	118.7934	103.8005	108.1332	97.7411	96.9393	93.8672	89.9191	101.2456	101.8344	103.5530	108.6774	115.0096 (219)
Water heating fuel used												1239.5140 (219)
Annual totals kWh/year												
Space heating fuel - main system												2788.9119 (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)												394.3960 (232)
Total delivered energy for all uses												4497.8218 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2788.9119	0.2160	602.4050 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1239.5140	0.2160	267.7350 (264)
Space and water heating			870.1400 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	394.3960	0.5190	204.6915 (268)
Total CO2, kg/year			1113.7565 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			13.6100 (273)

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

DER		13.6100 ZC1
Total Floor Area	TFA	81.8200
Assumed number of occupants	N	2.4965
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		16.1654 ZC2
CO2 emissions from cooking, equation (L16)		2.1867 ZC3
Total CO2 emissions		31.9621 ZC4
Residual CO2 emissions offset from biofuel CHP		0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year		0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 ZC7
Net CO2 emissions		31.9621 ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (5)

2. Ventilation rate

										main	secondary	other	total	m3 per hour			
										heating	heating						
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) =	0.1470 (8)
Pressure test										Yes							
Measured/design AP50										5.0000							
Infiltration rate										0.3970 (18)							
Number of sides sheltered										2 (19)							
Shelter factor										(20) = 1 - [0.075 x (19)] =					0.8500 (20)		
Infiltration rate adjusted to include shelter factor										(21) = (18) x (20) =					0.3374 (21)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)				
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)				
Adj infilt rate	0.4302	0.4218	0.4133	0.3712	0.3627	0.3205	0.3205	0.3121	0.3374	0.3627	0.3796	0.3965	(22b)				
Effective ac	0.5925	0.5889	0.5854	0.5689	0.5658	0.5514	0.5514	0.5487	0.5569	0.5658	0.5720	0.5786	(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					
TER Opaque door			2.0900	1.0000	2.0900		(26)					
TER Opening Type (Uw = 1.40)			9.0800	1.3258	12.0379		(27)					
Flr - Ground			40.9100	0.1300	5.3183		(28a)					
Wl - Brick (Timber Frame)	44.1670	11.1690	32.9980	0.1800	5.9396		(29a)					
Rf - Ins Joist	40.9120		40.9120	0.1300	5.3186		(30)					
Total net area of external elements Aum(A, m2)			125.9900				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		30.7044		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.3231 (36)					
Total fabric heat loss						(33) + (36) =	39.0275 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 39.9171	Feb 39.6751	Mar 39.4378	Apr 38.3233	May 38.1148	Jun 37.1441	Jul 37.1441	Aug 36.9644	Sep 37.5180	Oct 38.1148	Nov 38.5366	Dec 38.9776 (38)
Heat transfer coeff	78.9446	78.7026	78.4653	77.3508	77.1423	76.1716	76.1716	75.9919	76.5455	77.1423	77.5641	78.0051 (39)
Average = Sum(39)m / 12 =												77.3498 (39)
HLP	Jan 0.9649	Feb 0.9619	Mar 0.9590	Apr 0.9454	May 0.9428	Jun 0.9310	Jul 0.9310	Aug 0.9288	Sep 0.9355	Oct 0.9428	Nov 0.9480	Dec 0.9534 (40)
HLP (average)												0.9454 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)
Daily hot water use	Jan 102.8407	Feb 99.1011	Mar 95.3614	Apr 91.6217	May 87.8821	Jun 84.1424	Jul 84.1424	Aug 87.8821	Sep 91.6217	Oct 95.3614	Nov 99.1011	Dec 102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)										Total = Sum(45)m =		1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												
	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (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												

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Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Total heat required for water heating calculated for each month	50.9589	45.6136	48.5951	45.1833	44.7837	41.4949	42.8781	44.7837	45.1833	48.5951	48.8718	50.9589 (61)
Solar input	203.4687	178.9997	186.2376	165.1834	159.9266	140.8545	134.9493	150.4368	152.0983	173.1942	184.8814	198.6565 (62)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Heat gains from water heating, kWh/month	203.4687	178.9997	186.2376	165.1834	159.9266	140.8545	134.9493	150.4368	152.0983	173.1942	184.8814	198.6565 (64)
	63.4492	55.7543	57.9149	51.1958	49.4810	43.4108	41.3332	46.3256	46.8450	53.5780	57.4411	61.8492 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
(66)m	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.4705	19.9581	16.2310	12.2879	9.1854	7.7547	8.3792	10.8916	14.6187	18.5617	21.6643	23.0950	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.2022	225.5183	219.6817	207.2563	191.5714	176.8299	166.9816	164.6655	170.5021	182.9275	198.6124	213.3539	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	(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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	(71)
Water heating gains (Table 5)	85.2812	82.9677	77.8426	71.1053	66.5067	60.2927	55.5554	62.2656	65.0626	72.0134	79.7794	83.1306	(72)
Total internal gains	394.4012	391.8914	377.2027	354.0969	330.7108	308.3246	294.3635	301.2699	313.6306	336.9499	363.5033	383.0269	(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
East					6.3550	19.6403	0.6300	0.7000			0.7700	38.1447
West					2.7240	19.6403	0.6300	0.7000			0.7700	16.3503 (80)

Solar gains	54.4951	106.6039	175.5614	256.0459	313.7939	321.2239	305.8182	262.6933	204.1852	126.4945	67.9489	44.8141 (83)
Total gains	448.8963	498.4953	552.7641	610.1428	644.5046	629.5484	600.1817	563.9633	517.8158	463.4444	431.4523	427.8409 (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	71.9738	72.1952	72.4135	73.4568	73.6554	74.5940	74.5940	74.7704	74.2296	73.6554	73.2548	72.8407	
alpha	5.7983	5.8130	5.8276	5.8971	5.9104	5.9729	5.9729	5.9847	5.9486	5.9104	5.8837	5.8560	
util living area	0.9987	0.9973	0.9923	0.9705	0.8969	0.7288	0.5507	0.6059	0.8644	0.9831	0.9973	0.9990	(86)
MIT	19.9665	20.0849	20.2993	20.5901	20.8338	20.9657	20.9945	20.9906	20.9038	20.5865	20.2279	19.9487	(87)
Th 2	20.1127	20.1152	20.1176	20.1291	20.1312	20.1413	20.1413	20.1431	20.1374	20.1312	20.1269	20.1224	(88)
util rest of house	0.9983	0.9964	0.9895	0.9594	0.8592	0.6488	0.4473	0.5002	0.8032	0.9748	0.9962	0.9987	(89)
MIT 2	18.7205	18.8953	19.2092	19.6345	19.9623	20.1174	20.1391	20.1390	20.0565	19.6360	19.1135	18.7018	(90)
Living area fraction	18.9296	19.0949	19.3922	19.7949	20.1086	20.2598	20.2826	20.2819	20.1987	19.7955	19.3005	18.9110	(91)
MIT	18.9296	19.0949	19.3922	19.7949	20.1086	20.2598	20.2826	20.2819	20.1987	19.7955	19.3005	18.9110	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9296	19.0949	19.3922	19.7949	20.1086	20.2598	20.2826	20.2819	20.1987	19.7955	19.3005	18.9110	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	447.7495	495.9511	545.2352	582.0392	552.9988	415.8679	278.9121	292.0492	418.4994	449.7410	429.1317	427.0093	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1154.9270	1117.1760	1011.5862	842.7271	648.6568	431.1139	280.5097	294.9912	466.8279	709.3588	946.3205	1147.5359	(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	526.1400	417.4632	346.9651	187.6953	71.1696	0.0000	0.0000	0.0000	0.0000	193.1556	372.3759	536.0718	(98)
Space heating												2651.0365	(98)
Space heating per m2												32.4008	(99)

