

Full SAP Calculation Printout



Property Reference	14 Marlborough St		Issued on Date	06/02/2025	
Assessment Reference	Renewables	Prop Type Ref			
Property	14, Marlborough St, Bristol, BS5 6RH				
SAP Rating	76 C	DER	5.44	TER	
Environmental	95 A	% DER < TER	N/A		
CO ₂ Emissions (t/year)	0.46	DFEE	67.38	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	57.00	TPER	
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client					

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	53.2600 (1b)	x 2.4400 (2b)	= 129.9544 (1b) - (3b)
First floor	42.2400 (1c)	x 2.5500 (2c)	= 107.7120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.5000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 237.6664 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour											
Number of open chimneys	0 * 80 = 0.0000 (6a)											
Number of open flues	0 * 20 = 0.0000 (6b)											
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)											
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)											
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)											
Number of blocked chimneys	0 * 20 = 0.0000 (6f)											
Number of intermittent extract 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)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1262 (8)											
Pressure test	No											
Pressure Test Method	Blower Door											
Measured/design AP50	15.0000 (17)											
Infiltration rate	0.8762 (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) = 0.7448 (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	0.9496	0.9310	0.9124	0.8193	0.8007	0.7076	0.7076	0.6889	0.7448	0.8007	0.8379	0.8751 (22b)
Effective ac	0.9509	0.9334	0.9162	0.8356	0.8205	0.7503	0.7503	0.7373	0.7774	0.8205	0.8510	0.8829 (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
Glazing (Uw = 1.40)			11.6500	1.3258	15.4451		(27)
Door			1.6500	1.4000	2.3100		(26)
Roof Window SW			1.0900	1.3258	1.4451		(27a)
Existing Floor			47.5900	0.2500	11.8975		(28a)
New Floor			5.6700	0.1800	1.0206		(28a)
New Wall	40.3300	6.1300	34.2000	0.1800	6.1560		(29a)
Existing Wall	34.0500	7.1700	26.8800	0.2600	6.9888		(29a)
Existing Cold Pitched Roof	44.0900		44.0900	0.1100	4.8499		(30)
Existing Warm Pitched Roof	3.8700	1.0900	2.7800	0.1600	0.4448		(30)
New Warm Pitched Roof	5.7900		5.7900	0.1500	0.8685		(30)
Total net area of external elements Aum(A, m ²)			181.3900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 51.4263		(33)
Party Wall			86.6400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							36.2780 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	87.7043 (37)

