

Full SAP Calculation Printout



Property Reference	BH1+2 L03-6 03 x8_Copy		Issued on Date	12/09/2023	
Assessment Reference	BH1+2 L03-6 03 x8_Copy	Prop Type Ref			
Property					
SAP Rating	88 B	DER	9.20	TER	10.63
Environmental	92 A	% DER < TER	13.45		
CO ₂ Emissions (t/year)	0.92	DFEE	26.92	TFEE	26.50
Compliance Check	See BREL	% DFEE < TFEE	-1.55		
% DPER < TPER	5.12	DPER	48.98	TPER	51.62
Assessor Details	Mr. Richard Denteh		Assessor ID	U148-0001	
Client					

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	115.1000 (1b)	2.7400 (2b)	315.3740 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	115.1000		315.3740 (5)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)

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)
Air changes per hour	0.0000 / (5) = 0.0000 (8)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (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) = 0.1275 (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	Jan: 1.2750, Feb: 1.2500, Mar: 1.2250, Apr: 1.1000, May: 1.0750, Jun: 0.9500, Jul: 0.9500, Aug: 0.9250, Sep: 1.0000, Oct: 1.0750, Nov: 1.1250, Dec: 1.1750 (22a)
Adj infilt rate	0.1626, 0.1594, 0.1562, 0.1403, 0.1371, 0.1211, 0.1211, 0.1179, 0.1275, 0.1371, 0.1434, 0.1498 (22b)
Balanced mechanical ventilation with heat recovery	
If mechanical ventilation	0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	72.8000 (23c)
Effective ac	0.2986, 0.2954, 0.2922, 0.2762, 0.2731, 0.2571, 0.2571, 0.2539, 0.2635, 0.2731, 0.2794, 0.2858 (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 = 1.30)			17.7000	1.2357	21.8726		(27)
front door			2.3000	1.0000	2.3000		(26)
External Wall 1	66.4724	20.0000	46.4724	0.1400	6.5061	190.0000	8829.7560 (29a)

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Total net area of external elements Aum(A, m ²)	66.4724	(31)
Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) = 30.6788	(33)
Party Wall 1	65.1000	0.0000
Party Floor 1	115.1000	40.0000
Party Ceiling 1	115.1000	30.0000
Internal Wall 1	194.0000	75.0000
		11718.0000 (32)
		4604.0000 (32d)
		3453.0000 (32b)
		14550.0000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 43154.7560	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		374.9327 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	11.0400	0.0300	0.3312
E2 Other lintels (including other steel lintels)	7.3400	0.0300	0.2202
E3 Sill	27.8800	0.0300	0.8364
E4 Jamb	48.5200	0.0700	3.3964
E7 Party floor between dwellings (in blocks of flats)	3.4600	0.0000	0.0000
E8 Balcony within a dwelling, wall insulation continuous	5.4800	0.0900	0.4932
E16 Corner (normal)	10.9600	0.0600	0.6576
E18 Party wall between dwellings	2.7400	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)			5.9350 (36)

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	(36a) = 0.0000
Point Thermal bridges	(33) + (36) + (36a) = 36.6138 (37)
Total fabric heat loss	

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	
(38)m	Jan: 31.0724, Feb: 30.7407, Mar: 30.4090, Apr: 28.7503, May: 28.4185, Jun: 26.7599, Jul: 26.7599, Aug: 26.4281, Sep: 27.4233, Oct: 28.4185, Nov: 29.0820, Dec: 29.7455 (38)
Heat transfer coeff	67.6862, 67.3544, 67.0227, 65.3640, 65.0323, 63.3736, 63.3736, 63.0419, 64.0371, 65.0323, 65.6958, 66.3592 (39)
Average = Sum(39)m / 12 =	65.2811