8c. Space cooling requirement

Not applicable

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

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2838.3689 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	526.1400	417.4632	346.9651	187.6953	71.1696	0.0000	0.0000	0.0000	0.0000	193.1556	372.3759	536.0718	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	563.3191	446.9627	371.4830	200.9586	76.1987	0.0000	0.0000	0.0000	0.0000	206.8047	398.6894	573.9527	(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	203.4687	178.9997	186.2376	165.1834	159.9266	140.8545	134.9493	150.4368	152.0983	173.1942	184.8814	198.6565	(64)
Efficiency of water heater (217)m	87.3366	87.1118	86.5957	85.3735	83.1614	80.3000	80.3000	80.3000	80.3000	85.3263	86.7788	87.4268	(217)
Fuel for water heating, kWh/month	232.9709	205.4826	215.0657	193.4833	192.3088	175.4103	168.0564	187.3435	189.4125	202.9787	213.0491	227.2262	(219)
Water heating fuel used												2402.7879	(219)
Annual totals kWh/year													
Space heating fuel - main system												2838.3689	(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)												396.8354	(232)
Total delivered energy for all uses												5712.9922	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2838.3689	0.2160	613.0877 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2402.7879	0.2160	519.0022 (264)
Space and water heating			1132.0899 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	396.8354	0.5190	205.9576 (268)
Total CO2, kg/m2/year			1376.9724 (272)
Emissions per m2 for space and water heating			13.8363 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.5172 (272b)
Emissions per m2 for pumps and fans			0.4757 (272c)
Target Carbon Dioxide Emission Rate (TER) = (13.8363 * 1.00) + 2.5172 + 0.4757, rounded to 2 d.p.			16.8300 (273)

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (5)

2. Ventilation rate

										main	secondary	other	total	m3 per hour			
										heating	heating						
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) =	0.1470 (8)	
Pressure test															Yes		
Measured/design AP50																3.7500	
Infiltration rate																0.3345 (18)	
Number of sides sheltered																2 (19)	
Shelter factor														(20) = 1 - [0.075 x (19)] =		0.8500 (20)	
Infiltration rate adjusted to include shelter factor														(21) = (18) x (20) =		0.2843 (21)	
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)				
Adj infilt rate	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)				
	0.3625	0.3554	0.3483	0.3127	0.3056	0.2701	0.2701	0.2630	0.2843	0.3056	0.3198	0.3340	(22b)				
Effective ac	0.5657	0.5631	0.5606	0.5489	0.5467	0.5365	0.5365	0.5346	0.5404	0.5467	0.5511	0.5558	(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			2.0900	1.2000	2.5080		(26)					
Windows (Uw = 1.40)			9.0800	1.3258	12.0379		(27)					
Flr - Ground			40.9100	0.1600	6.5456	75.6000	3092.7960 (28a)					
Wl - Brick (Timber Frame)	44.1670	11.1690	32.9980	0.2100	6.9296	7.4000	244.1852 (29a)					
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)					
Total net area of external elements Aum(A, m2)			125.9900				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2940		(33)					
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)					
Stud			70.7018			7.4000	523.1936 (32c)					
Internal Floor			40.9120			7.4000	302.7488 (32d)					
Internal Ceiling			40.9120			7.4000	302.7488 (32e)					
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 5452.2404 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							66.6370 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.4340 (36)					
Total fabric heat loss						(33) + (36) =	45.7280 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	38.1087	37.9368	37.7684	36.9772	36.8292	36.1401	36.1401	36.0125	36.4055	36.8292	37.1286	37.4417 (38)
Heat transfer coeff	83.8367	83.6648	83.4964	82.7052	82.5572	81.8681	81.8681	81.7405	82.1336	82.5572	82.8567	83.1697 (39)
Average = Sum(39)m / 12 =												82.7045 (39)
HLP	Jan 1.0246	Feb 1.0225	Mar 1.0205	Apr 1.0108	May 1.0090	Jun 1.0006	Jul 1.0006	Aug 0.9990	Sep 1.0038	Oct 1.0090	Nov 1.0127	Dec 1.0165 (40)
HLP (average)												1.0108 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)
Daily hot water use	Jan 102.8407	Feb 99.1011	Mar 95.3614	Apr 91.6217	May 87.8821	Jun 84.1424	Jul 84.1424	Aug 87.8821	Sep 91.6217	Oct 95.3614	Nov 99.1011	Dec 102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)												Total = Sum(45)m = 1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												

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Water 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 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary 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 (59)
Heat gains from water heating, kWh/month	32.4083	28.3445	29.2490	25.5000	24.4679	21.1139	19.5651	22.4513	22.7194	26.4773	28.9020	31.3857 (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	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3323	19.8354	16.1312	12.2124	9.1289	7.7070	8.3277	10.8246	14.5288	18.4476	21.5311	22.9530	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.2022	225.5183	219.6817	207.2563	191.5714	176.8299	166.9816	164.6655	170.5021	182.9275	198.6124	213.3539	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	(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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	(71)
Water heating gains (Table 5)	43.5596	42.1794	39.3132	35.4167	32.8869	29.3249	26.2972	30.1765	31.5548	35.5878	40.1417	42.1851	(72)
Total internal gains	349.5414	347.9804	335.5735	315.3327	294.0346	274.3090	262.0538	266.1139	277.0329	297.4102	320.7325	338.9394	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W
East	6.3550	19.6403	0.7300	0.7200	0.7700	45.4623 (76)
West	2.7240	19.6403	0.7300	0.7200	0.7700	19.4869 (80)

Solar gains	64.9492	127.0544	209.2406	305.1649	373.9911	382.8464	364.4854	313.0875	243.3555	150.7608	80.9840	53.4111	(83)
Total gains	414.4907	475.0349	544.8141	620.4976	668.0256	657.1554	626.5392	579.2014	520.3884	448.1710	401.7166	392.3505	(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	18.0650	18.1021	18.1386	18.3122	18.3450	18.4994	18.4994	18.5283	18.4396	18.3450	18.2787	18.2099	
alpha	2.2043	2.2068	2.2092	2.2208	2.2230	2.2333	2.2333	2.2352	2.2293	2.2230	2.2186	2.2140	
util living area	0.9509	0.9327	0.8979	0.8327	0.7362	0.6096	0.4897	0.5340	0.7192	0.8715	0.9349	0.9560	(86)
MIT	18.0941	18.3863	18.9117	19.5927	20.1970	20.6398	20.8440	20.8050	20.4387	19.6383	18.7455	18.0362	(87)
Th 2	20.0628	20.0646	20.0663	20.0743	20.0758	20.0828	20.0828	20.0841	20.0801	20.0758	20.0728	20.0696	(88)
util rest of house	0.9454	0.9252	0.8861	0.8123	0.7015	0.5526	0.4087	0.4541	0.6702	0.8515	0.9264	0.9511	(89)
MIT 2	17.3773	17.6668	18.1851	18.8529	19.4275	19.8324	19.9980	19.9728	19.6648	18.9101	18.0315	17.3246	(90)
Living area fraction									fLA = Living area / (4) =			0.1678	(91)
MIT	17.4976	17.7876	18.3070	18.9771	19.5566	19.9679	20.1399	20.1124	19.7946	19.0323	18.1513	17.4440	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.4976	17.7876	18.3070	18.9771	19.5566	19.9679	20.1399	20.1124	19.7946	19.0323	18.1513	17.4440	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9250	0.9012	0.8582	0.7837	0.6795	0.5448	0.4141	0.4568	0.6528	0.8235	0.9029	0.9320	(94)
Ext temp.	383.3880	428.1090	467.5445	486.2651	453.9259	358.0168	259.4599	264.5931	339.6991	369.0585	362.7214	365.6879	(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	1106.4427	1078.2354	985.8445	833.4274	648.6193	439.4617	289.8079	303.4560	467.7200	696.1443	915.6756	1101.4976	(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	537.9527	436.8849	385.6152	249.9568	144.8519	0.0000	0.0000	0.0000	0.0000	243.3519	398.1270	547.4425	(98)
Space heating per m2												2944.1828	(98)
										(98) / (4) =		35.9837	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	769.5604	605.8241	621.2280	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7290	0.7888	0.7617	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	561.0434	477.9012	473.2165	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	862.4055	824.7697	771.3590	0.0000	0.0000	0.0000	0.0000	(103)