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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	74.5775	73.2043	71.8584	65.5363	64.3535	58.8472	58.8472	57.8275	60.9682	64.3535	66.7464	69.2480
Heat transfer coeff	162.2818	160.9086	159.5626	153.2406	152.0578	146.5515	146.5515	145.5318	148.6724	152.0578	154.4506	156.9522
Average = Sum(39)m / 12 =												153.2349
HLP	1.6993	1.6849	1.6708	1.6046	1.5922	1.5346	1.5346	1.5239	1.5568	1.5922	1.6173	1.6435
HLP (average)												1.6046
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6938	(42)
Hot water usage for mixer showers	122.5683	120.7263	118.0422	112.9067	109.1168	104.8903	102.4880	105.1518	108.0718	112.6097	117.8556	122.0987	122.0987	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	42.2170	40.6818	39.1467	37.6115	36.0764	34.5412	34.5412	36.0764	37.6115	39.1467	40.6818	42.2170	42.2170	(42c)
Average daily hot water use (litres/day)													151.3829	(43)
Daily hot water use	164.7853	161.4082	157.1889	150.5182	145.1931	139.4315	137.0292	141.2281	145.6833	151.7564	158.5374	164.3157	164.3157	(44)
Energy conte	260.9796	229.8431	241.5935	206.0519	195.4578	171.4473	165.7249	174.8699	179.6421	205.9320	225.8656	257.2786	257.2786	(45)
Energy content (annual)													Total = Sum(45)m =	2514.6862
Distribution loss (46)m = 0.15 x (45)m	39.1469	34.4765	36.2390	30.9078	29.3187	25.7171	24.8587	26.2305	26.9463	30.8898	33.8798	38.5918	38.5918	(46)
Water storage loss:														
Store volume													250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													2.2200	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													1.1988	(55)
Total storage loss	37.1628	33.5664	37.1628	35.9640	37.1628	35.9640	37.1628	37.1628	35.9640	37.1628	35.9640	37.1628	37.1628	(56)
If cylinder contains dedicated solar storage														
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	23.2624	(59)
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	0.0000	(61)
Total heat required for water heating calculated for each month	321.4048	284.4207	302.0187	264.5279	255.8830	229.9233	226.1501	235.2951	238.1181	266.3572	284.3416	317.7038	317.7038	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
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	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	321.4048	284.4207	302.0187	264.5279	255.8830	229.9233	226.1501	235.2951	238.1181	266.3572	284.3416	317.7038	317.7038	(64)
Total per year (kWh/year) = Sum(64)m =													3226.1442	(64)
12Total per year (kWh/year)													3226	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month	135.1159	120.0849	128.6700	115.2930	113.3299	103.7870	103.4437	106.4844	106.5118	116.8125	121.8811	133.8853	133.8853	(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	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	135.5638	150.0885	135.5638	140.0826	135.5638	140.0826	135.5638	135.5638	140.0826	135.5638	140.0826	135.5638
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	248.8409	251.4231	244.9161	231.0634	213.5768	197.1419	186.1624	183.5802	190.0873	203.9400	221.4265	237.8614
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Losses e.g. evaporation (negative values) (Table 5)	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512
Water heating gains (Table 5)	181.6074	178.6978	172.9435	160.1292	152.3251	144.1486	139.0372	143.1242	147.9330	157.0061	169.2793	179.9534
Total internal gains	629.4188	643.6161	616.8301	594.6819	564.8725	544.7799	524.1701	525.6749	541.5096	559.9166	594.1951	616.7853

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	5.5200	11.2829	0.6300	0.7000	0.7700	19.0341
Southwest	6.1300	36.7938	0.6300	0.7000	0.7700	68.9298
Southwest	1.0900	31.0867	0.6300	0.7000	1.0000	13.4487
Solar gains	101.4127	182.9442	275.7586	381.6367	461.9875	473.3114
Total gains	730.8315	826.5603	892.5887	976.3186	1026.8600	1018.0913
						974.4284
						914.0902
						853.8164
						769.1291
						717.5618
						123.3667
						85.5386
						702.3239

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	40.8669	41.2156	41.5633	43.2780	43.6146	45.2533	45.2533	45.5704	44.6078	43.6146	42.9389	42.2545	42.2545	
alpha	3.7245	3.7477	3.7709	3.8852	3.9076	4.0169	4.0169	4.0380	3.9739	3.9076	3.8626	3.8170	3.8170	
util living area														

