

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	5016-SUST-HP-ANNEX			Issued on Date	05/05/2021
Assessment Reference	additional 10%	Prop Type Ref	5016-SUST-HP-ANNEX		
Property	Annex, 14 , 14 Rushmoor Lane, Backwell, Bristol, BS48 3BN				
SAP Rating	81 B	DER	22.34	TER	24.90
Environmental	81 B	% DER<TER	10.29		
CO₂ Emissions (t/year)	1.98	DFEE	49.05	TFEE	57.65
General Requirements Compliance	Pass	% DFEE<TFEE	14.91		
Assessor Details	Mr. Michael Andrews, Energy Saving Experts Ltd, Tel: 01225 862266, mike@energy-saving-experts.com			Assessor ID	N388-0001
Client					

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

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DWELLING AS DESIGNED

Detached House, total floor area 121 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:Electricity
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 24.90 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 22.34 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)57.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)49.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	1.40 (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: 5.00 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Electric underfloor heating - Electric
Underfloor heating in thin screed (standard tariff)

Secondary heating system: None

5 Cylinder insulation

Hot water storage Nominal cylinder loss: 1.61 kWh/day
Permitted by DBSCG 1.89 OK
Primary pipework insulated: No primary pipework

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls: Cylinderstat 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 (Severn Valley): Medium OK

Based on:

Overshading: Average
Windows facing North: 6.46 m², No overhang
Windows facing East: 9.46 m², No overhang
Windows facing South: 1.51 m², No overhang
Windows facing West: 12.84 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features

Photovoltaic array 2.80 kW

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	69.0700 (1b)	2.4500 (2b)	169.2215 (1b) - (3b)
First floor	52.3000 (1c)	1.8500 (2c)	96.7550 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.3700		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 265.9765 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)							
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)							
Number of intermittent fans				2 * 10 =	20.0000 (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) =				20.0000 / (5) =	0.0752 (8)							
Pressure test				Yes								
Measured/design AP50				5.0000								
Infiltration rate				0.3252 (18)								
Number of sides sheltered				1 (19)								
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)							
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3008 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3835	0.3760	0.3685	0.3309	0.3234	0.2858	0.2858	0.2782	0.3008	0.3234	0.3384	0.3534 (22b)
Effective ac	0.5735	0.5707	0.5679	0.5547	0.5523	0.5408	0.5408	0.5387	0.5452	0.5523	0.5573	0.5625 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Windows and doors (Uw = 1.40)			30.2700	1.3258	40.1307		(27)					
Heat Loss Floor 1			69.0700	0.1300	8.9791		(28a)					
External Wall 1	128.9300	30.2700	98.6600	0.1800	17.7588		(29a)					
External Wall 2	6.5500		6.5500	0.1800	1.1790		(29a)					
External Roof 1	83.5000		83.5000	0.1300	10.8550		(30)					
Total net area of external elements Aum(A, m2)			288.0500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 78.9026		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							19.9364 (36)					
Total fabric heat loss							(33) + (36) = 98.8390 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 50.3414	Feb 50.0908	Mar 49.8451	Apr 48.6910	May 48.4751	Jun 47.4699	Jul 47.4699	Aug 47.2838	Sep 47.8571	Oct 48.4751	Nov 48.9119	Dec 49.3686 (38)
Heat transfer coeff	149.1804	148.9298	148.6841	147.5300	147.3141	146.3089	146.3089	146.1228	146.6961	147.3141	147.7509	148.2075 (39)
Average = Sum(39)m / 12 =												147.5290 (39)
HLP	Jan 1.2291	Feb 1.2271	Mar 1.2250	Apr 1.2155	May 1.2138	Jun 1.2055	Jul 1.2055	Aug 1.2039	Sep 1.2087	Oct 1.2138	Nov 1.2174	Dec 1.2211 (40)
HLP (average)												1.2155 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.8685 (42)
Average daily hot water use (litres/day)												102.3258 (43)
Daily hot water use	112.5584	108.4654	104.3723	100.2793	96.1863	92.0932	92.0932	96.1863	100.2793	104.3723	108.4654	112.5584 (44)
Energy conte	166.9209	145.9901	150.6487	131.3392	126.0230	108.7483	100.7713	115.6365	117.0176	136.3727	148.8615	161.6539 (45)
Energy content (annual)												Total = Sum(45)m = 1609.9836 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	25.0381	21.8985	22.5973	19.7009	18.9035	16.3122	15.1157	17.3455	17.5526	20.4559	22.3292	24.2481 (46)
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0115 (51)

