

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

Property Reference	Gosbrook Unit 4			Issued on Date	16/09/2025
Assessment Reference	Gosbrook Unit 4	Prop Type Ref			
Property	Flat 4, 2 Send Road, Caversham, Reading, RG4 8GZ				
SAP Rating	91 B	DER	9.63	TER	19.76
Environmental	94 A	% DER<TER	51.27		
CO ₂ Emissions (t/year)	0.37	DFEE	44.96	TFEE	53.59
General Requirements Compliance	Pass	% DFEE<TFEE	16.11		
Assessor Details	Miss Charlotte Rasinsky, Charlotte Rasinsky , Tel: 07591101243, charlotte.rasinsky@brookbanks.com			Assessor ID	ED74-0001
Client					

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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

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

DWELLING AS BUILT

Mid-floor flat, total floor area 61 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) 19.76 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 9.63 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)53.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)45.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.22 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.12 (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: 3.80 (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 830 VUW 306/6-3 (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 (Thames Valley): Medium OK
Based on:
Overshading: Average
Windows facing East: 4.68 m², No overhang
Windows facing South: 6.70 m², No overhang
Windows facing West: 6.70 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Roof U-value 0.11 W/m²K
Roof U-value 0.12 W/m²K
Exposed floor U-value 0.11 W/m²K
Air permeability 3.8 m³/m²h
Photovoltaic array 1.50 kW