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	0.9944	0.9905	0.9829	0.9590	0.9010	0.7666	0.6130	0.6620	0.8649	0.9684	0.9903	0.9953 (86)
Living	18.9762	19.1877	19.5274	20.0485	20.4921	20.8348	20.9501	20.9324	20.6997	20.1309	19.5143	19.0043
Non living	17.2525	17.5283	17.9663	18.6496	19.1833	19.5662	19.6469	19.6467	19.4381	18.7663	17.9772	17.3134
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.9647	19.1877	19.5274	20.0485	20.4921	20.8348	20.9501	20.9324	20.6997	20.1309	19.5143	19.2834 (87)
Th 2	19.5413	19.5517	19.5618	19.6100	19.6190	19.6617	19.6617	19.6696	19.6452	19.6190	19.6007	19.5816 (88)
util rest of house												
	0.9925	0.9871	0.9762	0.9415	0.8543	0.6590	0.4492	0.5020	0.7847	0.9513	0.9862	0.9936 (89)
MIT 2	18.6289	17.5283	17.9663	18.6496	19.1833	19.5662	19.6469	19.6467	19.4381	18.7663	17.9772	17.7221 (90)
Living area fraction									FLA = Living area / (4) =			0.2506 (91)
MIT	18.9636	17.9441	18.3575	19.0001	19.5112	19.8841	19.9735	19.9689	19.7542	19.1082	18.3623	18.1133 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9636	17.9441	18.3575	19.0001	19.5112	19.8841	19.9735	19.9689	19.7542	19.1082	18.3623	18.1133 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9914	0.9813	0.9680	0.9311	0.8498	0.6794	0.4904	0.5416	0.7927	0.9424	0.9805	0.9910 (94)
Useful gains	724.5709	811.1306	864.0544	909.0650	872.5796	691.6636	477.8839	495.1000	676.8059	724.8007	703.5865	696.0233 (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	2379.6337	2098.9039	1892.0104	1547.7470	1187.7594	774.3904	494.3871	519.3874	840.6294	1293.7434	1739.4714	2183.7269 (97)
Space heating kWh	1231.3668	865.3837	764.7993	459.8510	234.4938	0.0000	0.0000	0.0000	0.0000	423.2934	745.8371	1106.8515 (98a)
Space heating requirement - total per year (kWh/year)												5831.8765
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1231.3668	865.3837	764.7993	459.8510	234.4938	0.0000	0.0000	0.0000	0.0000	423.2934	745.8371	1106.8515 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5831.8765
Space heating per m2										(98c) / (4) =		61.0668 (99)

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 %)												370.6252 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1231.3668	865.3837	764.7993	459.8510	234.4938	0.0000	0.0000	0.0000	0.0000	423.2934	745.8371	1106.8515 (98)
Space heating efficiency (main heating system 1)	370.6252	370.6252	370.6252	370.6252	370.6252	0.0000	0.0000	0.0000	0.0000	370.6252	370.6252	370.6252 (210)
Space heating fuel (main heating system)	332.2404	233.4929	206.3538	124.0744	63.2698	0.0000	0.0000	0.0000	0.0000	114.2106	201.2376	298.6444 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	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	321.4048	284.4207	302.0187	264.5279	255.8830	229.9233	226.1501	235.2951	238.1181	266.3572	284.3416	317.7038 (64)
Efficiency of water heater (217)m	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942 (216)
Fuel for water heating, kWh/month	172.6180	152.7548	162.2062	142.0709	137.4280	123.4857	121.4592	126.3708	127.8869	143.0534	152.7124	170.6303 (219)
Space cooling fuel requirement												
(221)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 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	26.7990	21.4992	19.3576	14.1822	10.9548	8.9501	9.9933	12.9897	16.8723	22.1374	25.0041	27.5439 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)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 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)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 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)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 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)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 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)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 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)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 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)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 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)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 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1573.5240 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												186.1942
Water heating fuel used												1732.6768 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												216.2837 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)

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Total delivered energy for all uses

3522.4844 (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	1573.5240	0.1549	243.7790 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1732.6768	0.1410	244.2353 (264)
Space and water heating			488.0143 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	216.2837	0.1443	31.2164 (268)
Total CO2, kg/year			519.2307 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.4400 (273)

 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	1573.5240	1.5735	2476.0088 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1732.6768	1.5212	2635.7756 (278)
Space and water heating			5111.7844 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	216.2837	1.5338	331.7431 (282)
Total Primary energy kWh/year			5443.5275 (286)
Dwelling Primary energy Rate (DPER)			57.0000 (287)

Full SAP Calculation Printout



Property Reference	14 Marlborough St		Issued on Date	06/02/2025	
Assessment Reference	Renewables	Prop Type Ref			
Property	14, Marlborough St, Bristol, BS5 6RH				
SAP Rating	76 C	DER	5.44	TER	
Environmental	95 A	% DER < TER			N/A
CO ₂ Emissions (t/year)	0.46	DFEE	67.38	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	57.00	TPER	
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client					