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.5881	0.5852	0.5823	0.5679	0.5650	0.5506	0.5506	0.5477	0.5564	0.5650	0.5708	0.5765 (40)
HLP (average)												0.5672
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.8422 (42)
Hot water usage for mixer showers	98.8274, 97.3422, 95.1780, 91.0372, 87.9813, 84.5735, 82.6365, 84.7843, 87.1388, 90.7977, 95.0275, 98.4487 (42a)	
Hot water usage for baths	32.6648, 32.1797, 31.4966, 30.2370, 29.2938, 28.2479, 27.6830, 28.3614, 29.1000, 30.2191, 31.5047, 32.5544 (42b)	
Hot water usage for other uses	46.0391, 44.3649, 42.6908, 41.0166, 39.3425, 37.6683, 37.6683, 39.3425, 41.0166, 42.6908, 44.3649, 46.0391 (42c)	
Average daily hot water use (litres/day)		163.2547 (43)
Daily hot water use	Jan: 177.5313, Feb: 173.8868, Mar: 169.3653, Apr: 162.2908, May: 156.6176, Jun: 150.4898, Jul: 147.9879, Aug: 152.4883, Sep: 157.2554, Oct: 163.7076, Nov: 170.8971, Dec: 177.0422 (44)	
Energy conte	281.1661, 247.6125, 260.3082, 222.1679, 210.8374, 185.0448, 178.9786, 188.8123, 193.9117, 222.1497, 243.4742, 277.2053 (45)	
Energy content (annual)		Total = Sum(45)m = 2711.6688
Distribution loss (46)m = 0.15 x (45)m	42.1749, 37.1419, 39.0462, 33.3252, 31.6256, 27.7567, 26.8468, 28.3218, 29.0868, 33.3225, 36.5211, 41.5808 (46)	
Water storage loss:		
Store volume		110.0000 (47)
b) If manufacturer declared loss factor is not known:		
Hot water storage loss factor from Table 2 (kWh/litre/day)		0.0152 (51)
Volume factor from Table 2a		1.0294 (52)
Temperature factor from Table 2b		0.6000 (53)
Enter (49) or (54) in (55)		1.0327 (55)
Total storage loss	32.0144, 28.9162, 32.0144, 30.9817, 32.0144, 30.9817, 32.0144, 32.0144, 30.9817, 32.0144, 30.9817, 32.0144 (56)	
If cylinder contains dedicated solar storage	32.0144, 28.9162, 32.0144, 30.9817, 32.0144, 30.9817, 32.0144, 32.0144, 30.9817, 32.0144, 30.9817, 32.0144 (57)	
Primary loss	23.2624, 21.0112, 23.2624, 22.5120, 23.2624, 22.5120, 23.2624, 23.2624, 22.5120, 23.2624, 22.5120, 23.2624 (59)	
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 (61)	
Total heat required for water heating calculated for each month	336.4430, 297.5400, 315.5850, 275.6616, 266.1142, 238.5385, 234.2554, 244.0891, 247.4054, 277.4265, 296.9679, 332.4821 (62)	
WNHRS	-74.9664, -66.3009, -69.4264, -57.4878, -53.5766, -45.8459, -42.9732, -45.6977, -47.4339, -55.9193, -63.3498, -73.5781 (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	261.4766, 231.2391, 246.1586, 218.1738, 212.5376, 192.6926, 191.2822, 198.3914, 199.9715, 221.5072, 233.6181, 258.9040 (64)	
12Total per year (kWh/year)		Total per year (kWh/year) = Sum(64)m = 2665.9526 (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	137.7092, 122.2731, 130.7739, 116.6658, 114.3249, 104.3223, 103.7318, 107.0015, 107.2706, 118.0862, 123.7501, 136.3922 (65)	

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

Metabolic gains (Table 5), Watts	
(66)m	Jan: 142.1108, Feb: 142.1108, Mar: 142.1108, Apr: 142.1108, May: 142.1108, Jun: 142.1108, Jul: 142.1108, Aug: 142.1108, Sep: 142.1108, Oct: 142.1108, Nov: 142.1108, Dec: 142.1108 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	144.1344	159.5773	144.1344	148.9388	144.1344	148.9388	144.1344	144.1344	148.9388	144.1344	148.9388	144.1344	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	278.6893	281.5813	274.2937	258.7794	239.1953	220.7890	208.4925	205.6006	212.8882	228.4025	247.9866	266.3928	(68)
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)	-113.6887	-113.6887	-113.6887	-113.6887	-113.6887	-113.6887	-113.6887	-113.6887	-113.6887	-113.6887	-113.6887	-113.6887	(71)
Water heating gains (Table 5)	185.0930	181.9540	175.7714	162.0358	153.6625	144.8921	139.4245	143.8193	148.9869	158.7180	171.8752	183.3229	(72)
Total internal gains	673.5499	688.7459	659.8327	635.3873	602.6254	580.2533	557.6846	559.1875	576.4472	596.8881	634.4338	659.4833	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	Access Factor Table 6d	Gains W							
East	17.7000	19.6403	0.3300	0.8000	0.7700	63.6001	(76)						
Solar gains	63.6001	124.4153	204.8942	298.8260	366.2225	374.8939	356.9143	306.5841	238.3005	147.6292	79.3018	52.3016	(83)
Total gains	737.1500	813.1611	864.7269	934.2133	968.8479	955.1472	914.5989	865.7716	814.7476	744.5173	713.7357	711.7849	(84)

7. Mean internal temperature (heating season)

tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
util living area	0.9985	0.9937	0.9697	0.8308	0.6238	0.4246	0.3049	0.3350	0.5423	0.8773	0.9912	0.9990	(86)
MIT	20.7159	20.8008	20.9039	20.9893	20.9997	21.0000	21.0000	21.0000	21.0000	20.9833	20.8514	20.7086	(87)
Th 2	20.4408	20.4434	20.4460	20.4590	20.4616	20.4747	20.4747	20.4773	20.4694	20.4616	20.4564	20.4512	(88)
util rest of house	0.9979	0.9911	0.9586	0.7989	0.5879	0.3898	0.2685	0.2969	0.5066	0.8427	0.9870	0.9985	(89)
MIT 2	20.1836	20.2696	20.3697	20.4524	20.4614	20.4747	20.4747	20.4773	20.4694	20.4516	20.3314	20.1858	(90)
Living area fraction	0.3090	fLA = Living area / (4) =											
MIT	20.3481	20.4338	20.5348	20.6183	20.6278	20.6370	20.6370	20.6388	20.6334	20.6159	20.4921	20.3474	(92)
Temperature adjustment	0.0000												
adjusted MIT	20.3481	20.4338	20.5348	20.6183	20.6278	20.6370	20.6370	20.6388	20.6334	20.6159	20.4921	20.3474	(93)