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

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	61.0900 (1b)	x 2.4100 (2b)	= 147.2269 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.0900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 147.2269 (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) =				Air changes per hour
Pressure test					30.0000 / (5) = 0.2038 (8)
Measured/design AP50					Yes
Infiltration rate					3.8000
Number of sides sheltered					0.3938 (18)
					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3642 (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	0.4644	0.4553	0.4462	0.4007	0.3916	0.3460	0.3460	0.3369	0.3642	0.3916	0.4098	0.4280 (22b)
Effective ac	0.6078	0.6036	0.5995	0.5803	0.5767	0.5599	0.5599	0.5568	0.5663	0.5767	0.5840	0.5916 (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
Window/Door (Uw = 1.40)			18.0800	1.3258	23.9697		(27)
Front Door			2.1100	1.4000	2.9540		(26)
Heat Loss Floor 1			6.1500	0.1100	0.6765		(28b)
External Wall 1	51.4400	9.4600	41.9800	0.1600	6.7168	60.0000	2518.8000 (29a)
Stairwell	28.2600	2.1100	26.1500	0.2236	5.8482	60.0000	1569.0000 (29a)
WT02	18.1400	8.6200	9.5200	0.1500	1.4280	60.0000	571.2000 (29a)
External Roof 1	3.3100		3.3100	0.1100	0.3641	9.0000	29.7900 (30)
External Roof 2	13.0400		13.0400	0.1100	1.4344	9.0000	117.3600 (30)
External Roof 3	1.2800		1.2800	0.1200	0.1536	9.0000	11.5200 (30)
Total net area of external elements Aum(A, m ²)			121.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.5453		(33)
Party Wall 1			8.0200	0.0000	0.0000	45.0000	360.9000 (32)
Party Wall 2			4.4200	0.0000	0.0000	45.0000	198.9000 (32)
Party Floor 1			49.5300			70.0000	3467.1000 (32d)
Party Ceilings 1			44.4200			70.0000	3109.4000 (32b)
Internal Wall 1			65.1300			9.0000	586.1700 (32c)
Internal Wall 2			14.9200			75.0000	1119.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13659.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							223.5904 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.9167 (36)
Total fabric heat loss						(33) + (36) =	51.4620 (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	29.5315	29.3281	29.1287	28.1920	28.0168	27.2010	27.2010	27.0499	27.5152	28.0168	28.3713	28.7419 (38)
Heat transfer coeff	80.9935	80.7901	80.5907	79.6540	79.4788	78.6630	78.6630	78.5120	78.9772	79.4788	79.8333	80.2039 (39)
Average = Sum(39)m / 12 =												79.6532 (39)
HLP	1.3258	1.3225	1.3192	1.3039	1.3010	1.2877	1.2877	1.2852	1.2928	1.3010	1.3068	1.3129 (40)
HLP (average)												1.3039 (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												2.0123 (42)
Average daily hot water use (litres/day)												81.9916 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Daily hot water use	90.1908	86.9111	83.6315	80.3518	77.0721	73.7925	73.7925	77.0721	80.3518	83.6315	86.9111	90.1908 (44)
Energy conte	133.7504	116.9789	120.7118	105.2394	100.9797	87.1378	80.7460	92.6572	93.7639	109.2727	119.2797	129.5301 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m	20.0626	17.5468	18.1068	15.7859	15.1470	13.0707	12.1119	13.8986	14.0646	16.3909	17.8920	19.4295 (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	1.3873	1.1692	1.1610	0.9725	0.8950	0.7395	0.6852	0.8212	0.8664	1.0509	1.1922	1.3435 (61)
Total heat required for water heating calculated for each month	135.1376	118.1481	121.8727	106.2119	101.8748	87.8773	81.4312	93.4785	94.6303	110.3237	120.4719	130.8736 (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	135.1376	118.1481	121.8727	106.2119	101.8748	87.8773	81.4312	93.4785	94.6303	110.3237	120.4719	130.8736 (64)
Heat gains from water heating, kWh/month	44.8188	39.1878	40.4269	35.2352	33.7995	29.1582	27.0194	31.0138	31.3931	36.5959	39.9586	43.4046 (65)
Total per year (kWh/year) = Sum(64)m = 1302.3315 (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	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.6627	13.9114	11.3135	8.5651	6.4025	5.4053	5.8406	7.5918	10.1897	12.9381	15.1007	16.0980 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	175.6873	177.5104	172.9163	163.1360	150.7901	139.1867	131.4349	129.6118	134.2059	143.9862	156.3321	167.9355 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614 (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)	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912 (71)
Water heating gains (Table 5)	60.2403	58.3152	54.3372	48.9378	45.4295	40.4975	36.3163	41.6853	43.6015	49.1881	55.4980	58.3395 (72)
Total internal gains	307.7745	305.9212	294.7513	276.8231	258.8062	241.2736	229.7760	235.0730	244.1813	262.2966	283.1151	298.5572 (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				4.6800	19.6403	0.5400	0.8000	0.7700	27.5176 (76)			
South				6.7000	46.7521	0.5400	0.8000	0.7700	93.7762 (78)			
West				6.7000	19.6403	0.5400	0.8000	0.7700	39.3948 (80)			
Solar gains	160.6886	284.4761	411.2004	535.4992	615.7060	616.1573	592.1548	532.9505	455.0753	320.9695	194.5887	136.0568 (83)
Total gains	468.4631	590.3973	705.9517	812.3223	874.5123	857.4309	821.9308	768.0235	699.2566	583.2662	477.7037	434.6140 (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	46.8458	46.9638	47.0800	47.6336	47.7386	48.2337	48.2337	48.3265	48.0418	47.7386	47.5266	47.3070
alpha	4.1231	4.1309	4.1387	4.1756	4.1826	4.2156	4.2156	4.2218	4.2028	4.1826	4.1684	4.1538
util living area	0.9917	0.9787	0.9468	0.8689	0.7339	0.5598	0.4147	0.4597	0.6963	0.9181	0.9828	0.9938 (86)
MIT	19.8549	20.0552	20.3259	20.6203	20.8164	20.9070	20.9293	20.9260	20.8646	20.5797	20.1540	19.8192 (87)
Th 2	19.8207	19.8233	19.8258	19.8378	19.8400	19.8505	19.8505	19.8525	19.8465	19.8400	19.8355	19.8308 (88)
util rest of house	0.9892	0.9726	0.9317	0.8339	0.6707	0.4700	0.3095	0.3501	0.6076	0.8874	0.9768	0.9919 (89)
MIT 2	18.3115	18.6024	18.9881	19.3963	19.6372	19.7384	19.7542	19.7546	19.7003	19.3574	18.7574	18.2672 (90)
Living area fraction									fLA = Living area / (4) =			0.3788 (91)
MIT	18.8961	19.1527	19.4948	19.8599	20.0839	20.1811	20.1993	20.1983	20.1413	19.8204	19.2864	18.8551 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8961	19.1527	19.4948	19.8599	20.0839	20.1811	20.1993	20.1983	20.1413	19.8204	19.2864	18.8551 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9866	0.9681	0.9266	0.8347	0.6850	0.4967	0.3419	0.3839	0.6320	0.8867	0.9731	0.9898 (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	1182.1903	1151.4741	1047.2630	873.0039	666.3398	439.0227	283.1305	298.2143	477.1254	732.8255	972.8814	1175.3958 (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	535.6837	389.6967	292.4780	140.3763	50.0950	0.0000	0.0000	0.0000	0.0000	160.4177	365.7897	554.4301 (98)
Space heating												2488.9673 (98)
Space heating per m2												(98) / (4) = 40.7426 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

