

Full SAP Calculation Printout



Property Reference	13.07 x2_Copy_Copy_Copy		Issued on Date	12/09/2023	
Assessment Reference	13.07 x2_Copy_Copy_Copy	Prop Type Ref			
Property					
SAP Rating	87 B	DER	9.45	TER	9.59
Environmental	90 B	% DER < TER	1.46		
CO ₂ Emissions (t/year)	1.28	DFEE	30.72	TFEE	37.91
Compliance Check	See BREL	% DFEE < TFEE	18.97		
% DPER < TPER	-8.11	DPER	54.20	TPER	50.13
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	61.1000 (1b)	x 2.7300 (2b)	= 166.8030 (1b) -
First floor	62.1000 (1c)	x 2.9600 (2c)	= 183.8160 (1c) -
Second floor	39.1000 (1d)	x 3.0200 (2d)	= 118.0820 (1d) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	162.3000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 468.7010 (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	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
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	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	2 (19)

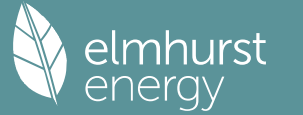
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1275 (21)

	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	0.1626	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												
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.4376	0.4344	0.4312	0.4153	0.4121	0.3961	0.3961	0.3929	0.4025	0.4121	0.4184	0.4248 (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 = 0.80)			26.0900	0.7752	20.2248		(27)

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front door	2.0000	1.0000	2.0000									(26)
Heatloss Floor 1	61.1000	0.0800	4.8880	110.0000	6721.0000							(28a)
exposed floor	1.6800	0.0800	0.1344									(28b)
External Wall 1				128.0622	28.0900	99.9722	0.1300	12.9964	190.0000	18994.7180		(29a)
External Roof 1				41.2700		41.2700	0.1000	4.1270	9.0000	371.4300		(30)
External Roof 2				19.2300		19.2300	0.1000	1.9230	9.0000	173.0700		(30)
Total net area of external elements Aum(A, m ²)				251.3422								(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	46.2936							(33)
Party Wall 1				114.0000		0.0000	0.0000		180.0000	20520.0000		(32)
Internal Wall 1				330.5300					9.0000	2974.7700		(32)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	49754.9880	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		306.5618	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	16.9600	0.0500	0.8480
E2 Other lintels (including other steel lintels)	15.7600	0.0500	0.7880
E3 Sill	40.5800	0.0500	2.0290
E4 Jamb	13.4000	0.1600	2.1440
E5 Ground floor (normal)	13.4000	0.0000	0.0000
E6 Intermediate floor within a dwelling	1.8000	0.3200	0.5760
E20 Exposed floor (normal)	12.0000	0.0800	0.9600
E13 Gable (insulation at rafter level)	6.5500	0.0400	0.2620
R5 Ridge (inverted)	20.4500	0.0800	1.6360
P1 Party wall - Ground floor	27.7000	0.1200	3.3240
P4 Party wall - Roof (insulation at ceiling level)	9.2300	0.0800	0.7384
E14 Flat roof	21.0000	0.0000	0.0000
P2 Party wall - Intermediate floor within a dwelling	5.6500	0.0400	0.2260
R7 Flat ceiling (inverted)	17.8800	0.0900	1.6092
E16 Corner (normal)	36.6000	0.0600	2.1960
E18 Party wall between dwellings	6.5500	0.0800	0.5240
R4 Ridge (vaulted ceiling)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		17.8606	(36)
Point Thermal bridges		0.0000	(36a) =
Total fabric heat loss	(33) + (36) + (36a) =	64.1542	(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	67.6784	67.1854	66.6923	64.2273	63.7343	61.2692	61.2692	60.7762	62.2552	63.7343	64.7203	65.7063 (38)
Heat transfer coeff	131.8326	131.3396	130.8465	128.3815	127.8884	125.4234	125.4234	124.9304	126.4094	127.8884	128.8745	129.8605 (39)
Average = Sum(39)m / 12 =	128.2582											

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8123	0.8092	0.8062	0.7910	0.7880	0.7728	0.7728	0.7697	0.7789	0.7880	0.7941	0.8001 (40)
HLP (average)	0.7903											
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.9521 (42)											
Hot water usage for mixer showers	101.3610	99.8377	97.6180	93.3710	90.2369	86.7417	84.7550	86.9579	89.3727	93.1255	97.4637	100.9726 (42a)
Hot water usage for baths	31.8240	31.3513	30.6858	29.4586	28.5397	27.5208	26.9704	27.6313	28.3509	29.4412	30.6937	31.7164 (42b)
Hot water usage for other uses	44.8626	43.2312	41.5998	39.9685	38.3371	36.7057	36.7057	38.3371	39.9685	41.5998	43.2312	44.8626 (42c)
Average daily hot water use (litres/day)	163.7414 (43)											

