

Full SAP Calculation Printout



Property Reference	001_Copy		Issued on Date	07/03/2024	
Assessment Reference	00001_Copy_Copy	Prop Type Ref			
Property	3 Gyles Court, Newquay, TR7 3ER				
SAP Rating	84 B	DER	13.43	TER	9.99
Environmental	90 B	% DER < TER	-34.43		
CO ₂ Emissions (t/year)	0.77	DFEE	37.36	TFEE	42.52
Compliance Check	See BREL	% DFEE < TFEE	12.14		
% DPER < TPER	-45.72	DPER	77.92	TPER	53.47
Assessor Details	Mr. David Barsted			Assessor ID	AV66-0001
Client	SAP04579, Mr Shoesmith, Mrs Shoesmith				

SAP 10 WORKSHEET FOR New Build (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	68.9600 (1b)	x 2.3000 (2b)	= 158.6080 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 158.6080 (5)

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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		0.6000 (17)
Infiltration rate		0.0300 (18)
Number of sides sheltered		0 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.0300 (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	0.0382	0.0375	0.0367	0.0330	0.0323	0.0285	0.0285	0.0278	0.0300	0.0323	0.0338	0.0352 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												79.2000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.1422	0.1415	0.1407	0.1370	0.1362	0.1325	0.1325	0.1317	0.1340	0.1362	0.1377	0.1392 (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 (Uw = 1.20)			8.8400	1.1450	10.1221		(27)
Front Door			2.0500	1.2000	2.4600		(26)
French Doors (Uw = 1.20)			3.2000	1.1450	3.6641		(27)
Heatloss Floor 1			68.9600	0.1100	7.5856	110.0000	7585.6000 (28a)
External Wall 1	81.4000	14.0900	67.3100	0.1600	10.7696	190.0000	12788.9000 (29a)
Cold Roof	68.9600		68.9600	0.1100	7.5856	9.0000	620.6400 (30)
Total net area of external elements Aum(A, m ²)			219.3200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.1871		(33)
Internal Wall 1			62.7400			9.0000	564.6600 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		21559.8000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							312.6421 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				9.4000	0.0280	0.2632	

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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	99.2341	99.2987	99.3634	99.6880	99.7532	100.0804	100.0804	100.1461	99.9493	99.7532	99.6229	99.4930
alpha	7.6156	7.6199	7.6242	7.6459	7.6502	7.6720	7.6720	7.6764	7.6633	7.6502	7.6415	7.6329
util living area	0.9933	0.9785	0.9406	0.8336	0.6617	0.4734	0.3393	0.3703	0.5785	0.8725	0.9803	0.9952 (86)
MIT	20.5259	20.6528	20.7857	20.9037	20.9501	20.9588	20.9594	20.9594	20.9566	20.8931	20.6886	20.4952 (87)
Th 2	20.1887	20.1892	20.1896	20.1921	20.1926	20.1950	20.1950	20.1955	20.1940	20.1926	20.1916	20.1906 (88)
util rest of house	0.9908	0.9713	0.9227	0.7954	0.6085	0.4143	0.2772	0.3056	0.5128	0.8319	0.9723	0.9935 (89)
MIT 2	19.6423	19.8010	19.9609	20.0915	20.1341	20.1427	20.1429	20.1434	20.1405	20.0847	19.8493	19.6051 (90)
Living area fraction									fLA = Living area / (4) =			0.5006 (91)
MIT	20.0846	20.2274	20.3738	20.4981	20.5426	20.5512	20.5516	20.5519	20.5490	20.4894	20.2694	20.0507 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0846	20.2274	20.3738	20.4981	20.5426	20.5512	20.5516	20.5519	20.5490	20.4894	20.2694	20.0507 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9904	0.9717	0.9272	0.8105	0.6319	0.4405	0.3047	0.3343	0.5420	0.8478	0.9732	0.9931 (94)
Useful gains	579.6012	664.7424	693.1342	653.5344	524.4786	355.7475	236.4490	248.2498	384.7426	543.4334	565.0973	553.3340 (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	952.6096	924.4157	836.2022	696.7633	530.8768	356.1201	236.4670	248.2866	386.4165	593.7239	791.6811	954.1102 (97)
Space heating kWh	277.5182	174.5004	106.4426	31.1248	4.7603	0.0000	0.0000	0.0000	0.0000	37.4162	163.1404	298.1775 (98a)
Space heating requirement - total per year (kWh/year)												1093.0805
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	277.5182	174.5004	106.4426	31.1248	4.7603	0.0000	0.0000	0.0000	0.0000	37.4162	163.1404	298.1775 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1093.0805
Space heating per m2										(98c) / (4) =		15.8509 (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 %)												84.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	277.5182	174.5004	106.4426	31.1248	4.7603	0.0000	0.0000	0.0000	0.0000	37.4162	163.1404	298.1775 (98)
Space heating efficiency (main heating system 1)	84.0000	84.0000	84.0000	84.0000	84.0000	0.0000	0.0000	0.0000	0.0000	84.0000	84.0000	84.0000 (210)
Space heating fuel (main heating system)	330.3789	207.7386	126.7174	37.0533	5.6670	0.0000	0.0000	0.0000	0.0000	44.5431	194.2147	354.9733 (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	249.0719	219.6318	231.5457	199.1232	190.0386	167.9756	163.3205	171.5759	175.4344	199.5516	217.0186	245.7502 (64)
Efficiency of water heater	88.1877	88.0446	87.8283	87.5260	87.3408	87.3000	87.3000	87.3000	87.3000	87.5641	88.0215	88.2238 (217)
Fuel for water heating, kWh/month	282.4337	249.4552	263.6344	227.5018	217.5829	192.4119	187.0796	196.5359	200.9558	227.8920	246.5518	278.5531 (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	29.2851	26.4511	29.2851	28.3404	29.2851	28.3404	29.2851	29.2851	28.3404	29.2851	28.3404	29.2851 (231)
Lighting	20.2103	16.2135	14.5984	10.6954	8.2615	6.7497	7.5364	9.7961	12.7241	16.6948	18.8567	20.7720 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	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)	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)	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)	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)	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)	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)	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)	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												1301.2863 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												87.3000
Water heating fuel used												2770.5882 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.3375)												
mechanical ventilation fans (SFP = 1.3375)												258.8086 (230a)
central heating pump												41.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												344.8086 (231)
Electricity for lighting (calculated in Appendix L)												163.1089 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)