8c. Space cooling requirement

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2759.3872 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	535.6837	389.6967	292.4780	140.3763	50.0950	0.0000	0.0000	0.0000	0.0000	160.4177	365.7897	554.4301	(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)	593.8844	432.0363	324.2550	155.6278	55.5377	0.0000	0.0000	0.0000	0.0000	177.8467	405.5318	614.6675	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	135.1376	118.1481	121.8727	106.2119	101.8748	87.8773	81.4312	93.4785	94.6303	110.3237	120.4719	130.8736	(64)
Efficiency of water heater (217)m	86.9807	86.5026	85.5755	83.5854	80.3089	76.2000	76.2000	76.2000	76.2000	83.9174	86.2730	76.2000	(216)
Fuel for water heating, kWh/month	155.3651	136.5833	142.4154	127.0699	126.8537	115.3245	106.8651	122.6752	124.1867	131.4670	139.6404	150.1834	(219)
Water heating fuel used												1578.6298	(219)
Annual totals kWh/year													
Space heating fuel - main system												2759.3872	(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)												276.6074	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 1.50 * 853 * 1.00) =												-1023.6359	(233)
Total delivered energy for all uses												3665.9885	(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	2759.3872	0.2160	596.0276 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1578.6298	0.2160	340.9840 (264)
Space and water heating			937.0117 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	276.6074	0.5190	143.5592 (268)
Energy saving/generation technologies			
PV Unit	-1023.6359	0.5190	-531.2670 (269)
Total CO2, kg/year			588.2289 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			9.6300 (273)