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	53.2600 (1b)	x 2.4400 (2b)	= 129.9544 (1b) - (3b)
First floor	42.2400 (1c)	x 2.5500 (2c)	= 107.7120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.5000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 237.6664 (5)
Dwelling volume			

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract 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)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1262 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8762 (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) = 0.7448 (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	0.9496	0.9310	0.9124	0.8193	0.8007	0.7076	0.7076	0.6889	0.7448	0.8007	0.8379	0.8751 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.9509	0.9334	0.9162	0.8356	0.8205	0.7503	0.7503	0.7373	0.7774	0.8205	0.8510	0.8829 (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
Glazing (Uw = 1.40)			11.6500	1.3258	15.4451		(27)
Door			1.6500	1.4000	2.3100		(26)
Roof Window SW			1.0900	1.3258	1.4451		(27a)
Existing Floor			47.5900	0.2500	11.8975		(28a)
New Floor			5.6700	0.1800	1.0206		(28a)
New Wall	40.3300	6.1300	34.2000	0.1800	6.1560		(29a)
Existing Wall	34.0500	7.1700	26.8800	0.2600	6.9888		(29a)
Existing Cold Pitched Roof	44.0900		44.0900	0.1100	4.8499		(30)
Existing Warm Pitched Roof	3.8700	1.0900	2.7800	0.1600	0.4448		(30)
New Warm Pitched Roof	5.7900		5.7900	0.1500	0.8685		(30)
Total net area of external elements Aum(A, m ²)			181.3900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 51.4263		(33)
Party Wall			86.6400	0.0000	0.0000		(32)
Thermal mass parameter (IMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							36.2780 (36)
Point Thermal bridges						(36a) =	0.0000

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Total fabric heat loss (33) + (36) + (36a) = 87.7043 (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	74.5775	73.2043	71.8584	65.5363	64.3535	58.8472	58.8472	57.8275	60.9682	64.3535	66.7464	69.2480 (38)
Heat transfer coeff	162.2818	160.9086	159.5626	153.2406	152.0578	146.5515	146.5515	145.5318	148.6724	152.0578	154.4506	156.9522 (39)
Average = Sum(39)m / 12 =												153.2349
HLP	1.6993	1.6849	1.6708	1.6046	1.5922	1.5346	1.5346	1.5239	1.5568	1.5922	1.6173	Dec 1.6435 (40)
HLP (average)												1.6046
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42)
Hot water usage for baths	29.9613	29.5163	28.8897	27.7344	26.8693	25.9100	25.3918	26.0141	26.6916	27.7180	28.8972	29.8600 (42b)
Hot water usage for other uses	42.2170	40.6818	39.1467	37.6115	36.0764	34.5412	34.5412	36.0764	37.6115	39.1467	40.6818	42.2170 (42c)
Average daily hot water use (litres/day)												66.1580 (43)
Daily hot water use	72.1783	70.1982	68.0364	65.3459	62.9456	60.4512	59.9330	62.0904	64.3031	66.8647	69.5790	72.0770 (44)
Energy conte (annual)	114.3128	99.9613	104.5694	89.4553	84.7369	74.3318	72.4838	76.8809	79.2921	90.7348	99.1280	112.8552 (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	0.0000 (56)
If cylinder contains dedicated solar storage												
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)
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 (59)
Total heat required for water heating calculated for each month	97.1659	84.9671	88.8840	76.0370	72.0264	63.1820	61.6112	65.3488	67.3983	77.1245	84.2588	95.9269 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
FV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
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 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	97.1659	84.9671	88.8840	76.0370	72.0264	63.1820	61.6112	65.3488	67.3983	77.1245	84.2588	95.9269 (64)
Total per year (kWh/year)												933.9310 (64)
Electric shower(s)	55.5663	49.5101	54.0631	51.5917	52.5598	50.1370	51.8082	52.5598	51.5917	54.0631	53.0465	55.5663 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												632.0637 (64a)
Heat gains from water heating, kWh/month	38.1831	33.6193	35.7368	31.9072	31.1466	28.3297	28.3549	29.4772	29.7475	32.7969	34.3263	37.8733 (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	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	135.5638	150.0885	135.5638	140.0826	135.5638	140.0826	135.5638	135.5638	140.0826	135.5638	140.0826	135.5638 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	248.8409	251.4231	244.9161	231.0634	213.5768	197.1419	186.1624	183.5802	190.0873	203.9400	221.4265	237.8614 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689 (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)	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512 (71)
Water heating gains (Table 5)	51.3213	50.0287	48.0333	44.3155	41.8636	39.3469	38.1114	39.6198	41.3160	44.0819	47.6755	50.9050 (72)
Total internal gains	499.1327	514.9470	491.9199	478.8682	454.4110	439.9781	423.2443	422.1705	434.8925	446.9923	472.5913	487.7369 (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					
Northeast	5.5200	11.2829	0.6300	0.7000	0.7700	19.0341 (75)						
Southwest	6.1300	36.7938	0.6300	0.7000	0.7700	68.9298 (79)						
Southwest	1.0900	31.0867	0.6300	0.7000	1.0000	13.4487 (82)						
Solar gains	101.4127	182.9442	275.7586	381.6367	461.9875	473.3114	450.2583	388.4153	312.3068	209.2126	123.3667	85.5386 (83)
Total gains	600.5455	697.8912	767.6785	860.5049	916.3985	913.2895	873.5025	810.5859	747.1994	656.2049	595.9580	573.2755 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
tau	40.8669	41.2156	41.5633	43.2780	43.6146	45.2533	45.2533	45.5704	44.6078	43.6146	42.9389	42.2545
alpha	3.7245	3.7477	3.7709	3.8852	3.9076	4.0169	4.0169	4.0380	3.9739	3.9076	3.8626	3.8170
util living area	0.9972	0.9946	0.9895	0.9722	0.9267	0.8112	0.6652	0.7185	0.9028	0.9809	0.9949	0.9977 (86)