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Month fraction	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000 (103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	216.9807	258.0702	221.8180	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												696.8689 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	54.2452	64.5175	55.4545	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												174.2172 (107)
Space cooling per m2												2.1293 (108)
Energy for space heating												35.9837 (99)
Energy for space cooling												2.1293 (108)
Total												38.1129 (109)
Dwelling Fabric Energy Efficiency (DFEE)												38.1 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (Version 9.92, January 2014)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3970 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3374 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4302	0.4218	0.4133	0.3712	0.3627	0.3205	0.3205	0.3121	0.3374	0.3627	0.3796	0.3965 (22b)
Effective ac	0.5925	0.5889	0.5854	0.5689	0.5658	0.5514	0.5514	0.5487	0.5569	0.5658	0.5720	0.5786 (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
TER Opaque door			2.0900	1.0000	2.0900		(26)
TER Opening Type (Uw = 1.40)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1300	5.3183		(28a)
Wl - Brick (Timber Frame)	44.1670	11.1690	32.9980	0.1800	5.9396		(29a)
Rf - Ins Joist	40.9120		40.9120	0.1300	5.3186		(30)
Total net area of external elements Aum(A, m ²)			125.9900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.7044		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.3231 (36)
Total fabric heat loss						(33) + (36) =	39.0275 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	39.9171	39.6751	39.4378	38.3233	38.1148	37.1441	37.1441
Heat transfer coeff	78.9446	78.7026	78.4653	77.3508	77.1423	76.1716	76.1716
Average = Sum(39)m / 12 =							
HLP	0.9649	0.9619	0.9590	0.9454	0.9428	0.9310	0.9310
HLP (average)							
Days in month	31	28	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)
Daily hot water use	102.8407	99.1011	95.3614	91.6217	87.8821	84.1424	84.1424	87.8821	91.6217	95.3614	99.1011	102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)										Total = Sum(45)m =		1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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	(56)
If cylinder contains dedicated solar storage												

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Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Heat gains from water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
	32.4083	28.3445	29.2490	25.5000	24.4679	21.1139	19.5651	22.4513	22.7194	26.4773	28.9020	31.3857 (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	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	124.8244	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.4705	19.9581	16.2310	12.2879	9.1854	7.7547	8.3792	10.8916	14.6187	18.5617	21.6643	23.0950	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.2022	225.5183	219.6817	207.2563	191.5714	176.8299	166.9816	164.6655	170.5021	182.9275	198.6124	213.3539	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	35.4824	(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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	(71)
Water heating gains (Table 5)	43.5596	42.1794	39.3132	35.4167	32.8869	29.3249	26.2972	30.1765	31.5548	35.5878	40.1417	42.1851	(72)
Total internal gains	349.6796	348.1031	335.6732	315.4082	294.0910	274.3567	262.1053	266.1808	277.1228	297.5243	320.8657	339.0814	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W		
East				6.3550	19.6403	0.6300		0.7000	0.7700	38.1447 (76)		
West				2.7240	19.6403	0.6300		0.7000	0.7700	16.3503 (80)		
Solar gains	54.4951	106.6039	175.5614	256.0459	313.7939	321.2239	305.8182	262.6933	204.1852	126.4945	67.9489	44.8141 (83)
Total gains	404.1746	454.7070	511.2347	571.4541	607.8849	595.5806	567.9235	528.8741	481.3080	424.0188	388.8146	383.8955 (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	71.9738	72.1952	72.4135	73.4568	73.6554	74.5940	74.5940	74.7704	74.2296	73.6554	73.2548	72.8407	
alpha	5.7983	5.8130	5.8276	5.8971	5.9104	5.9729	5.9729	5.9847	5.9486	5.9104	5.8837	5.8560	
util living area	0.9993	0.9983	0.9948	0.9780	0.9159	0.7588	0.5795	0.6410	0.8927	0.9890	0.9984	0.9995	(86)
MIT	19.9137	20.0335	20.2518	20.5505	20.8083	20.9575	20.9928	20.9874	20.8823	20.5432	20.1778	19.8967	(87)
Th 2	20.1127	20.1152	20.1176	20.1291	20.1312	20.1413	20.1413	20.1431	20.1374	20.1312	20.1269	20.1224	(88)
util rest of house	0.9990	0.9978	0.9928	0.9693	0.8825	0.6797	0.4720	0.5317	0.8381	0.9833	0.9978	0.9993	(89)
MIT 2	19.1095	19.2312	19.4506	19.7539	19.9954	20.1206	20.1393	20.1392	20.0672	19.7515	19.3851	19.1005	(90)
Living area fraction	19.2444	19.3658	19.5850	19.8876	20.1318	20.2610	20.2825	20.2816	20.2040	19.8844	19.5181	19.2341	(92)
MIT	19.2444	19.3658	19.5850	19.8876	20.1318	20.2610	20.2825	20.2816	20.2040	19.8844	19.5181	19.2341	(93)
Temperature adjustment												0.0000	
adjusted MIT	19.2444	19.3658	19.5850	19.8876	20.1318	20.2610	20.2825	20.2816	20.2040	19.8844	19.5181	19.2341	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	403.6411	453.3885	506.7848	552.1865	536.5012	411.8840	278.3853	290.9367	405.7808	415.9978	387.6976	383.5221	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1179.7828	1138.4966	1026.7199	849.9004	650.4471	431.2096	280.5013	294.9665	467.2346	716.2177	963.2013	1172.7345	(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	577.4494	460.3926	386.8317	214.3540	84.7757	0.0000	0.0000	0.0000	0.0000	223.3636	414.3626	587.1740	(98)
Space heating												2948.7036	(98)
Space heating per m2												36.0389	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	716.0131	563.6699	577.5381	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8953	0.9495	0.9300	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	641.0684	535.2060	537.1019	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	790.4983	756.3265	712.6241	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	107.5896	164.5136	130.5885	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												402.6916	(104)
Cooled fraction												1.0000	(105)

fC = cooled area / (4) =

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Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	26.8974	41.1284	32.6471	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											100.6729 (107)
Space cooling per m2											1.2304 (108)
Energy for space heating											36.0389 (99)
Energy for space cooling											1.2304 (108)
Total											37.2693 (109)
Target Fabric Energy Efficiency (TFEE)											42.9 (109)

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CALCULATION OF HEAT DEMAND 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Built) (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	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					3.7500
Infiltration rate					0.3345 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.2843 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.6000	4.5000	4.2000	4.2000	4.1000	4.1000	4.0000	4.0000	4.3000	4.3000	4.4000 (22)
Wind factor	1.2250	1.1500	1.1250	1.0500	1.0500	1.0250	1.0250	1.0000	1.0000	1.0750	1.0750	1.1000 (22a)
Adj infilt rate	0.3483	0.3269	0.3198	0.2985	0.2985	0.2914	0.2914	0.2843	0.2843	0.3056	0.3056	0.3127 (22b)
Effective ac	0.5606	0.5534	0.5511	0.5446	0.5446	0.5425	0.5425	0.5404	0.5404	0.5467	0.5467	0.5489 (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			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1600	6.5456	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	44.1670	11.1690	32.9980	0.2100	6.9296	7.4000	244.1852 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			125.9900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2940		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss
(28)...(30) + (32) + (32a)...(32e) = 5452.2404 (34)
(33) + (36) = 45.7280 (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	37.7684	37.2835	37.1286	36.6846	36.6846	36.5433	36.5433	36.4055	36.4055	36.8292	36.8292	36.9772 (38)
Heat transfer coeff	83.4964	83.0115	82.8567	82.4126	82.4126	82.2714	82.2714	82.1336	82.1336	82.5572	82.5572	82.7052 (39)
Average = Sum(39)m / 12 =												82.5683 (39)
HLP	Jan 1.0205	Feb 1.0146	Mar 1.0127	Apr 1.0072	May 1.0072	Jun 1.0055	Jul 1.0055	Aug 1.0038	Sep 1.0038	Oct 1.0090	Nov 1.0090	Dec 1.0108 (40)
HLP (average)												1.0091 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)
Daily hot water use	Jan 102.8407	Feb 99.1011	Mar 95.3614	Apr 91.6217	May 87.8821	Jun 84.1424	Jul 84.1424	Aug 87.8821	Sep 91.6217	Oct 95.3614	Nov 99.1011	Dec 102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)												Total = Sum(45)m = 1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												