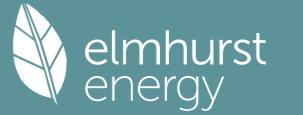
8. Space heating requirement

Useful gains	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	(96)
Heat loss rate W	1086.2358	1046.2705	940.6484	765.9553	580.5944	382.5875	255.8402	267.2234	418.3786	651.3554	879.8064	1071.5279	(97)
Space heating kWh	260.9555	161.5535	81.8418	7.6374	0.1921	0.0000	0.0000	0.0000	0.0000	12.0461	126.0844	268.5081	(98a)
Space heating requirement - total per year (kWh/year)	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 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	(98c)
Space heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98d)
Space heating requirement after solar contribution - total per year (kWh/year)	260.9555	161.5535	81.8418	7.6374	0.1921	0.0000	0.0000	0.0000	0.0000	12.0461	126.0844	268.5081	(98e)
Space heating per m2	(98e) / (4) =												

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(301)											
Fraction of space heat from community system	1.0000	(302)											
Fraction of heat from community Combined Heat and Power-Space and Water	0.5580	(303a)											
Fraction of heat from community Boilers-Space and Water	0.4420	(303b)											
Factor for control and charging method (Table 4c(3)) for space heating	1.0500	(305)											
Factor for charging method (Table 4c(3)) for water heating	1.0500	(305a)											
Distribution loss factor (Table 12c) for community heating system	1.2500	(306)											
Efficiency of secondary/supplementary heating system, %	0.0000	(208)											
Space heating:													
Space heating requirement	260.9555	161.5535	81.8418	7.6374	0.1921	0.0000	0.0000	0.0000	0.0000	12.0461	126.0844	268.5081	(98)
Space heat from Combined Heat and Power = (98) x 0.56 x 1.05 x 1.25	191.1173	118.3177	59.9389	5.5934	0.1407	0.0000	0.0000	0.0000	0.0000	8.8223	92.3411	196.6486	
Space heat from Boilers = (98) x 0.44 x 1.05 x 1.25	151.3868	93.7212	47.4785	4.4306	0.1114	0.0000	0.0000	0.0000	0.0000	6.9883	73.1447	155.7683	

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Space heating requirement	342.5041	212.0389	107.4174	10.0240	0.2521	0.0000	0.0000	0.0000	0.0000	0.0000	15.8106	165.4858	352.4169	(307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	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	(308)
Space heating fuel for secondary/supplementary system	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	(309)

Water heating

Annual water heating requirement	261.4766	231.2391	246.1586	218.1738	212.5376	192.6926	191.2822	198.3914	199.9715	221.5072	233.6181	258.9040	(64)	
Water heat from Combined Heat and Power = (64) x 0.56 x 1.05 x 1.25	191.4989	169.3537	180.2804	159.7850	155.6572	141.1232	140.0903	145.2969	146.4541	162.2263	171.0960	189.6148		
Water heat from Boilers = (64) x 0.44 x 1.05 x 1.25	151.6891	134.1476	142.8027	126.5681	123.2984	111.7858	110.9676	115.0918	116.0084	128.5018	135.5277	150.1967		
Water heating fuel	343.1880	303.5013	323.0831	286.3531	278.9556	252.9090	251.0578	260.3888	262.4625	290.7281	306.6237	339.8115	(310)	
Cooling System Energy Efficiency Ratio	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(314)	
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(315)	
Pumps and Fa	22.8746	20.6609	22.8746	22.1367	22.8746	22.1367	22.8746	22.8746	22.1367	22.8746	22.1367	22.8746	(331)	
Lighting	26.4795	21.2429	19.1269	14.0132	10.8242	8.8434	9.8742	12.8348	16.6712	21.8735	24.7060	27.2155	(332)	
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	(333a)	
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	(334a)	
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	(335a)	
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	(333b)	
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	(334b)	
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	(335b)	
Annual totals kWh/year														
Space heating fuel - community heating													1205.9498	(307)
Space heating fuel - secondary													0.0000	(309)
Water heating fuel - community heating													3499.0627	(310)
Efficiency of water heater													0.0000	(311)
Electricity used for heat distribution													12.0595	(313)
Space cooling fuel													0.0000	(321)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7000)		
mechanical ventilation fans (SFP = 0.7000)	269.3294	(330a)
Total electricity for the above, kWh/year	269.3294	(331)
Electricity for lighting (calculated in Appendix L)	213.7051	(332)

Energy saving/generation technologies (Appendices M, N and Q)

PV generation	0.0000	(333)
Wind generation	0.0000	(334)
Hydro-electric generation (Appendix N)	0.0000	(335a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(335)
Appendix Q - special features		
Energy saved or generated	-0.0000	(336)
Energy used	0.0000	(337)
Total delivered energy for all uses	5188.0470	(338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Electrical efficiency of CHP unit			32.0000
Heat efficiency of CHP unit			49.9000
Space heating from Combined Heat and Power less credit emissions for electricity	1348.5370	0.2100	283.1928
Water heating from Combined Heat and Power less credit emissions for electricity	-431.5318	0.3400	-150.1731
Efficiency of heat source Boilers	3912.7796	0.2100	821.6837
Space and Water heating from Boilers	-1252.0895	0.3400	-435.7271
Electrical energy for heat distribution (space & water)	93.9000		367
Overall CO2 factor for heat network	2214.7130	0.2100	119.2079
Total CO2 associated with community systems	12.0595	0.0000	6.8457
Space and water heating			0.2106
Pumps, fans and electric keep-hot	269.3294	0.1387	990.9117
Energy for lighting	213.7051	0.1443	990.9117
Total CO2, kg/year			37.3593
EPC Dwelling Carbon Dioxide Emission Rate (DER)			30.8443
			1059.1153
			9.2000