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8c. Space cooling requirement

Not applicable

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													5202.9559 (211)
Space heating requirement	1016.0607	790.4046	650.3964	373.0844	181.7783	0.0000	0.0000	0.0000	0.0000	410.3966	738.8989	1041.9360	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	1016.0607	790.4046	650.3964	373.0844	181.7783	0.0000	0.0000	0.0000	0.0000	410.3966	738.8989	1041.9360	(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	196.8293	173.0041	180.5571	160.2828	155.9315	137.6919	130.6797	145.5449	145.9612	166.2811	177.8051	191.5624	(64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	196.8293	173.0041	180.5571	160.2828	155.9315	137.6919	130.6797	145.5449	145.9612	166.2811	177.8051	191.5624	(219)
Water heating fuel used													1962.1310 (219)
Annual totals kWh/year													
Space heating fuel - main system													5202.9559 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)
Electricity for lighting (calculated in Appendix L)													451.8395 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 2.80 * 1068 * 1.00) =									-2392.4779				-2392.4779 (233)
Total delivered energy for all uses													5224.4486 (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	5202.9559	0.5190	2700.3341	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating	1962.1310	0.5190	1018.3460	(264)
Space and water heating			3718.6801	(265)
Pumps and fans	0.0000	0.0000	0.0000	(267)
Energy for lighting	451.8395	0.5190	234.5047	(268)
Energy saving/generation technologies				
PV Unit (0.90*22.30 + 0.10*8.72)	-2392.4779	0.5190	-1241.6960	(269)
Total CO2, kg/year			2711.4888	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			22.3400	(273)

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

	DER		
Total Floor Area		TFA	121.3700
Assumed number of occupants		N	2.8685
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			14.0119 ZC2
CO2 emissions from cooking, equation (L16)			1.5477 ZC3
Total CO2 emissions			37.8995 ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000 ZC5
Additional allowable electricity generation, kWh/m ² /year			0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000 ZC7
Net CO2 emissions			37.8995 ZC8

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1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	69.0700 (1b)	2.4500 (2b)	169.2215 (1b) - (3b)
First floor	52.3000 (1c)	1.8500 (2c)	96.7550 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.3700		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 265.9765 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)							
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)							
Number of intermittent fans				4 * 10 =	40.0000 (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) =				40.0000 / (5) =	0.1504 (8)							
Pressure test				Yes								
Measured/design AP50				5.0000								
Infiltration rate				0.4004 (18)								
Number of sides sheltered				1 (19)								
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)							
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3704 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4722	0.4630	0.4537	0.4074	0.3981	0.3518	0.3518	0.3426	0.3704	0.3981	0.4167	0.4352 (22b)
Effective ac	0.6115	0.6072	0.6029	0.5830	0.5793	0.5619	0.5619	0.5587	0.5686	0.5793	0.5868	0.5947 (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 Opening Type (Uw = 1.40)			30.2700	1.3258	40.1307		(27)					
Heat Loss Floor 1			69.0700	0.1300	8.9791		(28a)					
External Wall 1	128.9300	30.2700	98.6600	0.1800	17.7588		(29a)					
External Wall 2	6.5500		6.5500	0.1800	1.1790		(29a)					
External Roof 1	83.5000		83.5000	0.1300	10.8550		(30)					
Total net area of external elements Aum(A, m2)			288.0500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 78.9026		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							15.7557 (36)					
Total fabric heat loss							(33) + (36) = 94.6583 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 53.6719	Feb 53.2919	Mar 52.9194	Apr 51.1700	May 50.8426	Jun 49.3189	Jul 49.3189	Aug 49.0367	Sep 49.9058	Oct 50.8426	Nov 51.5048	Dec 52.1971 (38)
Heat transfer coeff	148.3302	147.9502	147.5777	145.8283	145.5009	143.9772	143.9772	143.6950	144.5641	145.5009	146.1631	146.8554 (39)
Average = Sum(39)m / 12 =												145.8267 (39)
HLP	Jan 1.2221	Feb 1.2190	Mar 1.2159	Apr 1.2015	May 1.1988	Jun 1.1863	Jul 1.1863	Aug 1.1839	Sep 1.1911	Oct 1.1988	Nov 1.2043	Dec 1.2100 (40)
HLP (average)												1.2015 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.8685 (42)
Average daily hot water use (litres/day)												102.3258 (43)
Daily hot water use	112.5584	108.4654	104.3723	100.2793	96.1863	92.0932	92.0932	96.1863	100.2793	104.3723	108.4654	112.5584 (44)
Energy conte	166.9209	145.9901	150.6487	131.3392	126.0230	108.7483	100.7713	115.6365	117.0176	136.3727	148.8615	161.6539 (45)
Energy content (annual)												Total = Sum(45)m = 1609.9836 (45)
Distribution loss (46)m = 0.15 x (45)m												24.2481 (46)
Water storage loss:												150.0000 (47)
Store volume												1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												