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	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (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	0.6702	0.5948	0.5907	0.4948	0.4554	0.3762	0.3486	0.4178	0.4408	0.5347	0.6065	0.6490 (61)
Total heat required for water heating calculated for each month	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (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	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (64)
RHI water heating demand												
Heat gains from water heating, kWh/month	50.8771	44.4996	45.9138	40.0237	38.3989	33.1311	30.7008	35.2341	35.6594	41.5629	45.3748	49.2717 (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	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.8308	49.5885	40.3280	30.5309	22.8222	19.2675	20.8192	27.0616	36.3220	46.1191	53.8278	57.3825 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	333.1376	336.5945	327.8832	309.3378	285.9275	263.9252	249.2263	245.7693	254.4807	273.0261	296.4364	318.4387 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754 (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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595 (71)
Water heating gains (Table 5)	68.3832	66.2196	61.7121	55.5885	51.6114	46.0154	41.2646	47.3577	49.5270	55.8641	63.0206	66.2254 (72)
Total internal gains	562.7568	557.8078	535.3285	500.8623	465.7663	434.6133	416.7152	425.5938	445.7348	480.4144	518.6899	547.4518 (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			
East				6.3550	25.1733	0.7300	0.7200	0.7700	58.2698			
West				2.7240	25.1733	0.7300	0.7200	0.7700	24.9767 (80)			
Solar gains	83.2465	138.5284	231.5197	339.2055	391.1705	441.8227	406.6628	364.3931	283.3910	179.4571	103.4588	67.2903 (83)
Total gains	646.0033	696.3361	766.8482	840.0678	856.9367	876.4360	823.3780	789.9868	729.1258	659.8715	622.1487	614.7421 (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	18.1386	18.2446	18.2787	18.3772	18.3772	18.4087	18.4087	18.4396	18.4396	18.3450	18.3450	18.3122
alpha	2.2092	2.2163	2.2186	2.2251	2.2251	2.2272	2.2272	2.2293	2.2293	2.2230	2.2230	2.2208
util living area	0.8766	0.8548	0.8025	0.7127	0.5912	0.4254	0.3105	0.3130	0.5165	0.7184	0.8338	0.8841 (86)
MIT	18.9415	19.1378	19.5865	20.1277	20.5795	20.8638	20.9539	20.9547	20.7809	20.2895	19.5788	18.9253 (87)
Th 2	20.0663	20.0712	20.0728	20.0773	20.0773	20.0787	20.0787	20.0801	20.0801	20.0758	20.0758	20.0743 (88)
util rest of house	0.8637	0.8400	0.7821	0.6825	0.5455	0.3611	0.2302	0.2297	0.4512	0.6802	0.8138	0.8718 (89)
MIT 2	17.3507	17.6309	18.2651	19.0169	19.6190	19.9622	20.0526	20.0553	19.8786	19.2538	18.2685	17.3329 (90)
Living area fraction	17.6176	17.8838	18.4869	19.2033	19.7802	20.1135	20.2038	20.2062	20.0300	19.4276	18.4883	17.6001 (92)
MIT	17.6176	17.8838	18.4869	19.2033	19.7802	20.1135	20.2038	20.2062	20.0300	19.4276	18.4883	17.6001 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.4676	17.7338	18.3369	19.0533	19.6302	19.9635	20.0538	20.0562	19.8800	19.2776	18.3383	17.4501 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	527.5519	551.7421	564.2034	541.1272	446.6520	309.0141	187.6995	179.6607	317.7243	423.4729	476.7678	507.4944 (95)
Ext temp.	5.7000	6.1000	7.7000	10.1000	13.1000	15.9000	17.7000	17.8000	15.5000	12.3000	8.8000	5.8000 (96)
Heat loss rate W	982.5554	965.7389	881.3356	737.8671	538.1724	334.3119	193.6514	185.3100	359.7490	576.0528	787.4587	963.5257 (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	338.5225	278.2058	235.9464	141.6528	68.0911	0.0000	0.0000	0.0000	0.0000	113.5195	223.6975	339.2873 (98)
Space heating												1738.9229 (98)
RHI space heating demand												1739 (98)

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Calculation Type: New Build (As Built)

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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					3.7500
Infiltration rate					0.3345 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2843 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3625	0.3554	0.3483	0.3127	0.3056	0.2701	0.2701	0.2630	0.2843	0.3056	0.3198	0.3340 (22b)
Effective ac	0.5657	0.5631	0.5606	0.5489	0.5467	0.5365	0.5365	0.5346	0.5404	0.5467	0.5511	0.5558 (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			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1600	6.5456	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	44.1670	11.1690	32.9980	0.2100	6.9296	7.4000	244.1852 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			125.9900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2940		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 5452.2404 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							66.6370 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.4340 (36)
Total fabric heat loss							(33) + (36) = 45.7280 (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	38.1087	37.9368	37.7684	36.9772	36.8292	36.1401	36.1401	36.0125	36.4055	36.8292	37.1286	37.4417 (38)
Heat transfer coeff	83.8367	83.6648	83.4964	82.7052	82.5572	81.8681	81.8681	81.7405	82.1336	82.5572	82.8567	83.1697 (39)
Average = Sum(39)m / 12 =												82.7045 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0246	1.0225	1.0205	1.0108	1.0090	1.0006	1.0006	0.9990	1.0038	1.0090	1.0127	1.0165 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	102.8407	99.1011	95.3614	91.6217	87.8821	84.1424	84.1424	87.8821	91.6217	95.3614	99.1011	102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)												Total = Sum(45)m = 1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Water storage loss:	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6702	0.5948	0.5907	0.4948	0.4554	0.3762	0.3486	0.4178	0.4408	0.5347	0.6065	0.6490 (61)
Total heat required for water heating calculated for each month	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (62)
WWHRS	-49.4854	-43.5394	-44.4384	-36.5722	-33.9630	-28.0213	-23.7216	-28.7193	-29.5543	-36.5280	-42.3034	-47.8278 eq. (G10)
Total of WWHRS savings												-444.6741
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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189 (64)
Heat gains from water heating, kWh/month	50.8771	44.4996	45.9138	40.0237	38.3989	33.1311	30.7008	35.2341	35.6594	41.5629	45.3748	49.2717 (65)
												1032.4919 (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	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.8308	49.5885	40.3280	30.5309	22.8222	19.2675	20.8192	27.0616	36.3220	46.1191	53.8278	57.3825 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	333.1376	336.5945	327.8832	309.3378	285.9275	263.9252	249.2263	245.7693	254.4807	273.0261	296.4364	318.4387 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754 (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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595 (71)
Water heating gains (Table 5)	68.3832	66.2196	61.7121	55.5885	51.6114	46.0154	41.2646	47.3577	49.5270	55.8641	63.0206	66.2254 (72)
Total internal gains	562.7568	557.8078	535.3285	500.8623	465.7663	434.6133	416.7152	425.5938	445.7348	480.4144	518.6899	547.4518 (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			
East				6.3550	19.6403	0.7300	0.7200	0.7700	45.4623 (76)			
West				2.7240	19.6403	0.7300	0.7200	0.7700	19.4869 (80)			
Solar gains	64.9492	127.0544	209.2406	305.1649	373.9911	382.8464	364.4854	243.3555	150.7608	80.9840	53.4111 (83)	
Total gains	627.7060	684.8622	744.5691	806.0272	839.7573	817.4596	781.2006	738.6813	689.0902	631.1752	599.6740	600.8629 (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	18.0650	18.1021	18.1386	18.3122	18.3450	18.4994	18.4994	18.5283	18.4396	18.3450	18.2787	18.2099
alpha	2.2043	2.2068	2.2092	2.2208	2.2230	2.2333	2.2333	2.2352	2.2293	2.2230	2.2186	2.2140
util living area	0.8981	0.8753	0.8335	0.7602	0.6583	0.5292	0.4131	0.4468	0.6207	0.7875	0.8716	0.9058 (86)
MIT	18.5840	18.8384	19.2921	19.8721	20.3745	20.7332	20.8904	20.8656	20.5945	19.9481	19.1729	18.5266 (87)
Th 2	20.0628	20.0646	20.0663	20.0743	20.0758	20.0828	20.0828	20.0841	20.0801	20.0758	20.0728	20.0696 (88)
util rest of house	0.8880	0.8630	0.8167	0.7352	0.6206	0.4733	0.3396	0.3733	0.5680	0.7599	0.8570	0.8963 (89)
MIT 2	16.8350	17.1989	17.8456	18.6642	19.3507	19.8179	19.9981	19.9755	19.6545	18.7876	17.6894	16.7561 (90)
Living area fraction									fLA = Living area / (4) =			0.1678 (91)
MIT	17.1285	17.4740	18.0883	18.8669	19.5225	19.9715	20.1478	20.1249	19.8123	18.9824	17.9383	17.0532 (92)
Temperature adjustment												-0.1500
adjusted MIT	16.9785	17.3240	17.9383	18.7169	19.3725	19.8215	19.9978	19.9749	19.6623	18.8324	17.7883	16.9032 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.8427	0.8158	0.7689	0.6920	0.5884	0.4561	0.3324	0.3639	0.5413	0.7148	0.8098	0.8523 (94)
Useful gains	528.9560	558.7336	572.5030	557.7887	494.1345	372.8163	259.6672	268.8260	373.0333	451.1850	485.6377	512.1137 (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	1062.9236	1039.4507	955.0582	811.9092	633.4215	427.4752	278.1737	292.2116	456.8478	679.6402	885.5966	1056.5229 (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	397.2719	323.0419	284.6211	182.9667	103.6296	0.0000	0.0000	0.0000	0.0000	169.9707	287.9705	405.0405 (98)
Space heating												2154.5128 (98)
Space heating per m2												(98) / (4) = 26.3323 (99)