13b. Primary energy - Community heating scheme

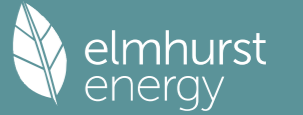
	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Electrical efficiency of CHP unit			32.0000
Heat efficiency of CHP unit			49.9000
Space heating from Combined Heat and Power less credit emissions for electricity	1348.5370	1.1300	1523.8468
Water heating from Combined Heat and Power less credit emissions for electricity	-431.5318	2.1490	-927.3619
Efficiency of heat source Boilers	3912.7796	1.1300	4421.4409
Space and Water heating from Boilers	-1252.0895	2.1490	-2690.7402
Electrical energy for heat distribution (space & water)			

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	m2	Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	factor Table 6d	W						
East	17.7000	19.6403	0.6300	0.7000	0.7700	106.2411 (76)						
Solar gains	106.2411	207.8301	342.2665	499.1753	611.7581	626.2432	596.2091	512.1348	398.0701	246.6079	132.4701	87.3675 (83)
Total gains	750.1840	867.8254	973.9769	1108.9926	1190.1382	1183.9059	1132.2017	1048.9089	951.3663	818.5231	739.7354	717.5683 (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	125.2490	125.6801	126.1055	128.1428	128.5313	130.3713	130.3713	130.7178	129.6563	128.5313	127.7478	126.9388
alpha	9.3499	9.3787	9.4070	9.5429	9.5688	9.6914	9.6914	9.7145	9.6438	9.5688	9.5165	9.4626
util living area	0.9996	0.9983	0.9905	0.9249	0.7359	0.5099	0.3668	0.4129	0.6825	0.9688	0.9984	0.9998 (86)
MIT	20.3955	20.5180	20.6942	20.9072	20.9900	20.9997	21.0000	21.0000	20.9961	20.8620	20.5916	20.3807 (87)
Th 2	20.2070	20.2095	20.2120	20.2236	20.2258	20.2359	20.2359	20.2378	20.2320	20.2258	20.2214	20.2168 (88)
util rest of house	0.9995	0.9975	0.9858	0.8961	0.6800	0.4493	0.3032	0.3445	0.6097	0.9497	0.9975	0.9996 (89)
MIT 2	19.4990	19.6578	19.8826	20.1417	20.2196	20.2358	20.2359	20.2378	20.2303	20.0998	19.7622	19.4882 (90)
Living area fraction	fLA = Living area / (4) =											0.3090 (91)
MIT	19.7760	19.9236	20.1334	20.3783	20.4577	20.4719	20.4720	20.4733	20.4669	20.3353	20.0185	19.7640 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.7760	19.9236	20.1334	20.3783	20.4577	20.4719	20.4720	20.4733	20.4669	20.3353	20.0185	19.7640 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9993	0.9971	0.9852	0.9024	0.6971	0.4680	0.3228	0.3656	0.6323	0.9530	0.9971	0.9995 (94)
Useful gains	749.6700	865.2946	959.5413	1000.7868	829.6584	554.1198	365.5179	383.4907	601.5628	780.0193	737.6030	717.2364 (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	1520.6976	1471.1783	1330.5401	1102.4025	838.5668	554.3085	365.5222	383.5046	604.3582	932.1773	1244.5645	1508.9874 (97)
Space heating kWh	573.6445	407.1538	276.0231	73.1633	6.6278	0.0000	0.0000	0.0000	0.0000	113.2055	365.0123	589.0628 (98a)
Space heating requirement - total per year (kWh/year)	2403.8932											
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	573.6445	407.1538	276.0231	73.1633	6.6278	0.0000	0.0000	0.0000	0.0000	113.2055	365.0123	589.0628 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2403.8932											
Space heating per m2	(98c) / (4) = 20.8853 (99)											
9b. Energy requirements												
Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)											
Fraction of space heat from community system	1.0000 (302)											
Fraction of heat from community Combined Heat and Power-Space and Water	0.5580 (303a)											
Fraction of heat from community Boilers-Space and Water	0.4420 (303b)											
Factor for control and charging method (Table 4c(3)) for space heating	1.0000 (305)											
Factor for charging method (Table 4c(3)) for water heating	1.0000 (305a)											
Distribution loss factor (Table 12c) for community heating system	1.2500 (306)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating:												
Space heating requirement	573.6445	407.1538	276.0231	73.1633	6.6278	0.0000	0.0000	0.0000	0.0000	113.2055	365.0123	589.0628 (98)
Space heat from Combined Heat and Power = (98) x 0.56 x 1.00 x 1.25	400.1171											
307a	400.1171	283.9898	192.5261	51.0314	4.6229	0.0000	0.0000	0.0000	0.0000	78.9608	254.5961	410.8713
Space heat from Boilers = (98) x 0.44 x 1.00 x 1.25	316.9386											
307b	316.9386	224.9525	152.5028	40.4227	3.6619	0.0000	0.0000	0.0000	0.0000	62.5460	201.6693	325.4572
Space heating requirement	717.0557	508.9423	345.0289	91.4541	8.2848	0.0000	0.0000	0.0000	0.0000	141.5069	456.2654	736.3285 (307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)											
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)
Water heating												
Annual water heating requirement	244.0289	215.6189	228.9213	201.3050	195.0730	175.7361	173.5746	180.6002	182.6934	203.7300	216.5803	241.4028 (64)
Water heat from Combined Heat and Power = (64) x 0.56 x 1.00 x 1.25	170.2102											
310a	170.2102	150.3942	159.6726	140.4102	136.0634	122.5759	121.0683	125.9686	127.4287	142.1017	151.0648	168.3785
Water heat from Boilers = (64) x 0.44 x 1.00 x 1.25	134.8260											
310b	134.8260	119.1294	126.4790	111.2210	107.7778	97.0942	95.9000	99.7816	100.9381	112.5608	119.6606	133.3751
Water heating fuel	305.0362	269.5236	286.1516	251.6312	243.8412	219.6701	216.9682	225.7502	228.3668	254.6625	270.7254	301.7535 (310)
Cooling System Energy Efficiency Ratio	0.0000 (314)											
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (315)
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 (331)
Lighting	30.7156	24.6412	22.1866	16.2549	12.5557	10.2581	11.4538	14.8880	19.3381	25.3726	28.6583	31.5692 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												