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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)
Total delivered energy for all uses	4579.7919 (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	1301.2863	0.2100	273.2701 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2770.5882	0.2100	581.8235 (264)
Space and water heating			855.0936 (265)
Pumps, fans and electric keep-hot	344.8086	0.1387	47.8292 (267)
Energy for lighting	163.1089	0.1443	23.5417 (268)
Total CO2, kg/year			926.4645 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.4300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor	Primary energy kWh/year
Space heating - main system 1	1301.2863	1.1300	1470.4535 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2770.5882	1.1300	3130.7647 (278)
Space and water heating			4601.2181 (279)
Pumps, fans and electric keep-hot	344.8086	1.5128	521.6265 (281)
Energy for lighting	163.1089	1.5338	250.1819 (282)
Total Primary energy kWh/year			5373.0264 (286)
Dwelling Primary energy Rate (DPER)			77.9200 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	68.9600 (1b)	x 2.3000 (2b)	= 158.6080 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 158.6080 (5)

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	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)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1261 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3761 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3761 (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 infltr rate	0.4795	0.4701	0.4607	0.4137	0.4043	0.3573	0.3573	0.3479	0.3761	0.4043	0.4231	0.4419 (22b)
Effective ac	0.6150	0.6105	0.6061	0.5856	0.5817	0.5638	0.5638	0.5605	0.5707	0.5817	0.5895	0.5976 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			2.0500	1.0000	2.0500		(26)
TER Opening Type (Uw = 1.20)			12.0400	1.1450	13.7863		(27)

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Heatloss Floor 1				68.9600	0.1300	8.9648		(28a)
External Wall 1	81.4000	14.0900		67.3100	0.1800	12.1158		(29a)
Cold Roof	68.9600			68.9600	0.1100	7.5856		(30)
Total net area of external elements Aum(A, m2)				219.3200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =		44.5025		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 312.6421 (35)

List of Thermal Bridges				Length	Psi-value	Total	
K1 Element				9.4000	0.0500	0.4700	
E2 Other lintels (including other steel lintels)				5.6000	0.0500	0.2800	
E3 Sill				18.9800	0.0500	0.9490	
E4 Jamb				35.3900	0.1600	5.6624	
E5 Ground floor (normal)				23.8000	0.0600	1.4280	
E10 Eaves (insulation at ceiling level)				11.5900	0.0600	0.6954	
E12 Gable (insulation at ceiling level)				9.2000	0.0900	0.8280	
E16 Corner (normal)							

Thermal bridges (Sum(L x Psi) calculated using Appendix K)								10.3128 (36)
Point Thermal bridges								(36a) = 0.0000
Total fabric heat loss								(33) + (36) + (36a) = 54.8153 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	32.1880	31.9543	31.7253	30.6495	30.4482	29.5112	29.5112	29.3376	29.8721	30.4482	30.8554	31.2811 (38)
Average = Sum(39)m / 12 =	87.0033	86.7696	86.5405	85.4647	85.2634	84.3264	84.3264	84.1529	84.6873	85.2634	85.6706	86.0963 (39)
												85.4638