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MIT	18.8457	19.0602	19.4068	19.9451	20.4131	20.7933	20.9331	20.9085	20.6329	20.0259	19.3925	18.8734 (87)
Th 2	19.5413	19.5517	19.5618	19.6100	19.6190	19.6617	19.6617	19.6696	19.6452	19.6190	19.6007	19.5816 (88)
util rest of house												
	0.9961	0.9926	0.9853	0.9596	0.8886	0.7101	0.4958	0.5567	0.8362	0.9699	0.9926	0.9968 (89)
MIT 2	17.6279	17.8488	18.2005	18.7646	19.2141	19.5638	19.6453	19.6438	19.4366	18.8556	18.2154	17.6838 (90)
Living area fraction									flA = Living area / (4) =			0.2506 (91)
MIT	17.9331	18.1524	18.5028	19.0604	19.5146	19.8719	19.9680	19.9607	19.7364	19.1488	18.5103	17.9819 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9331	18.1524	18.5028	19.0604	19.5146	19.8719	19.9680	19.9607	19.7364	19.1488	18.5103	17.9819 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9943	0.9897	0.9807	0.9527	0.8850	0.7288	0.5387	0.5970	0.8420	0.9645	0.9899	0.9954 (94)
Useful gains	597.1359	690.7160	752.8487	819.8158	810.9701	665.5908	470.5989	483.9058	629.1188	632.9151	589.9406	570.6205 (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												
	2212.3965	2132.4207	1915.1927	1556.9826	1188.2637	772.6053	493.5876	518.2006	837.9713	1299.9158	1762.3334	2163.0943 (97)
Space heating kWh	1201.7539	968.8256	864.7840	530.7602	280.7064	0.0000	0.0000	0.0000	0.0000	496.2485	844.1229	1184.8005 (98a)
Space heating requirement - total per year (kWh/year)												6372.0019
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1201.7539	968.8256	864.7840	530.7602	280.7064	0.0000	0.0000	0.0000	0.0000	496.2485	844.1229	1184.8005 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6372.0019
Space heating per m2												(98c) / (4) = 66.7225 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	1377.5838	1084.4809	1106.0416	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.6532	0.7439	0.7013	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	899.7815	806.7460	775.6150	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	991.5996	948.7480	880.1299	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction												
	0.0000	0.0000	0.0000	0.0000	0.0000	66.1090	105.6495	77.7591	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)									fc = cooled area / (4) =			1.0000 (105)
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	16.5273	26.4124	19.4398	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												62.3794 (107)
Energy for space heating												66.7225 (99)
Energy for space cooling												0.6532 (108)
Total												67.3757 (109)
Fabric Energy Efficiency (DFEE)												67.4 (109)