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Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss												
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage												
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month												
	213.5158	188.0758	197.2436	176.4310	172.6179	153.8401	147.3662	162.2314	162.1094	182.9676	193.9533	208.2488 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
												Solar input (sum of months) = Sum(63)m = 0.0000 (63)
Output from w/h												
	213.5158	188.0758	197.2436	176.4310	172.6179	153.8401	147.3662	162.2314	162.1094	182.9676	193.9533	208.2488 (64)
												Total per year (kWh/year) = Sum(64)m = 2158.6010 (64)
Heat gains from water heating, kWh/month												
	92.7771	82.2103	87.3666	79.7437	79.1786	72.2323	70.7824	75.7251	74.9818	82.6199	85.5699	91.0259 (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	143.4228	143.4228	143.4228	143.4228	143.4228	143.4228	143.4228	143.4228	143.4228	143.4228	143.4228	143.4228 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	25.5850	22.7244	18.4807	13.9911	10.4585	8.8295	9.5406	12.4012	16.6449	21.1345	24.6671	26.2961 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	286.9861	289.9641	282.4596	266.4834	246.3163	227.3621	214.6995	211.7215	219.2260	235.2022	255.3693	274.3235 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	37.3423	37.3423	37.3423	37.3423	37.3423	37.3423	37.3423	37.3423	37.3423	37.3423	37.3423	37.3423 (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)												
	-114.7382	-114.7382	-114.7382	-114.7382	-114.7382	-114.7382	-114.7382	-114.7382	-114.7382	-114.7382	-114.7382	-114.7382 (71)
Water heating gains (Table 5)												
	124.7004	122.3367	117.4282	110.7552	106.4228	100.3226	95.1376	101.7810	104.1414	111.0482	118.8471	122.3466 (72)
Total internal gains	506.2984	504.0521	487.3954	460.2565	432.2245	405.5411	388.4045	394.9306	409.0392	436.4118	467.9104	491.9931 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m ²	Table 6a	Specific data	Specific data	factor	W						
		W/m ²	or Table 6b	or Table 6c	Table 6d							
North	6.4600	10.6334	0.6300	0.7000	0.7700	20.9931 (74)						
East	9.4600	19.6403	0.6300	0.7000	0.7700	56.7819 (76)						
South	1.5100	46.7521	0.6300	0.7000	0.7700	21.5749 (78)						
West	12.8400	19.6403	0.6300	0.7000	0.7700	77.0698 (80)						
Solar gains	176.4198	337.2954	544.3983	789.2762	971.2645	997.9228	948.4319	810.6059	630.5056	396.5655	218.3687	146.2168 (83)
Total gains	682.7182	841.3475	1031.7938	1249.5328	1403.4890	1403.4638	1336.8365	1205.5365	1039.5448	832.9773	686.2791	638.2098 (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	56.8224	56.9683	57.1121	57.7973	57.9273	58.5403	58.5403	58.6553	58.3027	57.9273	57.6648	57.3930
alpha	4.7882	4.7979	4.8075	4.8532	4.8618	4.9027	4.9027	4.9104	4.8868	4.8618	4.8443	4.8262
util living area	0.9985	0.9956	0.9842	0.9370	0.8139	0.6253	0.4674	0.5350	0.8125	0.9746	0.9965	0.9989 (86)
MIT	19.6287	19.8198	20.1403	20.5448	20.8383	20.9663	20.9933	20.9876	20.8826	20.4620	19.9673	19.5995 (87)
Th 2	19.9023	19.9048	19.9073	19.9188	19.9209	19.9310	19.9310	19.9329	19.9271	19.9209	19.9166	19.9120 (88)
util rest of house	0.9980	0.9941	0.9786	0.9149	0.7571	0.5337	0.3572	0.4176	0.7329	0.9617	0.9951	0.9985 (89)
MIT 2	18.0756	18.3562	18.8222	19.3981	19.7709	19.9101	19.9287	19.9281	19.8365	19.2974	18.5807	18.0397 (90)
Living area fraction												fLA = Living area / (4) = 0.4025 (91)
MIT	18.7007	18.9453	19.3527	19.8597	20.2005	20.3352	20.3572	20.3546	20.2576	19.7661	19.1388	18.6675 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7007	18.9453	19.3527	19.8597	20.2005	20.3352	20.3572	20.3546	20.2576	19.7661	19.1388	18.6675 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	680.7427	834.7726	1005.8390	1141.3524	1085.0490	799.3504	537.1195	560.6830	790.0697	799.1133	681.8871	636.8627 (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												
	2136.0616	2078.0022	1896.7759	1598.2278	1236.8327	825.7366	540.9536	568.2495	890.1656	1333.6797	1759.6242	2124.6277 (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	1082.7573	835.4503	662.8570	328.9503	112.9271	0.0000	0.0000	0.0000	0.0000	397.7174	775.9707	1106.8971 (98)
Space heating												5303.5273 (98)
Space heating per m ²												(98) / (4) = 43.6972 (99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Not applicable