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(333a)m	-16.5497	-25.1592	-38.9454	-47.2409	-54.0009	-51.4934	-50.8305	-46.4351	-39.2880	-30.2018	-18.8204	-14.1011 (333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334a)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 (334a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335a)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 (335a)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333b)m	-4.5164	-9.8175	-20.1352	-31.2002	-42.2420	-42.8502	-42.3845	-35.4554	-25.4066	-14.3804	-6.1326	-3.5507 (333b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334b)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 (334b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335b)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 (335b)
Annual totals kWh/year												
Space heating fuel - community heating	3004.8665 (307)											
Space heating fuel - secondary	0.0000 (309)											
Water heating fuel - community heating	3074.0807 (310)											
Efficiency of water heater	0.0000 (311)											
Electricity used for heat distribution	30.0487 (313)											
Space cooling fuel	0.0000 (321)											
Electricity for pumps and fans:												
Total electricity for the above, kWh/year	0.0000 (331)											
Electricity for lighting (calculated in Appendix L)	247.8922 (332)											
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation	-711.1382 (333)											
Wind generation	0.0000 (334)											
Hydro-electric generation (Appendix N)	0.0000 (335a)											
Electricity generated - Micro CHP (Appendix N)	0.0000 (335)											
Appendix Q - special features												
Energy saved or generated	-0.0000 (336)											
Energy used	0.0000 (337)											
Total delivered energy for all uses	5615.7012 (338)											
12b. Carbon dioxide emissions - Community heating scheme												
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year									
Electrical efficiency of CHP unit			32.0000 (361)									
Heat efficiency of CHP unit			49.9000 (362)									
Space heating from Combined Heat and Power	3360.1513	0.2100	705.6318 (363)									
less credit emissions for electricity	-1075.2484	0.3480	-374.1864 (364)									
Water heating from Combined Heat and Power	3437.5492	0.2100	721.8853 (365)									
less credit emissions for electricity	-1100.0157	0.3480	-382.8055 (366)									
Efficiency of heat source Boilers			93.9000 (367)									
Space and Water heating from Boilers	2861.4426	0.2100	297.0306 (368)									
Electrical energy for heat distribution (space & water)	30.0487	0.0000	9.0652 (372)									
Overall CO2 factor for heat network			0.2106 (386)									
Total CO2 associated with community systems			1280.4933 (373)									
Space and water heating			1280.4933 (376)									
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (378)									
Energy for lighting	247.8922	0.1443	35.7785 (379)									
Energy saving/generation technologies												
PV Unit electricity used in dwelling	-433.0666	0.1331	-57.6284									
PV Unit electricity exported	-278.0717	0.1250	-34.7510									
Total			-92.3794 (380)									
Total CO2, kg/year			1223.8924 (383)									
EPC Target Carbon Dioxide Emission Rate (TER)			10.6300 (384)									
13b. Primary energy - Community heating scheme												
	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year									
Electrical efficiency of CHP unit			32.0000 (461)									
Heat efficiency of CHP unit			49.9000 (462)									
Space heating from Combined Heat and Power	3360.1513	1.1300	3796.9709 (463)									
less credit emissions for electricity	-1075.2484	2.1490	-2310.7088 (464)									
Water heating from Combined Heat and Power	3437.5492	1.1300	3884.4305 (465)									
less credit emissions for electricity	-1100.0157	2.1490	-2363.9338 (466)									
Efficiency of heat source Boilers			93.9000 (467b)									
Space and Water heating from Boilers	2861.4426	1.1300	1598.3073 (468)									
Electrical energy for heat distribution (space & water)	30.0487	0.0000	94.3294 (472)									
Overall CO2 factor for heat network			1.0420 (486)									
Total CO2 associated with community systems			6334.5185 (473)									
Space and water heating			6334.5185 (476)									
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (478)									
Energy for lighting	247.8922	1.5338	380.2254 (479)									
Energy saving/generation technologies												
PV Unit electricity used in dwelling	-433.0666	1.4917	-646.0137									
PV Unit electricity exported	-278.0717	0.4587	-127.5469									
Total			-773.5606 (480)									
Total Primary energy kWh/year			5941.1833 (483)									
Target Primary Energy Rate (TPER)			51.6200 (484)									

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Property Reference	L01-6.04 SO x6_Copy_Copy		Issued on Date	12/09/2023	
Assessment Reference	L00.04 SO_Copy_Copy	Prop Type Ref			
Property					
SAP Rating	87 B	DER	10.20	TER	12.48
Environmental	92 A	% DER < TER	18.27		
CO ₂ Emissions (t/year)	0.66	DFEE	27.44	TFEE	27.80
Compliance Check	See BREL	% DFEE < TFEE	1.28		
% DPER < TPER	13.69	DPER	58.53	TPER	67.82
Assessor Details	Mr. Richard Denteh		Assessor ID	U148-0001	
Client					