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

DER		9.6300	ZC1
Total Floor Area		61.0900	
Assumed number of occupants		2.0123	
CO2 emission factor in Table 12 for electricity displaced from grid		0.5190	
CO2 emissions from appliances, equation (L14)		17.0418	ZC2
CO2 emissions from cooking, equation (L16)		2.7385	ZC3
Total CO2 emissions		29.4103	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		29.4103	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	61.0900 (1b)	x 2.4100 (2b)	= 147.2269 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.0900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 147.2269 (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					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) =				Air changes per hour
Pressure test					20.0000 / (5) = 0.1358 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.3858 (18)
					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3569 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4551	0.4461	0.4372	0.3926	0.3837	0.3391	0.3391	0.3301	0.3569	0.3837	0.4015	0.4194 (22b)
	0.6035	0.5995	0.5956	0.5771	0.5736	0.5575	0.5575	0.5545	0.5637	0.5736	0.5806	0.5879 (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			2.1100	1.0000	2.1100		(26)
TER Opening Type (Uw = 1.40)			13.1700	1.3258	17.4602		(27)
Heat Loss Floor 1			6.1500	0.1300	0.7995		(28b)
External Wall 1	51.4400	6.8900	44.5500	0.1800	8.0190		(29a)
Stairwell	28.2600	2.1100	26.1500	0.1800	4.7070		(29a)
WT02	18.1400	6.2800	11.8600	0.1800	2.1348		(29a)
External Roof 1			3.3100	0.1300	0.4303		(30)
External Roof 2	13.0400		13.0400	0.1300	1.6952		(30)
External Roof 3	1.2800		1.2800	0.1300	0.1664		(30)
Total net area of external elements Aum(A, m ²)			121.6200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.5224		(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)							10.8196 (36)
Total fabric heat loss						(33) + (36) =	48.3420 (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	29.3228	29.1275	28.9360	28.0367	27.8684	27.0852	27.0852	26.9401	27.3869	27.8684	28.2088	28.5647 (38)
Heat transfer coeff	77.6648	77.4695	77.2780	76.3787	76.2105	75.4272	75.4272	75.2821	75.7289	76.2105	76.5508	76.9067 (39)
Average = Sum(39)m / 12 =												76.3779 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2713	1.2681	1.2650	1.2503	1.2475	1.2347	1.2347	1.2323	1.2396	1.2475	1.2531	1.2589 (40)
HLP (average)												1.2503 (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												2.0123 (42)
Average daily hot water use (litres/day)												81.9916 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	90.1908	86.9111	83.6315	80.3518	77.0721	73.7925	73.7925	77.0721	80.3518	83.6315	86.9111	90.1908 (44)
Energy conte	133.7504	116.9789	120.7118	105.2394	100.9797	87.1378	80.7460	92.6572	93.7639	109.2727	119.2797	129.5301 (45)
Energy content (annual)										Total = Sum(45)m =		1290.0477 (45)
Distribution loss (46)m = 0.15 x (45)m												
	20.0626	17.5468	18.1068	15.7859	15.1470	13.0707	12.1119	13.8986	14.0646	16.3909	17.8920	19.4295 (46)
Water storage loss:												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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	45.9602	40.0029	42.6177	39.6255	39.2751	36.3908	37.6038	39.2751	39.6255	42.6177	42.8603	45.9602	(61)
Total heat required for water heating calculated for each month	179.7106	156.9818	163.3294	144.8650	140.2549	123.5287	118.3499	131.9324	133.3894	151.8904	162.1400	175.4903	(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	179.7106	156.9818	163.3294	144.8650	140.2549	123.5287	118.3499	131.9324	133.3894	151.8904	162.1400	175.4903	(64)
Heat gains from water heating, kWh/month	55.9621	48.8962	50.7911	44.8985	43.3945	38.0710	36.2490	40.6273	41.0829	46.9876	50.3756	54.5588	(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	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	100.6140	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.6810	13.9277	11.3268	8.5751	6.4100	5.4116	5.8474	7.6007	10.2016	12.9533	15.1184	16.1168	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	175.6873	177.5104	172.9163	163.1360	150.7901	139.1867	131.4349	129.6118	134.2059	143.9862	156.3321	167.9355	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	33.0614	(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)	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	-80.4912	(71)
Water heating gains (Table 5)	75.2178	72.7622	68.2676	62.3590	58.3260	52.8764	48.7218	54.6066	57.0595	63.1554	69.9661	73.3317	(72)
Total internal gains	322.7703	320.3845	308.6948	290.2543	271.7102	253.6589	242.1882	248.0032	257.6512	276.2791	297.6008	313.5683	(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			3.4100		19.6403		0.6300		0.7000		0.7700		20.4679 (76)
South			4.8800		46.7521		0.6300		0.7000		0.7700		69.7256 (78)
West			4.8800		19.6403		0.6300		0.7000		0.7700		29.2913 (80)