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	178.0475	174.4202	169.9036	162.7981	157.1137	150.9682	148.4312	152.9264	157.6921	164.1665	171.3885	177.5516 (44)
Energy conte	281.9837	248.3721	261.1355	222.8625	211.5052	185.6331	179.5147	189.3548	194.4501	222.7724	244.1744	278.0028 (45)
Energy content (annual)	Total = Sum(45)m = 2719.7613											
Distribution loss (46)m = 0.15 x (45)m	42.2976	37.2558	39.1703	33.4294	31.7258	27.8450	26.9272	28.4032	29.1675	33.4159	36.6262	41.7004 (46)

Water storage loss:												
Store volume	300.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	2.1100 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	1.1394 (55)											
Total storage loss	35.3214	31.9032	35.3214	34.1820	35.3214	34.1820	35.3214	35.3214	34.1820	35.3214	34.1820	35.3214 (56)

If cylinder contains dedicated solar storage	35.3214	31.9032	35.3214	34.1820	35.3214	34.1820	35.3214	35.3214	34.1820	35.3214	34.1820	35.3214 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	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	340.5675	301.2865	318.3236	272.8029	257.2947	229.7203	225.0715	235.8421	245.7413	279.9605	300.8684	336.5866 (62)
WVHRS	-76.8882	-68.0006	-71.2063	-58.9616	-54.9501	-47.0212	-44.0749	-46.8692	-48.6500	-57.3529	-64.9739	-75.4644 (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)
Aperture area of solar collector	0.9900 (H1)											
Zero-loss collector efficiency	0.8000 (H2)											
Overshading factor	1.0000 (H8)											
Overall heat loss coefficient of system	5.4950 (H10)											
Heat loss coefficient of collector loop	9.0505 (H11)											
Dedicated solar storage volume	180.0000 (H12)											
Effective solar volume	180.0000 (H14)											
Reference volume	74.2500 (H15)											
Storage tank correction coefficient	0.8014 (H16)											
Heat delivered to hot water	205.5996 (H24)											
Heat delivered to space heating	0.0000 (H29)											