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		
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.0000	197.2800 (1b) - (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 197.2800 (5)

2. Ventilation rate

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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)											
Air changes per hour	0.0000 / (5) = 0.0000 (8)											
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 (8)											
Pressure test	Yes											
Pressure Test Method	Blower Door											
Measured/design AP50	3.0000 (17)											
Infiltration rate	0.1500 (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) = 0.1275 (21)											
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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation	0.5000 (23a)											
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23b)											
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	72.8000 (23c)											
Effective ac	0.2986	0.2954	0.2922	0.2762	0.2731	0.2571	0.2571	0.2539	0.2635	0.2731	0.2794	0.2858 (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 = 1.30)			14.8000	1.2357	18.2890		(27)
External Wall 1	47.8404	14.8000	33.0404	0.1400	4.6257	190.0000	6277.6760 (29a)
Total net area of external elements Aum(A, m ²)			47.8404				(31)

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Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) =	22.9146	(33)
Party Wall 1	58.2000	0.0000	0.0000
Party Floor 1	72.0000		180.0000
Party Ceiling 1	72.0000		40.0000
Internal Wall 1	118.3600		2880.0000 (32d)
			30.0000
			2160.0000 (32b)
			75.0000
			8877.0000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	30670.6760 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		425.9816 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	7.5700	0.0300	0.2271
E2 Other lintels (including other steel lintels)	5.9900	0.0300	0.1797
E3 Sill	17.1000	0.0300	0.5130
E4 Jamb	34.9200	0.0700	2.4444
E7 Party floor between dwellings (in blocks of flats)	5.4800	0.0600	0.3288
E18 Party wall between dwellings	2.7400	0.0900	0.2466
E16 Corner (normal)	5.8000	0.0000	0.0000
E8 Balcony within a dwelling, wall insulation continuous	2.7400	-0.0900	-0.2466
E17 Corner (inverted - internal area greater than external area)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.6930 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 26.6076 (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	19.4371	19.2296	19.0221	17.9845	17.7770	16.7395	16.7395	16.5319	17.1545	17.7770	18.1921	18.6071 (38)
Heat transfer coeff	46.0448	45.8373	45.6297	44.5922	44.3847	43.3471	43.3471	43.1396	43.7621	44.3847	44.7997	45.2147 (39)
Average = Sum(39)m / 12 =	44.5403											

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6395	0.6366	0.6337	0.6193	0.6165	0.6020	0.6020	0.5992	0.6078	0.6165	0.6222	0.6280 (40)
HLP (average)	0.6186											
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	86.1812	84.8860	82.9988	79.3878	76.7230	73.7513	72.0621	73.9351	75.9883	79.1790	82.8675	85.8510 (42a)
Hot water usage for baths	27.0765	26.6744	26.1081	25.0640	24.2822	23.4152	22.9470	23.5093	24.1216	25.0492	26.1148	26.9849 (42b)
Hot water usage for other uses	38.1196	36.7335	35.3473	33.9611	32.5749	31.1888	31.1888	32.5749	33.9611	35.3473	36.7335	38.1196 (42c)
Average daily hot water use (litres/day)	139.2145 (43)											
Daily hot water use	151.3773	148.2938	144.4541	138.4129	133.5801	128.3553	126.1979	130.0194	134.0709	139.5755	145.7158	150.9555 (44)
Energy conte	239.7446	211.1684	222.0206	189.4803	179.8245	157.8278	152.6254	160.9911	165.3229	189.4026	207.5988	236.3599 (45)
Energy content (annual)	Total = Sum(45)m = 2312.3670											
Distribution loss (46)m = 0.15 x (45)m	35.9617	31.6753	33.3031	28.4221	26.9737	23.6742	22.8938	24.1487	24.7984	28.4104	31.1398	35.4540 (46)
Water storage loss:												
Store volume	180.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.5200 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.8208 (55)											
Total storage loss	25.4448	22.9824	25.4448	24.6240	25.4448	24.6240	25.4448	25.4448	24.6240	25.4448	24.6240	25.4448 (56)
If cylinder contains dedicated solar storage												
Primary loss	25.4448	23.2624	25.4448	24.6240	25.4448	24.6240	25.4448	25.4448	24.6240	25.4448	24.6240	25.4448 (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 (61)
Total heat required for water heating calculated for each month	288.4518	255.1620	270.7278	236.6163	228.5317	204.9638	201.3326	209.6983	212.4589	238.1098	254.7348	285.0671 (62)
WMHRS	-65.3735	-57.8168	-60.5425	-50.1315	-46.7208	-39.9793	-37.4742	-39.8501	-41.3641	-48.7638	-55.2434	-64.1628 (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	223.0783	197.3452	210.1853	186.4848	181.8109	164.9845	163.8584	169.8482	171.0947	189.3460	199.4914	220.9042 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 2278.4321 (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	118.6808	105.4084	112.7876	100.7110	98.7574	90.1866	89.7137	92.4953	92.6787	101.9421	106.7354	117.5554 (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	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.8450	112.7570	101.8450	105.2399	101.8450	105.2399	101.8450	101.8450	105.2399	101.8450	105.2399	101.8450 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	201.9192	204.0145	198.7344	187.4938	173.3045	159.9686	151.0594	148.9641	154.2442	165.4848	179.6741	193.0100 (68)