Full SAP Calculation Printout



Property Reference	14 Marlborough St		Issued on Date	06/02/2025	
Assessment Reference	Renewables	Prop Type Ref			
Property	14, Marlborough St, Bristol, BS5 6RH				
SAP Rating	76 C	DER	5.44	TER	
Environmental	95 A	% DER < TER	N/A		
CO ₂ Emissions (t/year)	0.46	DFEE	67.38	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	57.00	TPER	
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client					

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	53.2600 (1b)	x 2.4400 (2b)	= 129.9544 (1b) - (3b)
First floor	42.2400 (1c)	x 2.5500 (2c)	= 107.7120 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.5000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 237.6664 (5)
Dwelling volume			

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract 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)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1262 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.8762 (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) =	0.7448 (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	0.9496	0.9310	0.9124	0.8193	0.8007	0.7076	0.7076	0.6889	0.7448	0.8007	0.8379	0.8751 (22b)
Effective ac	0.9509	0.9334	0.9162	0.8356	0.8205	0.7503	0.7503	0.7373	0.7774	0.8205	0.8510	0.8829 (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
Glazing (Uw = 1.40)			11.6500	1.3258	15.4451		(27)
Door			1.6500	1.4000	2.3100		(26)
Roof Window SW			1.0900	1.3258	1.4451		(27a)
Existing Floor			47.5900	0.2500	11.8975		(28a)
New Floor			5.6700	0.1800	1.0206		(28a)
New Wall	40.3300	6.1300	34.2000	0.1800	6.1560		(29a)
Existing Wall	34.0500	7.1700	26.8800	0.2600	6.9888		(29a)
Existing Cold Pitched Roof	44.0900		44.0900	0.1100	4.8499		(30)
Existing Warm Pitched Roof	3.8700	1.0900	2.7800	0.1600	0.4448		(30)
New Warm Pitched Roof	5.7900		5.7900	0.1500	0.8685		(30)
Total net area of external elements Aum(A, m ²)			181.3900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	51.4263	(33)
Party Wall			86.6400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							36.2780 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =	87.7043	(37)

Full SAP Calculation Printout



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	74.5775	73.2043	71.8584	65.5363	64.3535	58.8472	58.8472	57.8275	60.9682	64.3535	66.7464	69.2480 (38)
Heat transfer coeff	162.2818	160.9086	159.5626	153.2406	152.0578	146.5515	146.5515	145.5318	148.6724	152.0578	154.4506	156.9522 (39)
Average = Sum(39)m / 12 =												153.2349