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Solar input													205.5996
Solar input	-0.0000	-0.0000	-12.5962	-26.2957	-41.9783	-40.4352	-39.6432	-30.3119	-14.3390	-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	263.6793	233.2859	234.5211	187.5455	160.3663	142.2639	141.3534	158.6610	182.7523	222.6075	235.8945	261.1222	(64)
	Total per year (kWh/year) = Sum(64)m = 2424.0538 (64)												
	2424 (64)												
12Total per year (kWh/year)													
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) = Sum(64a)m = 0.0000 (64a)												
Heat gains from water heating, kWh/month	140.6266	124.9152	132.5780	114.0541	106.9571	96.9928	96.1341	100.1503	105.6876	119.8223	126.5432	139.3030	(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	147.6056	147.6056	147.6056	147.6056	147.6056	147.6056	147.6056	147.6056	147.6056	147.6056	147.6056	147.6056	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	175.3892	194.1809	175.3892	181.2355	175.3892	181.2355	175.3892	175.3892	181.2355	175.3892	181.2355	175.3892	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	333.6109	337.0727	328.3490	309.7772	286.3337	264.3001	249.5803	246.1185	254.8422	273.4140	296.8575	318.8911	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7606	37.7606	37.7606	37.7606	37.7606	37.7606	37.7606	37.7606	37.7606	37.7606	37.7606	37.7606	(69)
Pumps, fans	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)
Losses e.g. evaporation (negative values) (Table 5)	-118.0845	-118.0845	-118.0845	-118.0845	-118.0845	-118.0845	-118.0845	-118.0845	-118.0845	-118.0845	-118.0845	-118.0845	(71)
Water heating gains (Table 5)	189.0143	185.8858	178.1963	158.4085	143.7595	134.7122	129.2125	134.6107	146.7883	161.0514	175.7544	187.2352	(72)
Total internal gains	768.2960	787.4211	752.2161	719.7029	675.7641	647.5296	621.4637	623.4001	650.1477	680.1363	724.1291	751.7971	(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								
North	10.9200	10.6334	0.5000	0.8000	0.7700	32.1875 (74)							
South	11.5200	46.7521	0.5000	0.8000	0.7700	149.2954 (78)							
Southwest	3.6500	36.7938	0.5000	0.8000	0.7700	37.2273 (79)							
Solar gains	218.7102	369.4313	502.7459	627.4120	713.4018	714.6767	686.2182	619.9246	544.9732	407.0298	261.2631	187.6969	(83)
Total gains	987.0063	1156.8523	1254.9620	1347.1149	1389.1659	1362.2063	1307.6819	1243.3247	1195.1209	1087.1661	985.3922	939.4940	(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	104.8362	105.2298	105.6263	107.6544	108.0694	110.1934	110.1934	110.6283	109.3339	108.0694	107.2426	106.4283	
alpha	7.9891	8.0153	8.0418	8.1770	8.2046	8.3462	8.3462	8.3752	8.2889	8.2046	8.1495	8.0952	
util living area	0.9991	0.9964	0.9875	0.9432	0.8109	0.5863	0.4218	0.4618	0.7145	0.9586	0.9965	0.9994	(86)
MIT	20.2815	20.4311	20.6107	20.8323	20.9627	20.9976	20.9999	20.9997	20.9891	20.8292	20.5201	20.2639	(87)
Th 2	20.2427	20.2453	20.2480	20.2611	20.2638	20.2770	20.2770	20.2796	20.2717	20.2638	20.2585	20.2532	(88)
util rest of house	0.9987	0.9950	0.9826	0.9230	0.7617	0.5216	0.3526	0.3897	0.6461	0.9393	0.9949	0.9991	(89)
MIT 2	19.5830	19.7341	19.9132	20.1335	20.2417	20.2761	20.2769	20.2796	20.2669	20.1364	19.8344	19.5745	(90)
Living area fraction	fLA = Living area / (4) = 0.1348 (91)												
MIT	19.6772	19.8281	20.0072	20.2277	20.3389	20.3733	20.3744	20.3766	20.3643	20.2298	19.9268	19.6674	(92)
Temperature adjustment	0.0000												
adjusted MIT	19.6772	19.8281	20.0072	20.2277	20.3389	20.3733	20.3744	20.3766	20.3643	20.2298	19.9268	19.6674	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9984	0.9940	0.9807	0.9219	0.7670	0.5303	0.3620	0.3995	0.6550	0.9383	0.9940	0.9989	(94)
Ext temp.	985.3919	1149.8814	1230.6829	1241.9120	1065.5031	722.3705	473.3361	496.6664	782.8536	1020.0468	979.4669	938.4274	(95)
Heat loss rate W	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)
Space heating kWh	2027.2119	1960.6476	1767.3757	1454.2629	1104.8197	724.1128	473.3988	496.8038	791.8625	1231.5352	1653.0477	2008.6047	(97)
Space heating requirement - total per year (kWh/year)	775.1141	544.8349	399.2995	152.8926	29.2515	0.0000	0.0000	0.0000	0.0000	157.3474	484.9782	796.2120	(98a)
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													

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Space heating requirement after solar contribution - total per year (kWh/year)	775.1141	544.8349	399.2995	152.8926	29.2515	0.0000	0.0000	0.0000	0.0000	157.3474	484.9782	796.2120	(98c)
Space heating per m2	(98c) / (4) = 20.5787 (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 %)													84.5000 (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	775.1141	544.8349	399.2995	152.8926	29.2515	0.0000	0.0000	0.0000	0.0000	157.3474	484.9782	796.2120	(98)
Space heating efficiency (main heating system 1)	84.5000	84.5000	84.5000	84.5000	84.5000	0.0000	0.0000	0.0000	0.0000	84.5000	84.5000	84.5000	(210)
Space heating fuel (main heating system)	917.2948	644.7750	472.5438	180.9380	34.6172	0.0000	0.0000	0.0000	0.0000	186.2099	573.9387	942.2627	(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	263.6793	233.2859	234.5211	187.5455	160.3663	142.2639	141.3534	158.6610	182.7523	222.6075	235.8945	261.1222	(64)
Efficiency of water heater	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	(216)
Fuel for water heating, kWh/month	312.0465	276.0780	277.5397	221.9474	189.7826	168.3597	167.2822	187.7645	216.2749	263.4409	279.1650	309.0204	(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	38.6919	34.9475	38.6919	37.4438	38.6919	37.4438	38.6919	38.6919	37.4438	38.6919	37.4438	38.6919	(231)
Lighting	32.2215	25.8493	23.2744	17.0518	13.1713	10.7611	12.0153	15.6180	20.2862	26.6166	30.0634	33.1170	(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													3952.5800 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													89.5000
Water heating fuel used													2868.7018 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)													
mechanical ventilation fans (SFP = 0.7250)													414.5660 (230a)
central heating pump													41.0000 (230c)
Total electricity for the above, kWh/year													455.5660 (231)
Electricity for lighting (calculated in Appendix L)													260.0461 (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)
Total delivered energy for all uses													7536.8938 (238)