8c. Space cooling requirement

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Calculation Type: New Build (As Built)

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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 %)												90.2000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												2388.5951 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	397.2719	323.0419	284.6211	182.9667	103.6296	0.0000	0.0000	0.0000	0.0000	169.9707	287.9705	405.0405 (98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000 (210)
Space heating fuel (main heating system)	440.4344	358.1396	315.5444	202.8456	114.8887	0.0000	0.0000	0.0000	0.0000	188.4375	319.2577	449.0471 (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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189 (64)
Efficiency of water heater (217)m	86.9491	86.7717	86.3347	85.3522	83.5501	76.4000	76.4000	76.4000	76.4000	84.9425	86.3519	76.4000 (216)
Fuel for water heating, kWh/month	119.2589	104.2292	108.6408	98.3251	97.7082	93.8672	89.9191	101.2456	101.8344	104.3126	109.2190	115.4422 (219)
Water heating fuel used												1244.0024 (219)
Annual totals kWh/year												
Space heating fuel - main system												2388.5951 (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)												394.3960 (232)
Total delivered energy for all uses												4101.9935 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2388.5951	3.4800	83.1231 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1244.0024	3.4800	43.2913 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	394.3960	13.1900	52.0208 (250)
Additional standing charges			120.0000 (251)
Total energy cost			308.3277 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.0211 (257)
SAP value		85.7555
SAP rating (Section 12)		86 (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	2388.5951	0.2160	515.9365 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1244.0024	0.2160	268.7045 (264)
Space and water heating			784.6411 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	394.3960	0.5190	204.6915 (268)
Total kg/year			1028.2576 (272)
CO2 emissions per m2			12.5700 (273)
EI value			89.1353
EI rating			89 (274)
EI band			B

Calculation of stars for heating and DHW

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9020 = 3.858$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9020 = 0.2395$, stars = 4
Water heating energy efficiency	$3.48 / 0.8274 = 4.206$, stars = 5
Water heating environmental impact	$0.216 / 0.8274 = 0.2610$, stars = 5

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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					3.7500
Infiltration rate					0.3345 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.2843 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.6000	4.5000	4.2000	4.2000	4.1000	4.1000	4.0000	4.0000	4.3000	4.3000	4.4000 (22)
Wind factor	1.2250	1.1500	1.1250	1.0500	1.0500	1.0250	1.0250	1.0000	1.0000	1.0750	1.0750	1.1000 (22a)
Adj infilt rate	0.3483	0.3269	0.3198	0.2985	0.2985	0.2914	0.2914	0.2843	0.2843	0.3056	0.3056	0.3127 (22b)
Effective ac	0.5606	0.5534	0.5511	0.5446	0.5446	0.5425	0.5425	0.5404	0.5404	0.5467	0.5467	0.5489 (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			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1600	6.5456	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	44.1670	11.1690	32.9980	0.2100	6.9296	7.4000	244.1852 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			125.9900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2940		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 5452.2404 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							66.6370 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.4340 (36)
Total fabric heat loss							(33) + (36) = 45.7280 (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	37.7684	37.2835	37.1286	36.6846	36.6846	36.5433	36.5433	36.4055	36.4055	36.8292	36.8292	36.9772 (38)
Heat transfer coeff	83.4964	83.0115	82.8567	82.4126	82.4126	82.2714	82.2714	82.1336	82.1336	82.5572	82.5572	82.7052 (39)
Average = Sum(39)m / 12 =												82.5683 (39)
HLP	1.0205	1.0146	1.0127	1.0072	1.0072	1.0055	1.0055	1.0038	1.0038	1.0090	1.0090	1.0108 (40)
HLP (average)												1.0091 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	102.8407	99.1011	95.3614	91.6217	87.8821	84.1424	84.1424	87.8821	91.6217	95.3614	99.1011	102.8407 (44)
Energy content (annual)	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Distribution loss (46)m = 0.15 x (45)m												1470.9864 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

Water storage loss:	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6702	0.5948	0.5907	0.4948	0.4554	0.3762	0.3486	0.4178	0.4408	0.5347	0.6065	0.6490 (61)
Total heat required for water heating calculated for each month	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (62)
WWHRS	-49.4854	-43.5394	-44.4384	-36.5722	-33.9630	-28.0213	-23.7216	-28.7193	-29.5543	-36.5280	-42.3034	-47.8278 eq. (G10)
Total of WWHRS savings												-444.6741
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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189 (64)
Heat gains from water heating, kWh/month	50.8771	44.4996	45.9138	40.0237	38.3989	33.1311	30.7008	35.2341	35.6594	41.5629	45.3748	49.2717 (65)
												1032.4919 (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	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.8308	49.5885	40.3280	30.5309	22.8222	19.2675	20.8192	27.0616	36.3220	46.1191	53.8278	57.3825 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	333.1376	336.5945	327.8832	309.3378	285.9275	263.9252	249.2263	245.7693	254.4807	273.0261	296.4364	318.4387 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754 (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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595 (71)
Water heating gains (Table 5)	68.3832	66.2196	61.7121	55.5885	51.6114	46.0154	41.2646	47.3577	49.5270	55.8641	63.0206	66.2254 (72)
Total internal gains	562.7568	557.8078	535.3285	500.8623	465.7663	434.6133	416.7152	425.5938	445.7348	480.4144	518.6899	547.4518 (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	
East					6.3550	25.1733	0.7300	0.7200	0.7700		58.2698 (76)	
West					2.7240	25.1733	0.7300	0.7200	0.7700		24.9767 (80)	