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.6993	1.6849	1.6708	1.6046	1.5922	1.5346	1.5346	1.5239	1.5568	1.5922	1.6173	1.6435 (40)
HLP (average)												1.6046
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.6938 (42)
Hot water usage for mixer showers	122.5683	120.7263	118.0422	112.9067	109.1168	104.8903	102.4880	105.1518	108.0718	112.6097	117.8556	122.0987 (42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses	42.2170	40.6818	39.1467	37.6115	36.0764	34.5412	34.5412	36.0764	37.6115	39.1467	40.6818	42.2170 (42c)
Average daily hot water use (litres/day)												151.3829 (43)
Daily hot water use	164.7853	161.4082	157.1889	150.5182	145.1931	139.4315	137.0292	141.2281	145.6833	151.7564	158.5374	164.3157 (44)
Energy conte	260.9796	229.8431	241.5935	206.0519	195.4578	171.4473	165.7249	174.8699	179.6421	205.9320	225.8656	257.2786 (45)
Energy content (annual)												Total = Sum(45)m = 2514.6862
Distribution loss (46)m = 0.15 x (45)m	39.1469	34.4765	36.2390	30.9078	29.3187	25.7171	24.8587	26.2305	26.9463	30.8898	33.8798	38.5918 (46)
Water storage loss:												250.0000 (47)
Store volume												2.2200 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												1.1988 (55)
Enter (49) or (54) in (55)												
Total storage loss	37.1628	33.5664	37.1628	35.9640	37.1628	35.9640	37.1628	37.1628	35.9640	37.1628	35.9640	37.1628 (56)
If cylinder contains dedicated solar storage												
Primary loss	37.1628	33.5664	37.1628	35.9640	37.1628	35.9640	37.1628	37.1628	35.9640	37.1628	35.9640	37.1628 (57)
Combi 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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
WWHRS	321.4048	284.4207	302.0187	264.5279	255.8830	229.9233	226.1501	235.2951	238.1181	266.3572	284.3416	317.7038 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
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 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	321.4048	284.4207	302.0187	264.5279	255.8830	229.9233	226.1501	235.2951	238.1181	266.3572	284.3416	317.7038 (64)
Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 3226.1442 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	135.1159	120.0849	128.6700	115.2930	113.3299	103.7870	103.4437	106.4844	106.5118	116.8125	121.8811	133.8853 (65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890	134.6890 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	135.5638	150.0885	135.5638	140.0826	135.5638	140.0826	135.5638	135.5638	140.0826	135.5638	140.0826	135.5638 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	248.8409	251.4231	244.9161	231.0634	213.5768	197.1419	186.1624	183.5802	190.0873	203.9400	221.4265	237.8614 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689	36.4689 (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)	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512	-107.7512 (71)
Water heating gains (Table 5)	181.6074	178.6978	172.9435	160.1292	152.3251	144.1486	139.0372	143.1242	147.9330	157.0061	169.2793	179.9534 (72)
Total internal gains	629.4188	643.6161	616.8301	594.6819	564.8725	544.7799	524.1701	525.6749	541.5096	559.9166	594.1951	616.7853 (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						
Northeast	5.5200	11.2829	0.6300	0.7000	0.7700	19.0341 (75)						
Southwest	6.1300	36.7938	0.6300	0.7000	0.7700	68.9298 (79)						
Southwest	1.0900	31.0867	0.6300	0.7000	1.0000	13.4487 (82)						
Solar gains	101.4127	182.9442	275.7586	381.6367	461.9875	473.3114	450.2583	388.4153	312.3068	209.2126	123.3667	85.5386 (83)
Total gains	730.8315	826.5603	892.5887	976.3186	1026.8600	1018.0913	974.4284	914.0902	853.8164	769.1291	717.5618	702.3239 (84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	40.8669	41.2156	41.5633	43.2780	43.6146	45.2533	45.2533	45.5704	44.6078	43.6146	42.9389	42.2545
alpha	3.7245	3.7477	3.7709	3.8852	3.9076	4.0169	4.0169	4.0380	3.9739	3.9076	3.8626	3.8170
util living area												