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2616	1.2583	1.2549	1.2393	1.2364	1.2228	1.2228	1.2203	1.2281	1.2364	1.2423	1.2485 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2206 (42)
Hot water usage for mixer showers													
Hot water usage for baths	78.9150	77.7291	76.0009	72.6944	70.2543	67.5331	65.9864	67.7015	69.5815	72.5033	75.8808	78.6127 (42a)	
Hot water usage for other uses	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)	
Average daily hot water use (litres/day)	37.3713	36.0123	34.6534	33.2944	31.9355	30.5765	30.5765	31.9355	33.2944	34.6534	36.0123	37.3713 (42c)	
													106.7309 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	116.2863	113.7414	110.6543	105.9889	102.1898	98.1097	96.5629	99.6370	102.8759	107.1566	111.8931	115.9840 (44)	
Energy content (annual)	184.1691	161.9663	170.0716	145.0935	137.5671	120.6373	116.7845	123.3714	126.8563	145.4105	159.4122	181.6029 (45)	
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 1772.9427
Water storage loss:	27.6254	24.2949	25.5107	21.7640	20.6351	18.0956	17.5177	18.5057	19.0284	21.8116	23.9118	27.2404 (46)	
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	48.3828	49.2074	50.7739	49.3151	50.9589	49.3151	50.9589 (61)	
Total heat required for water heating calculated for each month	235.1280	207.9937	221.0305	194.4085	188.5260	169.0201	165.9919	174.1453	176.1714	196.3694	208.7273	232.5618 (62)	
WWHRS	-36.0767	-31.9065	-33.4106	-27.6653	-25.7831	-22.0628	-20.6803	-21.9915	-22.8270	-26.9105	-30.4863	-35.4086 (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 (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	199.0514	176.0872	187.6198	166.7432	162.7429	146.9574	145.3116	152.1538	153.3444	169.4589	178.2410	197.1532 (64)	
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 2034.8648 (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	73.9760	65.3606	69.2885	60.5723	58.4808	52.2076	51.1327	53.7145	54.5085	61.0887	65.3333	73.1227 (65)	

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	111.0307	111.0307	111.0307	111.0307	111.0307	111.0307	111.0307	111.0307	111.0307	111.0307	111.0307	111.0307 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	100.8909	111.7007	100.8909	104.2539	100.8909	104.2539	100.8909	100.8909	104.2539	100.8909	104.2539	100.8909 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	194.8577	196.8797	191.7843	180.9368	167.2437	154.3742	145.7766	143.7545	148.8500	159.6975	173.3905	186.2601 (68)
Pumps, fans	34.1031	34.1031	34.1031	34.1031	34.1031	34.1031	34.1031	34.1031	34.1031	34.1031	34.1031	34.1031 (69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Water heating gains (Table 5)	-88.8245	-88.8245	-88.8245	-88.8245	-88.8245	-88.8245	-88.8245	-88.8245	-88.8245	-88.8245	-88.8245	-88.8245 (71)
Total internal gains	99.4300	97.2629	93.1297	84.1283	78.6032	72.5106	68.7267	72.1968	75.7062	82.1085	90.7408	98.2832 (72)
	454.4878	465.1524	445.1141	428.6282	406.0471	387.4479	371.7034	373.1515	385.1193	402.0061	427.6944	444.7433 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
	m2	Table 6a	Specific data	Specific data	factor	W
		W/m2	or Table 6b	or Table 6c	Table 6d	
East	5.0900	19.6403	0.6300	0.7000	0.7700	30.5518 (76)
South	5.8200	46.7521	0.6300	0.7000	0.7700	83.1564 (78)
West	1.1300	19.6403	0.6300	0.7000	0.7700	6.7826 (80)