Solar gains	119.4849	211.5322	305.7656	398.1972	457.8417	458.1783	440.3295	396.3031	338.3921	238.6691	144.6926	101.1689	(83)
Total gains	442.2552	531.9168	614.4605	688.4515	729.5520	711.8371	682.5177	644.3063	596.0433	514.9482	442.2934	414.7372	(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	54.6240	54.7617	54.8974	55.5438	55.6664	56.2445	56.2445	56.3528	56.0204	55.6664	55.4189	55.1624		
alpha	4.6416	4.6508	4.6598	4.7029	4.7111	4.7496	4.7496	4.7569	4.7347	4.7111	4.6946	4.6775		
util living area	0.9955	0.9890	0.9716	0.9215	0.8128	0.6395	0.4780	0.5241	0.7673	0.9498	0.9905	0.9967	(86)	
MIT	19.7114	19.9146	20.2117	20.5625	20.8251	20.9584	20.9915	20.9870	20.9014	20.5416	20.0554	19.6754	(87)	
Th 2	19.8634	19.8659	19.8684	19.8800	19.8822	19.8923	19.8923	19.8942	19.8884	19.8822	19.8778	19.8732	(88)	
util rest of house	0.9940	0.9854	0.9620	0.8952	0.7546	0.5444	0.3619	0.4048	0.6806	0.9272	0.9867	0.9955	(89)	
MIT 2	18.1690	18.4656	18.8936	19.3883	19.7206	19.8665	19.8895	19.8893	19.8160	19.3734	18.6804	18.1235	(90)	
Living area fraction	18.7532	19.0145	19.3929	19.8331	20.1389	20.2801	20.3069	20.3051	20.2271	19.8159	19.2012	18.7113	(92)	
Temperature adjustment	18.7532	19.0145	19.3929	19.8331	20.1389	20.2801	20.3069	20.3051	20.2271	19.8159	19.2012	18.7113	(92)	
adjusted MIT	18.7532	19.0145	19.3929	19.8331	20.1389	20.2801	20.3069	20.3051	20.2271	19.8159	19.2012	18.7113	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	438.6839	522.1801	587.9768	615.4079	561.1848	412.2617	277.2044	290.1169	422.7939	476.5907	434.9980	412.1861	(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	1122.5092	1093.4429	996.3355	835.0558	643.1362	428.4321	279.5997	293.9849	464.0012	702.3484	926.3589	1116.0183	(97)	
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	(97a)	
Space heating kWh	508.7661	383.8886	303.8189	158.1465	60.9718	0.0000	0.0000	0.0000	0.0000	167.9637	353.7798	523.6511	(98)	
Space heating												2460.9866	(98)	
Space heating per m2												40.2846	(99)	

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Built)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2634.8893 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	508.7661	383.8886	303.8189	158.1465	60.9718	0.0000	0.0000	0.0000	0.0000	167.9637	353.7798	523.6511	(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)	544.7174	411.0156	325.2879	169.3217	65.2803	0.0000	0.0000	0.0000	0.0000	179.8327	378.7793	560.6543	(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	179.7106	156.9818	163.3294	144.8650	140.2549	123.5287	118.3499	131.9324	133.3894	151.8904	162.1400	175.4903	(64)
Efficiency of water heater (217)m	87.5264	87.2161	86.5920	85.2723	83.1136	80.3000	80.3000	80.3000	80.3000	85.3048	86.9625	87.6333	(216)
Fuel for water heating, kWh/month	205.3216	179.9918	188.6195	169.8851	168.7507	153.8339	147.3846	164.2993	166.1138	178.0560	186.4483	200.2553	(219)
Water heating fuel used												2108.9600	(219)
Annual totals kWh/year													
Space heating fuel - main system												2634.8893	(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)												276.9307	(232)
Total delivered energy for all uses												5095.7800	(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	2634.8893	0.2160	569.1361 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2108.9600	0.2160	455.5354 (264)
Space and water heating			1024.6715 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	276.9307	0.5190	143.7270 (268)
Total CO2, kg/m2/year			1207.3235 (272)
Emissions per m2 for space and water heating			16.7731 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3527 (272b)
Emissions per m2 for pumps and fans			0.6372 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.7731 * 1.00) + 2.3527 + 0.6372, rounded to 2 d.p.			19.7600 (273)