Solar gains	83.2465	138.5284	231.5197	339.2055	391.1705	441.8227	406.6628	364.3931	283.3910	179.4571	103.4588	67.2903 (83)
Total gains	646.0033	696.3361	766.8482	840.0678	856.9367	876.4360	823.3780	789.9868	729.1258	659.8715	622.1487	614.7421 (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	18.1386	18.2446	18.2787	18.3772	18.3772	18.4087	18.4087	18.4396	18.4396	18.3450	18.3450	18.3122
alpha	2.2092	2.2163	2.2186	2.2251	2.2251	2.2272	2.2272	2.2293	2.2293	2.2230	2.2230	2.2208
util living area	0.8766	0.8548	0.8025	0.7127	0.5912	0.4254	0.3105	0.3130	0.5165	0.7184	0.8338	0.8841 (86)
MIT	18.9415	19.1378	19.5865	20.1277	20.5795	20.8638	20.9539	20.9547	20.7809	20.2895	19.5788	18.9253 (87)
Th 2	20.0663	20.0712	20.0728	20.0773	20.0773	20.0787	20.0787	20.0801	20.0801	20.0758	20.0758	20.0743 (88)
util rest of house	0.8637	0.8400	0.7821	0.6825	0.5455	0.3611	0.2302	0.2297	0.4512	0.6802	0.8138	0.8718 (89)
MIT 2	17.3507	17.6309	18.2651	19.0169	19.6190	19.9622	20.0526	20.0553	19.8786	19.2538	18.2685	17.3329 (90)
Living area fraction	17.6176	17.8838	18.4869	19.2033	19.7802	20.1135	20.2038	20.2062	20.0300	19.4276	18.4883	17.6001 (91)
MIT	17.6176	17.8838	18.4869	19.2033	19.7802	20.1135	20.2038	20.2062	20.0300	19.4276	18.4883	17.6001 (92)
Temperature adjustment	17.4676	17.7338	18.3369	19.0533	19.6302	19.9635	20.0538	20.0562	19.8800	19.2776	18.3383	17.4501 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.8166	0.7924	0.7357	0.6441	0.5212	0.3526	0.2280	0.2274	0.4358	0.6418	0.7663	0.8255 (94)
Useful gains	527.5519	551.7421	564.2034	541.1272	446.6520	309.0141	187.6995	179.6607	317.7243	423.4729	476.7678	507.4944 (95)
Ext temp.	5.7000	6.1000	7.7000	10.1000	13.1000	15.9000	17.7000	17.8000	15.5000	12.3000	8.8000	5.8000 (96)
Heat loss rate W	982.5554	965.7389	881.3356	737.8671	538.1724	334.3119	193.6514	185.3100	359.7490	576.0528	787.4587	963.5257 (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	338.5225	278.2058	235.9464	141.6528	68.0911	0.0000	0.0000	0.0000	0.0000	113.5195	223.6975	339.2873 (98)
Space heating												1738.9229 (98)
Space heating per m2												21.2530 (99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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 %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													1927.8524 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	338.5225	278.2058	235.9464	141.6528	68.0911	0.0000	0.0000	0.0000	0.0000	113.5195	223.6975	339.2873	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	375.3022	308.4322	261.5813	157.0430	75.4891	0.0000	0.0000	0.0000	0.0000	125.8531	248.0017	376.1500	(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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189	(64)
Efficiency of water heater (217)m	86.5348	86.3725	85.7920	84.5202	82.1132	76.4000	76.4000	76.4000	76.4000	83.5818	85.6137	76.4000	(216)
Fuel for water heating, kWh/month	119.8299	104.7110	109.3280	99.2930	99.4180	93.8672	89.9191	101.2456	101.8344	106.0107	110.1607	116.0406	(219)
Water heating fuel used												1251.6583	(219)
Annual totals kWh/year													
Space heating fuel - main system												1927.8524	(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)												394.3960	(232)
Total delivered energy for all uses												3648.9067	(238)

10a. Fuel costs - using BEDF prices (559)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1927.8524	5.7300	110.4659 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1251.6583	5.7300	71.7200 (247)
Pumps and fans for heating	75.0000	24.1800	18.1350 (249)
Energy for lighting	394.3960	24.1800	95.3650 (250)
Additional standing charges			114.0000 (251)
Total energy cost			409.6859 (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	1927.8524	0.2160	416.4161 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1251.6583	0.2160	270.3582 (264)
Space and water heating			686.7743 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	394.3960	0.5190	204.6915 (268)
Total kg/year			930.3908 (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	1927.8524	1.2200	2351.9799 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1251.6583	1.2200	1527.0231 (264)
Space and water heating			3879.0030 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	394.3960	3.0700	1210.7958 (268)
Primary energy kWh/year			5320.0488 (272)
Primary energy kWh/m2/year			65.0214 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 86
Current environmental impact rating: B 89

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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
F	Already installed
G	Not considered
H	Not considered
I	Not considered
J	Not considered
K	Not considered
M	Not considered
N	Solar water heating
O	SAP increase too small
P	Not considered
R	Not considered
S	Not considered
T	Not considered
U	Solar photovoltaic panels
A2	Recommended
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
L2	Not applicable
Q3	Not considered
O3	Not considered

Recommended measures:	SAP change	Cost change	CO2 change
U Solar photovoltaic panels	+ 10.5	-£ 471	-1010 kg (108.6%)

Measures omitted - SAP change or cost saving too small:

N Solar water heating	+ 0.9	-£ 33	-144 kg (15.5%)
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Recommended measures	Typical annual savings		Energy efficiency	Environmental impact
Solar photovoltaic panels	£471	12.35 kg/m²	A 96	A 99
Total Savings	£471	12.35 kg/m²		
Potential energy efficiency rating:			A 96	
Potential environmental impact rating:				A 99

Fuel prices for cost data on this page from database revision number 559 TEST (13 Dec 2024)
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	£113	£113	£0
Mains gas	£296	£296	£0
Space heating	£243	£243	£0
Water heating	£72	£72	£0
Lighting	£95	£95	£0
Generated (PV)	-£0	-£471	£471
Total cost of fuels	£409	-£62	£471
Total cost of uses	£410	-£61	£471
Delivered energy	45 kWh/m²	21 kWh/m²	24 kWh/m²
Carbon dioxide emissions	0.9 tonnes	-0.1 tonnes	1.0 tonnes
CO2 emissions per m²	11 kg/m²	-1 kg/m²	12 kg/m²
Primary energy	65 kWh/m²	-8 kWh/m²	73 kWh/m²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
					Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					3.7500
Infiltration rate					0.3345 (18)
Number of sides sheltered					2 (19)
Shelter factor					(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) = 0.2843 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3625	0.3554	0.3483	0.3127	0.3056	0.2701	0.2701	0.2630	0.2843	0.3056	0.3198	0.3340 (22b)
Effective ac	0.5657	0.5631	0.5606	0.5489	0.5467	0.5365	0.5365	0.5346	0.5404	0.5467	0.5511	0.5558 (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			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1600	6.5456	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	44.1670	11.1690	32.9980	0.2100	6.9296	7.4000	244.1852 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			125.9900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2940		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 5452.2404 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							66.6370 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.4340 (36)
Total fabric heat loss							(33) + (36) = 45.7280 (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	38.1087	37.9368	37.7684	36.9772	36.8292	36.1401	36.1401	36.0125	36.4055	36.8292	37.1286	37.4417 (38)
Heat transfer coeff	83.8367	83.6648	83.4964	82.7052	82.5572	81.8681	81.8681	81.7405	82.1336	82.5572	82.8567	83.1697 (39)
Average = Sum(39)m / 12 =												82.7045 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0246	1.0225	1.0205	1.0108	1.0090	1.0006	1.0006	0.9990	1.0038	1.0090	1.0127	1.0165 (40)
HLP (average)												1.0108 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	102.8407	99.1011	95.3614	91.6217	87.8821	84.1424	84.1424	87.8821	91.6217	95.3614	99.1011	102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)												Total = Sum(45)m = 1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