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Solar gains	120.4908	209.2228	293.7570	371.4868	419.2969	416.6974	401.6326	366.5430	321.1074	233.5534	145.1203	102.5568 (83)
Total gains	574.9787	674.3752	738.8711	800.1150	825.3439	804.1453	773.3360	739.6945	706.2268	635.5595	572.8147	547.3001 (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	68.8346	69.0200	69.2026	70.0738	70.2392	71.0197	71.0197	71.1661	70.7170	70.2392	69.9053	69.5597
alpha	5.5890	5.6013	5.6135	5.6716	5.6826	5.7346	5.7346	5.7444	5.7145	5.6826	5.6604	5.6373
util living area	0.9966	0.9912	0.9783	0.9356	0.8328	0.6471	0.4761	0.5172	0.7602	0.9521	0.9917	0.9974 (86)
MIT	19.8774	20.0700	20.3206	20.6344	20.8648	20.9752	20.9963	20.9942	20.9391	20.6394	20.2032	19.8488 (87)
Th 2	19.8710	19.8737	19.8763	19.8887	19.8910	19.9018	19.9018	19.9038	19.8976	19.8910	19.8863	19.8814 (88)
util rest of house	0.9952	0.9876	0.9693	0.9091	0.7713	0.5473	0.3594	0.3974	0.6661	0.9266	0.9877	0.9963 (89)
MIT 2	18.5899	18.8365	19.1530	19.5409	19.7894	19.8903	19.9009	19.9023	19.8638	19.5570	19.0167	18.5612 (90)
Living area fraction												fLA = Living area / (4) = 0.5006 (91)
MIT	19.2344	19.4540	19.7375	20.0883	20.3277	20.4334	20.4493	20.4489	20.4021	20.0988	19.6106	19.2058 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2344	19.4540	19.7375	20.0883	20.3277	20.4334	20.4493	20.4489	20.4021	20.0988	19.6106	19.2058 (93)

8. Space heating requirement

Utilisation	0.9941	0.9859	0.9680	0.9146	0.7974	0.5970	0.4181	0.4577	0.7118	0.9323	0.9864	0.9954 (94)
Useful gains	571.5979	664.8654	715.1972	731.7667	658.1269	480.0722	323.2935	338.5728	502.6673	592.5399	565.0062	544.8023 (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	1299.3415	1262.8412	1145.5778	956.2035	735.6265	491.9058	324.5940	340.7245	533.7090	809.9000	1071.7917	1291.9412 (97)
Space heating kWh	541.4412	401.8397	320.2032	161.5945	57.6598	0.0000	0.0000	0.0000	0.0000	161.7160	364.8855	555.8714 (98a)
Space heating requirement - total per year (kWh/year)												2565.2112
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	541.4412	401.8397	320.2032	161.5945	57.6598	0.0000	0.0000	0.0000	0.0000	161.7160	364.8855	555.8714 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2565.2112
Space heating per m2												(98c) / (4) = 37.1985 (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 %)												92.4000 (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	541.4412	401.8397	320.2032	161.5945	57.6598	0.0000	0.0000	0.0000	0.0000	161.7160	364.8855	555.8714 (98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000 (210)
Space heating fuel (main heating system)	585.9754	434.8915	346.5402	174.8858	62.4023	0.0000	0.0000	0.0000	0.0000	175.0173	394.8977	601.5924 (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	199.0514	176.0872	187.6198	166.7432	162.7429	146.9574	145.3116	152.1538	153.3444	169.4589	178.2410	197.1532 (64)
Efficiency of water heater (217)m	86.4123	86.0907	85.5163	84.3142	82.3850	80.3000	80.3000	80.3000	80.3000	84.2813	85.8815	86.4752 (217)
Fuel for water heating, kWh/month	230.3508	204.5368	219.3967	197.7640	197.5396	183.0104	180.9609	189.4817	190.9644	201.0635	207.5429	227.9880 (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	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	20.9631	16.8174	15.1422	11.0938	8.5692	7.0011	7.8171	10.1610	13.1981	17.3166	19.5591	21.5458 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-53.6984	-70.7960	-95.2700	-100.1150	-102.4674	-93.8031	-92.6550	-90.0616	-84.8261	-77.4810	-57.2707	-47.0277 (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	-47.2726	-96.8489	-187.9067	-275.8570	-358.8298	-358.3905	-354.1291	-302.4436	-225.2584	-136.2037	-62.3305	-37.5779 (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												2776.2026 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												80.3000
Water heating fuel used												2430.5997 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

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Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	169.1845 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3408.5208 (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)
Total delivered energy for all uses	2053.4661 (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	2776.2026	0.2100	583.0025 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2430.5997	0.2100	510.4259 (264)
Space and water heating			1093.4285 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	169.1845	0.1443	24.4186 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-965.4722	0.1360	-131.3262
PV Unit electricity exported	-2443.0486	0.1266	-309.2533
Total			-440.5795 (269)
Total CO2, kg/year			689.1968 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.9900 (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	2776.2026	1.1300	3137.1089 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2430.5997	1.1300	2746.5777 (278)
Space and water heating			5883.6866 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	169.1845	1.5338	259.5009 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-965.4722	1.5028	-1450.9069
PV Unit electricity exported	-2443.0486	0.4647	-1135.2475
Total			-2586.1544 (283)
Total Primary energy kWh/year			3687.1339 (286)
Target Primary Energy Rate (TPER)			53.4700 (287)