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	0.9944	0.9905	0.9829	0.9590	0.9010	0.7666	0.6130	0.6620	0.8649	0.9684	0.9903	0.9953 (86)
Living	18.9762	19.1877	19.5274	20.0485	20.4921	20.8348	20.9501	20.9324	20.6997	20.1309	19.5143	19.0043
Non living	17.2525	17.5283	17.9663	18.6496	19.1833	19.5662	19.6469	19.6467	19.4381	18.7663	17.9772	17.3134
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.9647	19.1877	19.5274	20.0485	20.4921	20.8348	20.9501	20.9324	20.6997	20.1309	19.5143	19.2834 (87)
Th 2	19.5413	19.5517	19.5618	19.6100	19.6190	19.6617	19.6617	19.6696	19.6452	19.6190	19.6007	19.5816 (88)
util rest of house												
	0.9925	0.9871	0.9762	0.9415	0.8543	0.6590	0.4492	0.5020	0.7847	0.9513	0.9862	0.9936 (89)
MIT 2	18.6289	17.5283	17.9663	18.6496	19.1833	19.5662	19.6469	19.6467	19.4381	18.7663	17.9772	17.7221 (90)
Living area fraction									FLA = Living area / (4) =			0.2506 (91)
MIT	18.9636	17.9441	18.3575	19.0001	19.5112	19.8841	19.9735	19.9689	19.7542	19.1082	18.3623	18.1133 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9636	17.9441	18.3575	19.0001	19.5112	19.8841	19.9735	19.9689	19.7542	19.1082	18.3623	18.1133 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9914	0.9813	0.9680	0.9311	0.8498	0.6794	0.4904	0.5416	0.7927	0.9424	0.9805	0.9910 (94)
Useful gains	724.5709	811.1306	864.0544	909.0650	872.5796	691.6636	477.8839	495.1000	676.8059	724.8007	703.5865	696.0233 (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	2379.6337	2098.9039	1892.0104	1547.7470	1187.7594	774.3904	494.3871	519.3874	840.6294	1293.7434	1739.4714	2183.7269 (97)
Space heating kWh	1231.3668	865.3837	764.7993	459.8510	234.4938	0.0000	0.0000	0.0000	0.0000	423.2934	745.8371	1106.8515 (98a)
Space heating requirement - total per year (kWh/year)												5831.8765
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1231.3668	865.3837	764.7993	459.8510	234.4938	0.0000	0.0000	0.0000	0.0000	423.2934	745.8371	1106.8515 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5831.8765
Space heating per m2										(98c) / (4) =		61.0668 (99)

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 %)												370.6252 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1231.3668	865.3837	764.7993	459.8510	234.4938	0.0000	0.0000	0.0000	0.0000	423.2934	745.8371	1106.8515 (98)
Space heating efficiency (main heating system 1)	370.6252	370.6252	370.6252	370.6252	370.6252	0.0000	0.0000	0.0000	0.0000	370.6252	370.6252	370.6252 (210)
Space heating fuel (main heating system)	332.2404	233.4929	206.3538	124.0744	63.2698	0.0000	0.0000	0.0000	0.0000	114.2106	201.2376	298.6444 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	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	321.4048	284.4207	302.0187	264.5279	255.8830	229.9233	226.1501	235.2951	238.1181	266.3572	284.3416	317.7038 (64)
Efficiency of water heater (217)m	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942	186.1942 (216)
Fuel for water heating, kWh/month	172.6180	152.7548	162.2062	142.0709	137.4280	123.4857	121.4592	126.3708	127.8869	143.0534	152.7124	170.6303 (219)
Space cooling fuel requirement												
(221)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 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	26.7990	21.4992	19.3576	14.1822	10.9548	8.9501	9.9933	12.9897	16.8723	22.1374	25.0041	27.5439 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)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 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)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 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)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 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)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 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)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 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)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 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)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 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)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 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1573.5240 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												186.1942
Water heating fuel used												1732.6768 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												216.2837 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
FV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)

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Total delivered energy for all uses

3522.4844 (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	1573.5240	0.1549	243.7790 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1732.6768	0.1410	244.2353 (264)
Space and water heating			488.0143 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	216.2837	0.1443	31.2164 (268)
Total CO2, kg/year			519.2307 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.4400 (273)

 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	1573.5240	1.5735	2476.0088 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1732.6768	1.5212	2635.7756 (278)
Space and water heating			5111.7844 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	216.2837	1.5338	331.7431 (282)
Total Primary energy kWh/year			5443.5275 (286)
Dwelling Primary energy Rate (DPER)			57.0000 (287)