Water storage loss:	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.6702	0.5948	0.5907	0.4948	0.4554	0.3762	0.3486	0.4178	0.4408	0.5347	0.6065	0.6490 (61)
Total heat required for water heating calculated for each month	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (62)
WWHRS	-49.4854	-43.5394	-44.4384	-36.5722	-33.9630	-28.0213	-23.7216	-28.7193	-29.5543	-36.5280	-42.3034	-47.8278 eq. (G10)
Total of WWHRS savings												-444.6741
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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189 (64)
Heat gains from water heating, kWh/month	50.8771	44.4996	45.9138	40.0237	38.3989	33.1311	30.7008	35.2341	35.6594	41.5629	45.3748	49.2717 (65)
												1032.4919 (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	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.8308	49.5885	40.3280	30.5309	22.8222	19.2675	20.8192	27.0616	36.3220	46.1191	53.8278	57.3825 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	333.1376	336.5945	327.8832	309.3378	285.9275	263.9252	249.2263	245.7693	254.4807	273.0261	296.4364	318.4387 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754 (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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595 (71)
Water heating gains (Table 5)	68.3832	66.2196	61.7121	55.5885	51.6114	46.0154	41.2646	47.3577	49.5270	55.8641	63.0206	66.2254 (72)
Total internal gains	562.7568	557.8078	535.3285	500.8623	465.7663	434.6133	416.7152	425.5938	445.7348	480.4144	518.6899	547.4518 (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			
East				6.3550	19.6403	0.7300	0.7200	0.7700	45.4623 (76)			
West				2.7240	19.6403	0.7300	0.7200	0.7700	19.4869 (80)			
Solar gains	64.9492	127.0544	209.2406	305.1649	373.9911	382.8464	364.4854	313.0875	243.3555	150.7608	80.9840	53.4111 (83)
Total gains	627.7060	684.8622	744.5691	806.0272	839.7573	817.4596	781.2006	738.6813	689.0902	631.1752	599.6740	600.8629 (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	18.0650	18.1021	18.1386	18.3122	18.3450	18.4994	18.4994	18.5283	18.4396	18.3450	18.2787	18.2099
alpha	2.2043	2.2068	2.2092	2.2208	2.2230	2.2333	2.2333	2.2352	2.2293	2.2230	2.2186	2.2140
util living area	0.8981	0.8753	0.8335	0.7602	0.6583	0.5292	0.4131	0.4468	0.6207	0.7875	0.8716	0.9058 (86)
MIT	18.5840	18.8384	19.2921	19.8721	20.3745	20.7332	20.8904	20.8656	20.5945	19.9481	19.1729	18.5266 (87)
Th 2	20.0628	20.0646	20.0663	20.0743	20.0758	20.0828	20.0828	20.0841	20.0801	20.0758	20.0728	20.0696 (88)
util rest of house	0.8880	0.8630	0.8167	0.7352	0.6206	0.4733	0.3396	0.3733	0.5680	0.7599	0.8570	0.8963 (89)
MIT 2	16.8350	17.1989	17.8456	18.6642	19.3507	19.8179	19.9981	19.9755	19.6545	18.7876	17.6894	16.7561 (90)
Living area fraction	17.1285	17.4740	18.0883	18.8669	19.5225	19.9715	20.1478	20.1249	19.8123	18.9824	17.9383	17.0532 (91)
MIT	16.9785	17.3240	17.9383	18.7169	19.3725	19.8215	19.9978	19.9749	19.6623	18.8324	17.7883	16.9032 (93)
Temperature adjustment												-0.1500
adjusted MIT												16.9032 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	528.9560	558.7336	572.5030	557.7887	494.1345	372.8163	259.6672	268.8260	373.0333	451.1850	485.6377	512.1137 (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	1062.9236	1039.4507	955.0582	811.9092	633.4215	427.4752	278.1737	292.2116	456.8478	679.6402	885.5966	1056.5229 (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	397.2719	323.0419	284.6211	182.9667	103.6296	0.0000	0.0000	0.0000	0.0000	169.9707	287.9705	405.0405 (98)
Space heating												2154.5128 (98)
Space heating per m2												(98) / (4) = 26.3323 (99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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 %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2388.5951 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	397.2719	323.0419	284.6211	182.9667	103.6296	0.0000	0.0000	0.0000	0.0000	169.9707	287.9705	405.0405	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	440.4344	358.1396	315.5444	202.8456	114.8887	0.0000	0.0000	0.0000	0.0000	188.4375	319.2577	449.0471	(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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189	(64)
Efficiency of water heater (217)m	86.9491	86.7717	86.3347	85.3522	83.5501	76.4000	76.4000	76.4000	76.4000	84.9425	86.3519	76.4000	(216)
Fuel for water heating, kWh/month	119.2589	104.2292	108.6408	98.3251	97.7082	93.8672	89.9191	101.2456	101.8344	104.3126	109.2190	115.4422	(219)
Water heating fuel used												1244.0024	(219)
Annual totals kWh/year													
Space heating fuel - main system												2388.5951	(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)												394.3960	(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												2374.7542	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2388.5951	3.4800	83.1231 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1244.0024	3.4800	43.2913 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	394.3960	13.1900	52.0208 (250)
Additional standing charges			120.0000 (251)
Energy saving/generation technologies			
PV Unit	-1727.2394	13.1900	-227.8229 (252)
Total energy cost			80.5049 (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] =	0.2666 (257)
SAP value		96.2807
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
Space heating - main system 1	2388.5951	0.2160	515.9365 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1244.0024	0.2160	268.7045 (264)
Space and water heating			784.6411 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	394.3960	0.5190	204.6915 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			131.8204 (272)
CO2 emissions per m2			1.6100 (273)
EI value			98.6072
EI rating			99 (274)
EI band			A

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

SAP 2012 WORKSHEET FOR New Build (As Built) (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	40.9100 (1b)	x 2.3700 (2b)	= 96.9567 (1b) - (3b)
First floor	40.9100 (1c)	x 2.6200 (2c)	= 107.1842 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.1409 (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) = 0.1470 (8)
Pressure test					Yes
Measured/design AP50					3.7500
Infiltration rate					0.3345 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2843 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.6000	4.5000	4.2000	4.2000	4.1000	4.1000	4.0000	4.0000	4.3000	4.3000	4.4000 (22)
Wind factor	1.2250	1.1500	1.1250	1.0500	1.0500	1.0250	1.0250	1.0000	1.0000	1.0750	1.0750	1.1000 (22a)
Adj infilt rate	0.3483	0.3269	0.3198	0.2985	0.2985	0.2914	0.2914	0.2843	0.2843	0.3056	0.3056	0.3127 (22b)
Effective ac	0.5606	0.5534	0.5511	0.5446	0.5446	0.5425	0.5425	0.5404	0.5404	0.5467	0.5467	0.5489 (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			2.0900	1.2000	2.5080		(26)
Windows (Uw = 1.40)			9.0800	1.3258	12.0379		(27)
Flr - Ground			40.9100	0.1600	6.5456	75.6000	3092.7960 (28a)
Wl - Brick (Timber Frame)	44.1670	11.1690	32.9980	0.2100	6.9296	7.4000	244.1852 (29a)
Rf - Ins Joist	40.9120		40.9120	0.0800	3.2730	7.4000	302.7488 (30)
Total net area of external elements Aum(A, m ²)			125.9900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.2940		(33)
Party Wall			92.4080	0.0000	0.0000	7.4000	683.8192 (32)
Stud			70.7018			7.4000	523.1936 (32c)
Internal Floor			40.9120			7.4000	302.7488 (32d)
Internal Ceiling			40.9120			7.4000	302.7488 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 5452.2404 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							66.6370 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.4340 (36)
Total fabric heat loss							(33) + (36) = 45.7280 (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	37.7684	37.2835	37.1286	36.6846	36.6846	36.5433	36.5433	36.4055	36.4055	36.8292	36.8292	36.9772 (38)
Heat transfer coeff	83.4964	83.0115	82.8567	82.4126	82.4126	82.2714	82.2714	82.1336	82.1336	82.5572	82.5572	82.7052 (39)
Average = Sum(39)m / 12 =												82.5683 (39)
HLP	1.0205	1.0146	1.0127	1.0072	1.0072	1.0055	1.0055	1.0038	1.0038	1.0090	1.0090	1.0108 (40)
HLP (average)												1.0091 (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												2.4965 (42)
Average daily hot water use (litres/day)												93.4916 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	102.8407	99.1011	95.3614	91.6217	87.8821	84.1424	84.1424	87.8821	91.6217	95.3614	99.1011	102.8407 (44)
Energy conte	152.5098	133.3861	137.6425	120.0000	115.1429	99.3596	92.0712	105.6531	106.9149	124.5990	136.0096	147.6976 (45)
Energy content (annual)												Total = Sum(45)m = 1470.9864 (45)
Distribution loss (46)m = 0.15 x (45)m												

	22.8765	20.0079	20.6464	18.0000	17.2714	14.9039	13.8107	15.8480	16.0372	18.6899	20.4014	22.1546 (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	0.6702	0.5948	0.5907	0.4948	0.4554	0.3762	0.3486	0.4178	0.4408	0.5347	0.6065	0.6490 (61)
Total heat required for water heating calculated for each month	153.1800	133.9809	138.2331	120.4948	115.5983	99.7358	92.4199	106.0709	107.3557	125.1337	136.6161	148.3467 (62)
WWHRS	-49.4854	-43.5394	-44.4384	-36.5722	-33.9630	-28.0213	-23.7216	-28.7193	-29.5543	-36.5280	-42.3034	-47.8278 eq. (G10)
Total of WWHRS savings												-444.6741
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	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189 (64)
Heat gains from water heating, kWh/month	50.8771	44.4996	45.9138	40.0237	38.3989	33.1311	30.7008	35.2341	35.6594	41.5629	45.3748	49.2717 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892	149.7892 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.8308	49.5885	40.3280	30.5309	22.8222	19.2675	20.8192	27.0616	36.3220	46.1191	53.8278	57.3825 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	333.1376	336.5945	327.8832	309.3378	285.9275	263.9252	249.2263	245.7693	254.4807	273.0261	296.4364	318.4387 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754	52.4754 (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)	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595	-99.8595 (71)
Water heating gains (Table 5)	68.3832	66.2196	61.7121	55.5885	51.6114	46.0154	41.2646	47.3577	49.5270	55.8641	63.0206	66.2254 (72)
Total internal gains	562.7568	557.8078	535.3285	500.8623	465.7663	434.6133	416.7152	425.5938	445.7348	480.4144	518.6899	547.4518 (73)