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CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	72.0000 (1b)	x 2.7400 (2b)	= 197.2800 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.0000 (4)		
Dwelling volume	(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		= 197.2800 (5)

2. Ventilation rate

	Value	Reference
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)

	Value	Reference
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1521	(8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4021	(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) = 0.3418	(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
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
Adj infilt rate												
Effective ac	0.4357	0.4272	0.4187	0.3759	0.3674	0.3247	0.3247	0.3161	0.3418	0.3674	0.3845	0.4016
	0.5949	0.5912	0.5876	0.5707	0.5675	0.5527	0.5527	0.5500	0.5584	0.5675	0.5739	0.5806

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 Opening Type (Uw = 1.20)			14.8000	1.1450	16.9466		(27)
External Wall 1	47.8404	14.8000	33.0404	0.1800	5.9473		(29a)
Total net area of external elements Aum(A, m ²)			47.8404				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...	(30) + (32) =	22.8938		(33)
Party Wall 1			58.2000	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K	Value	Reference	
List of Thermal Bridges			
K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	7.5700	0.0500	0.3785
E3 Sill	5.9900	0.0500	0.2995
E4 Jamb	17.1000	0.0500	0.8550
E7 Party floor between dwellings (in blocks of flats)	34.9200	0.0700	2.4444
E18 Party wall between dwellings	5.4800	0.0600	0.3288
E16 Corner (normal)	2.7400	0.0900	0.2466
E8 Balcony within a dwelling, wall insulation continuous	5.8000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	2.7400	-0.0900	-0.2466
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.3062 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 27.2000 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	38.7317	38.4917	38.2565	37.1515	36.9448	35.9824	35.9824	35.8042	36.3531	36.9448	37.3630	37.8002
Heat transfer coeff	65.9317	65.6918	65.4565	64.3516	64.1448	63.1825	63.1825	63.0043	63.5532	64.1448	64.5631	65.0003
Average = Sum(39)m / 12 =	64.3506 (39)											

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9157	0.9124	0.9091	0.8938	0.8909	0.8775	0.8775	0.8751	0.8827	0.8909	0.8967	0.9028
HLP (average)	0.8938 (40)											
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy	2.2937 (42)											
Hot water usage for mixer showers	62.6772	61.7353	60.3627	57.7366	55.7986	53.6373	52.4088	53.7710	55.2642	57.5847	60.2673	62.4371
Hot water usage for baths	27.0765	26.6744	26.1081	25.0640	24.2822	23.4152	22.9470	23.5093	24.1216	25.0492	26.1148	26.9849
Hot water usage for other uses	38.1196	36.7335	35.3473	33.9611	32.5749	31.1888	31.1888	32.5749	33.9611	35.3473	36.7335	38.1196
Average daily hot water use (litres/day)	117.5446 (43)											

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	127.8733	125.1431	121.8181	116.7617	112.6557	108.2413	106.5446	109.8552	113.3469	117.9812	123.1155	127.5416
Energy conte	202.5201	178.2021	187.2299	159.8409	151.6562	133.0953	128.8565	136.0237	139.7680	160.0994	175.4006	199.6994
Energy content (annual)	1952.3920											
Distribution loss (46)m = 0.15 x (45)m	30.3780	26.7303	28.0845	23.9761	22.7484	19.9643	19.3285	20.4036	20.9652	24.0149	26.3101	29.9549

	Value	Reference
Water storage loss:		
Store volume	180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):	1.5520	(48)
Temperature factor from Table 2b	0.5400	(49)
Enter (49) or (54) in (55)	0.8381	(55)
Total storage loss	25.9803	(56)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624
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
Total heat required for water heating calculated for each month	251.7627	222.6793	236.4725	207.4951	200.8989	180.7495	178.0991	185.2664	187.4222	209.3420	223.0548	248.9420

	Value	Reference
WWHRS	-28.6534	(62)
PV diverter	-0.0000	(63a)
Solar input	0.0000	(63b)
FGHRS	0.0000	(63c)
Output from w/h	0.0000	(63d)

	Value	Reference
12Total per year (kWh/year)	2265.9493	(64)
Electric shower(s)	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)

	Value	Reference
Heat gains from water heating, kWh/month	106.7321	(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												
(66)m	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842	114.6842
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	102.2951	113.2553	102.2951	105.7050	102.2951	105.7050	102.2951	102.2951	105.7050	102.2951	105.7050	102.2951
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	201.9192	204.0145	198.7344	187.4938	173.3045	159.9686	151.0594	148.9641	154.2442	165.4848	179.6741	193.0100
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.4684	34.4684	34.4684	34.4684	34.4684	34.4684	34.4684	34.4684	34.4684	34.4684	34.4684	34.4684
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
Losses e.g. evaporation (negative values) (Table 5)	-91.7474	-91.7474	-91.7474	-91.7474	-91.7474	-91.7474	-91.7474	-91.7474	-91.7474	-91.7474	-91.7474	-91.7474
Water heating gains (Table 5)	143.4571	141.1220	136.6237	126.7645	120.7256	114.4133	110.5362	113.7393	117.4948	124.4989	133.9501	142.1965
Total internal gains	508.0767	518.7971	498.0586	480.3686	456.7305	437.4921	421.2960	422.4038	434.8492	452.6841	479.7344	497.9068