12a

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EPC Dwelling Carbon Dioxide Emission Rate (DER)

9.4500 (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	3952.5800	1.1300	4466.4154 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2868.7018	1.1300	3241.6330 (278)
Space and water heating			7708.0484 (279)
Pumps, fans and electric keep-hot	455.5660	1.5128	689.1803 (281)
Energy for lighting	260.0461	1.5338	398.8673 (282)
Total Primary energy kwh/year			8796.0960 (286)
Dwelling Primary energy Rate (DPER)			54.2000 (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	61.1000 (1b)	x 2.7300 (2b)	= 166.8030 (1b) -
First floor	62.1000 (1c)	x 2.9600 (2c)	= 183.8160 (1c) -
Second floor	39.1000 (1d)	x 3.0200 (2d)	= 118.0820 (1d) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	162.3000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 468.7010 (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	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

	Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.0853 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3353 (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) = 0.2850 (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 inflt rate	0.3634	0.3563	0.3492	0.3135	0.3064	0.2708	0.2708	0.2637	0.2850	0.3064	0.3207	0.3349 (22b)
Effective ac	0.5660	0.5635	0.5610	0.5492	0.5469	0.5367	0.5367	0.5348	0.5406	0.5469	0.5514	0.5561 (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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			26.0900	1.1450	29.8740		(27)
Heatloss Floor 1			61.1000	0.1300	7.9430		(28a)
exposed floor			1.6800	0.1300	0.2184		(28b)
External Wall 1	128.0622	28.0900	99.9722	0.1800	17.9950		(29a)
External Roof 1	41.2700		41.2700	0.1100	4.5397		(30)
External Roof 2	19.2300		19.2300	0.1100	2.1153		(30)

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Total net area of external elements Aum(A, m2)	251.3422			(31)
Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) =	64.6854		(33)
Party Wall 1	114.0000	0.0000	0.0000	(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
List of Thermal Bridges 306.5618 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	16.9600	0.0500	0.8480
E3 Sill	15.7600	0.0500	0.7880
E4 Jamb	40.5800	0.0500	2.0290
E5 Ground floor (normal)	13.4000	0.1600	2.1440
E6 Intermediate floor within a dwelling	13.4000	0.0000	0.0000
E20 Exposed floor (normal)	1.8000	0.3200	0.5760
E13 Gable (insulation at rafter level)	12.0000	0.0800	0.9600
R5 Ridge (inverted)	6.5500	0.0400	0.2620
P1 Party wall - Ground floor	20.4500	0.0800	1.6360
P4 Party wall - Roof (insulation at ceiling level)	27.7000	0.1200	3.3240
E14 Flat roof	9.2300	0.0800	0.7384
P2 Party wall - Intermediate floor within a dwelling	21.0000	0.0000	0.0000
R7 Flat ceiling (inverted)	5.6500	0.0400	0.2260
E16 Corner (normal)	17.8800	0.0900	1.6092
E18 Party wall between dwellings	36.6000	0.0600	2.1960
R4 Ridge (vaulted ceiling)	6.5500	0.0800	0.5240

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 82.5460 (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)	87.5501	87.1535	86.7647	84.9386	84.5969	83.0064	83.0064	82.7119	83.6191	84.5969	85.2881	86.0107 (38)
Heat transfer coeff	170.0961	169.6995	169.3107	167.4846	167.1430	165.5525	165.5525	165.2579	166.1651	167.1430	167.8341	168.5567 (39)
Average = Sum(39)m / 12 =												167.4830

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0480	1.0456	1.0432	1.0319	1.0298	1.0200	1.0200	1.0182	1.0238	1.0298	1.0341	1.0386 (40)
HLP (average)												1.0319
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												2.9521 (42)
Hot water usage for mixer showers	73.7171	72.6092	70.9949	67.9062	65.6268	63.0849	61.6400	63.2421	64.9983	67.7276	70.8827	73.4346 (42a)
Hot water usage for baths	31.8240	31.3513	30.6858	29.4586	28.5397	27.5208	26.9704	27.6313	28.3509	29.4412	30.6937	31.7164 (42b)
Hot water usage for other uses	44.8626	43.2312	41.5998	39.9685	38.3371	36.7057	36.7057	38.3371	39.9685	41.5998	43.2312	44.8626 (42c)
Average daily hot water use (litres/day)												138.2546 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	150.4036	147.1918	143.2805	137.3333	132.5036	127.3114	125.3162	129.2106	133.3177	138.7687	144.8075	150.0136 (44)
Energy conte	238.2025	209.5991	220.2168	188.0024	178.3754	156.5442	151.5591	159.9897	164.3941	188.3078	206.3049	234.8850 (45)
Energy content (annual)												Total = Sum(45)m = 2296.3810