[Jan					Area	Solar flux	g	FF			Access	Gains
					m2	Table 6a	Specific data	Specific data			factor	W
						W/m2	or Table 6b	or Table 6c			Table 6d	
East					6.3550	25.1733	0.7300	0.7200			0.7700	58.2698
West					2.7240	25.1733	0.7300	0.7200			0.7700	24.9767
Solar gains	83.2465	138.5284	231.5197	339.2055	391.1705	441.8227	406.6628	364.3931	283.3910	179.4571	103.4588	67.2903
Total gains	646.0033	696.3361	766.8482	840.0678	856.9367	876.4360	823.3780	789.9868	729.1258	659.8715	622.1487	614.7421

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nll,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	18.1386	18.2446	18.2787	18.3772	18.3772	18.4087	18.4087	18.4396	18.4396	18.3450	18.3450	18.3122
alpha	2.2092	2.2163	2.2186	2.2251	2.2251	2.2272	2.2272	2.2293	2.2293	2.2230	2.2230	2.2208
util living area	0.8766	0.8548	0.8025	0.7127	0.5912	0.4254	0.3105	0.3130	0.5165	0.7184	0.8338	0.8841 (86)
MIT	18.9415	19.1378	19.5865	20.1277	20.5795	20.8638	20.9539	20.9547	20.7809	20.2895	19.5788	18.9253 (87)
Th 2	20.0663	20.0712	20.0728	20.0773	20.0773	20.0787	20.0787	20.0801	20.0801	20.0758	20.0758	20.0743 (88)
util rest of house	0.8637	0.8400	0.7821	0.6825	0.5455	0.3611	0.2302	0.2297	0.4512	0.6802	0.8138	0.8718 (89)
MIT 2	17.3507	17.6309	18.2651	19.0169	19.6190	19.9622	20.0526	20.0553	19.8786	19.2538	18.2685	17.3329 (90)
Living area fraction									fLA = Living area / (4) =			0.1678 (91)
MIT	17.6176	17.8838	18.4869	19.2033	19.7802	20.1135	20.2038	20.2062	20.0300	19.4276	18.4883	17.6001 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.4676	17.7338	18.3369	19.0533	19.6302	19.9635	20.0538	20.0562	19.8800	19.2776	18.3383	17.4501 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8166	0.7924	0.7357	0.6441	0.5212	0.3526	0.2280	0.2274	0.4358	0.6418	0.7663	0.8255 (94)
Useful gains	527.5519	551.7421	564.2034	541.1272	446.6520	309.0141	187.6995	179.6607	317.7243	423.4729	476.7678	507.4944 (95)
Ext temp.	5.7000	6.1000	7.7000	10.1000	13.1000	15.9000	17.7000	17.8000	15.5000	12.3000	8.8000	5.8000 (96)
Heat loss rate W	982.5554	965.7389	881.3356	737.8671	538.1724	334.3119	193.6514	185.3100	359.7490	576.0528	787.4587	963.5257 (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	338.5225	278.2058	235.9464	141.6528	68.0911	0.0000	0.0000	0.0000	0.0000	113.5195	223.6975	339.2873 (98)
Space heating												1738.9229 (98)
Space heating per m2										(98) / (4) =		21.2530 (99)

Regs Region: England
Elmhurst Energy Systems
SAP2012 Calculator (Design
System) version 4.14r19

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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 %)												90.2000	(206)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement												1927.8524	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	338.5225	278.2058	235.9464	141.6528	68.0911	0.0000	0.0000	0.0000	0.0000	113.5195	223.6975	339.2873	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	375.3022	308.4322	261.5813	157.0430	75.4891	0.0000	0.0000	0.0000	0.0000	125.8531	248.0017	376.1500	(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													
Water heating requirement	103.6946	90.4415	93.7947	83.9226	81.6353	71.7145	68.6982	77.3516	77.8015	88.6057	94.3127	100.5189	(64)
Efficiency of water heater	86.5348	86.3725	85.7920	84.5202	82.1132	76.4000	76.4000	76.4000	76.4000	83.5818	85.6137	76.4000	(216)
(217)m												86.6239	(217)
Fuel for water heating, kWh/month	119.8299	104.7110	109.3280	99.2930	99.4180	93.8672	89.9191	101.2456	101.8344	106.0107	110.1607	116.0406	(219)
Water heating fuel used												1251.6583	(219)
Annual totals kWh/year													
Space heating fuel - main system												1927.8524	(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)												394.3960	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 2.50 * 1217 * 0.80) =										-1946.4459		-1946.4459	(233)
Total delivered energy for all uses												1702.4608	(238)

10a. Fuel costs - using BEDF prices (559)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1927.8524	5.7300	110.4659 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1251.6583	5.7300	71.7200 (247)
Pumps and fans for heating	75.0000	24.1800	18.1350 (249)
Energy for lighting	394.3960	24.1800	95.3650 (250)
Additional standing charges			114.0000 (251)
Energy saving/generation technologies			
PV Unit	-1946.4459	24.1800	-470.6506 (252)
Total energy cost			-60.9647 (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	1927.8524	0.2160	416.4161 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1251.6583	0.2160	270.3582 (264)
Space and water heating			686.7743 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	394.3960	0.5190	204.6915 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	0.5190	-1010.2054 (269)
Total kg/year			-79.8146 (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	1927.8524	1.2200	2351.9799 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1251.6583	1.2200	1527.0231 (264)
Space and water heating			3879.0030 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	394.3960	3.0700	1210.7958 (268)
Energy saving/generation technologies			
PV Unit	-1946.4459	3.0700	-5975.5890 (269)
Primary energy kWh/year			-655.5402 (272)
Primary energy kWh/m2/year			-8.0120 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Property Reference	057 - PRJ013014	Issued on Date	27/01/2025
Assessment Reference	057	Prop Type Ref	2B
Property	21 Erwood Close, Netley Abbey, Southampton, SO31 5TJ		
SAP Rating	86 B	DER	13.61
Environmental	89 B	TER	16.83
CO ₂ Emissions (t/year)	0.93	% DER<TER	19.13
General Requirements Compliance	Pass	DfEE	38.11
		TfEE	42.86
		% DfEE<TfEE	11.08
Assessor Details	Mr. Christopher Nicholls, Briary Energy Limited, Tel: 0203 397 1373, chris@briaryenergy.co.uk		Assessor ID
			U903-0001
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Built)

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)	16.83	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.61	kgCO ₂ /m ²	Pass
	-3.22 (-19.1%)	kgCO ₂ /m ²	

1b TfEE and DfEE

Target Fabric Energy Efficiency (TfEE)	42.86	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DfEE)	38.11	kWh/m ² /yr	
	-4.8 (-11.2%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.21 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	Pass
Roof	0.08 (max. 0.20)	0.08 (max. 0.35)	Pass
Openings	1.36 (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	3.75 (measured in this dwelling)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Built)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoFIT sustain 835 VUW 356/6-3 (H-GB)
Combi boiler
Efficiency: 89.3% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Southern England)

Slight

Pass

Based on:

Overshading

Average

Windows facing East

6.36 m², No overhang

Windows facing West

2.72 m², No overhang

Air change rate

4.66 ach

Blinds/curtains

Dark-coloured curtain or roller blind, closed 100% of daylight hours

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

3.75 (measured in this dwelling)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Roof U-value

0.08

W/m²K

Air permeability

3.8

m³/m²h

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.