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W						
North	11.6500	10.6334	0.6300	0.7000	0.7700	37.8590 (74)						
West	3.1500	19.6403	0.6300	0.7000	0.7700	18.9073 (80)						
Solar gains	56.7663	109.3373	183.8531	286.3115	374.8894	396.2294	371.9829	302.0828	218.6582	130.0117	70.2792	47.1096
Total gains	564.8430	628.1344	681.9117	766.6801	831.6199	833.7215	793.2788	724.4866	653.5074	582.6958	550.0136	545.0165

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, ni1,m (see Table 9a)												
tau	132.2524	132.7356	133.2126	135.4999	135.9366	138.0071	138.0071	138.3975	137.2022	135.9366	135.0561	134.1476

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alpha	9.8168	9.8490	9.8808	10.0333	10.0624	10.2005	10.2005	10.2265	10.1468	10.0624	10.0037	9.9432
util living area	0.9993	0.9976	0.9890	0.9162	0.7100	0.4849	0.3504	0.4000	0.6671	0.9582	0.9971	0.9995 (86)
MIT	20.4830	20.5846	20.7351	20.9264	20.9941	20.9999	21.0000	21.0000	20.9975	20.8949	20.6630	20.4720 (87)
Th 2	20.1542	20.1570	20.1598	20.1728	20.1752	20.1866	20.1866	20.1888	20.1822	20.1752	20.1703	20.1651 (88)
util rest of house	0.9989	0.9962	0.9828	0.8822	0.6505	0.4233	0.2857	0.3295	0.5903	0.9316	0.9951	0.9992 (89)
MIT 2	19.5595	19.6914	19.8827	20.1120	20.1720	20.1866	20.1866	20.1887	20.1813	20.0868	19.8029	19.5546 (90)
Living area fraction										fLA = Living area / (4) =		0.3778 (91)
MIT	19.9084	20.0288	20.2047	20.4197	20.4826	20.4938	20.4939	20.4952	20.4896	20.3921	20.1278	19.9011 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9084	20.0288	20.2047	20.4197	20.4826	20.4938	20.4939	20.4952	20.4896	20.3921	20.1278	19.9011 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9987	0.9960	0.9832	0.8933	0.6730	0.4466	0.3101	0.3561	0.6195	0.9398	0.9950	0.9991 (94)
Useful gains	564.1361	625.5974	670.4449	684.8796	559.6967	372.3318	246.0255	258.0118	404.8458	547.5963	547.2713	544.5195 (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	1029.0870	993.8388	897.0630	741.3085	563.3554	372.3872	246.0266	258.0161	406.0825	628.1106	841.1175	1020.5787 (97)
Space heating kWh	345.9235	247.4582	168.6039	40.6288	2.7220	0.0000	0.0000	0.0000	0.0000	59.9027	211.5693	354.1880 (98a)
Space heating requirement - total per year (kWh/year)												1430.9965
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	345.9235	247.4582	168.6039	40.6288	2.7220	0.0000	0.0000	0.0000	0.0000	59.9027	211.5693	354.1880 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1430.9965
Space heating per m2										(98c) / (4) =		19.8750 (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 %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	345.9235	247.4582	168.6039	40.6288	2.7220	0.0000	0.0000	0.0000	0.0000	59.9027	211.5693	354.1880 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	374.7817	268.1021	182.6695	44.0182	2.9491	0.0000	0.0000	0.0000	0.0000	64.9000	229.2192	383.7357 (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	223.1093	197.3380	209.9366	185.5223	180.4210	163.2265	161.6740	167.8000	169.2922	187.9687	198.8415	220.8192 (64)
Efficiency of water heater	85.0395	84.5685	83.5727	81.2800	79.9204	79.8000	79.8000	79.8000	79.8000	81.8037	84.1992	85.1136 (217)
Fuel for water heating, kWh/month	262.3595	233.3471	251.2024	228.2510	225.7509	204.5444	202.5991	210.2757	212.1456	229.7804	236.1561	259.4406 (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	21.2549	17.0515	15.3530	11.2482	8.6885	7.0986	7.9259	10.3024	13.3818	17.5576	19.8313	21.8456 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.9527	-12.3348	-19.4826	-24.1407	-28.0746	-26.9689	-26.6424	-24.1143	-20.0659	-15.0285	-9.1322	-6.7512 (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)	-1.6311	-3.5775	-7.3956	-11.5453	-15.7102	-15.9518	-15.7648	-13.1410	-9.3663	-5.2538	-2.2200	-1.2793 (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												1550.3754 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2755.8526 (219)

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Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												171.5393 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-323.5255 (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												4240.2418 (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	1550.3754	0.2100	325.5788 (261)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	2755.8526	0.2100	578.7291 (274)
Space and water heating			904.3079 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	171.5393	0.1443	24.7584 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-220.6887	0.1326	-29.2744
PV Unit electricity exported	-102.8368	0.1248	-12.8326
Total			-42.1069 (269)
Total CO2, kg/year			898.8886 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.4800 (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	1550.3754	1.1300	1751.9242 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2755.8526	1.1300	3114.1135 (278)
Space and water heating			4866.0377 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	171.5393	1.5338	263.1127 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-220.6887	1.4901	-328.8571
PV Unit electricity exported	-102.8368	0.4580	-47.0988
Total			-375.9559 (283)
Total Primary energy kWh/year			4883.2953 (286)
Target Primary Energy Rate (TPER)			67.8200 (287)