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													5672.2217 (211)
Space heating requirement	1082.7573	835.4503	662.8570	328.9503	112.9271	0.0000	0.0000	0.0000	0.0000	397.7174	775.9707	1106.8971	(98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000	(210)
Space heating fuel (main heating system)	1158.0292	893.5298	708.9380	351.8185	120.7777	0.0000	0.0000	0.0000	0.0000	425.3662	829.9152	1183.8472	(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	213.5158	188.0758	197.2436	176.4310	172.6179	153.8401	147.3662	162.2314	162.1094	182.9676	193.9533	208.2488	(64)
Efficiency of water heater (217)m	88.5444	88.3238	87.8002	86.4531	83.7143	79.8000	79.8000	79.8000	79.8000	86.8315	88.1368	88.6185	(217)
Fuel for water heating, kWh/month	241.1397	212.9389	224.6504	204.0770	206.1988	192.7821	184.6694	203.2975	203.1447	210.7158	220.0594	234.9949	(219)
Water heating fuel used													2538.6686 (219)
Annual totals kWh/year													
Space heating fuel - main system													5672.2217 (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)													451.8395 (232)
Total delivered energy for all uses													8737.7298 (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	5672.2217	0.2160	1225.1999 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2538.6686	0.2160	548.3524 (264)
Space and water heating			1773.5523 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	451.8395	0.5190	234.5047 (268)
Total CO2, kg/m2/year			2046.9820 (272)
Emissions per m2 for space and water heating			14.6128 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			1.9321 (272b)
Emissions per m2 for pumps and fans			0.3207 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.6128 * 1.55) + 1.9321 + 0.3207, rounded to 2 d.p.			24.9000 (273)