Distribution loss (46)m = 0.15 x (45)m
35.7304 31.4399 33.0325 28.2004 26.7563 23.4816 22.7339 23.9985 24.6591 28.2462 30.9457 35.2328 (46)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1127 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1409 (55)
Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (56)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
If cylinder contains dedicated solar storage												
Primary loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (57)
Combi 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 (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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WWHS	-33.7004	-29.8049	-31.2099	-25.8431	-24.0848	-20.6095	-19.3182	-20.5429	-21.3234	-25.1380	-28.4783	-33.0763 (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)
FGHS	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	263.1310	232.7493	247.6357	218.8969	212.9194	192.6722	190.8697	198.0756	199.8082	221.7986	234.5642	260.4375 (64)
Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2673.5583 (64)

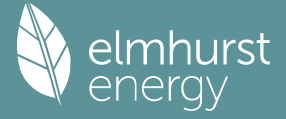
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat gains from water heating, kWh/month	126.1054	112.0558	120.1251	107.9008	106.2129	97.4410	97.2964	100.0996	100.0511	109.5154	113.9864	125.0023 (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												

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PV Unit electricity exported	-1828.6909	0.4622	-845.1641
Total			-2629.6193 (283)
Total Primary energy kWh/year			8135.4838 (286)
Target Primary Energy Rate (TPER)			50.1300 (287)

Full SAP Calculation Printout



Property Reference	BH1 L01-6 02 x6_Copy_Copy		Issued on Date	12/09/2023	
Assessment Reference	BH1 L01 02_Copy_Copy		Prop Type Ref		
Property					
SAP Rating	87 B	DER	10.18	TER	11.27
Environmental	91 B	% DER < TER	9.67		
CO ₂ Emissions (t/year)	0.89	DFEE	27.71	TFEE	27.09
Compliance Check	See BREL	% DFEE < TFEE	-2.27		
% DPER < TPER	2.12	DPER	53.56	TPER	54.72
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	99.7000 (1b)	2.7400 (2b)	273.1780 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.7000		273.1780 (5)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)

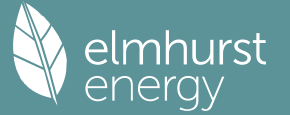
2. Ventilation rate

	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 infiltr 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)			20.4500	1.2357	25.2709		(27)
External Wall 1	66.4998	20.4500	46.0498	0.1400	6.4470	190.0000	8749.4620 (29a)
Total net area of external elements Aum(A, m ²)			66.4998				(31)

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Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) =	31.7179	(33)
Party Wall 1	66.4700	0.0000	0.0000
Party Floor 1	99.7000		180.0000
Party Ceiling 1	99.7000		40.0000
Internal Wall 1	176.5300		30.0000
			2991.0000 (32b)
			13239.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	40932.8120 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		410.5598 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	11.4100	0.0300	0.3423
E2 Other lintels (including other steel lintels)	7.9000	0.0300	0.2370
E3 Sill	24.9000	0.0300	0.7470
E4 Jamb	48.5400	0.0700	3.3978
E7 Party floor between dwellings (in blocks of flats)	6.6000	0.0000	0.0000
E8 Balcony within a dwelling, wall insulation continuous	5.4800	0.0900	0.4932
E16 Corner (normal)	5.4800	0.0600	0.3288
E18 Party wall between dwellings	2.7400	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)			5.5461 (36)

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	(36a) =	0.0000
Point Thermal bridges	(33) + (36) + (36a) =	37.2640 (37)
Total fabric heat loss		

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	26.9150	26.6277	26.3403	24.9036	24.6162	23.1795	23.1795	22.8921	23.7542	24.6162	25.1909	25.7656 (38)
Heat transfer coeff	64.1790	63.8917	63.6043	62.1676	61.8802	60.4435	60.4435	60.1561	61.0182	61.8802	62.4549	63.0296 (39)
Average = Sum(39)m / 12 =												62.0957

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6437	0.6408	0.6380	0.6235	0.6207	0.6063	0.6063	0.6034	0.6120	0.6207	0.6264	0.6322 (40)
HLP (average)												0.6228
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												2.7367 (42)
Hot water usage for mixer showers	96.3954	94.9468	92.8359	88.7969	85.8163	82.4924	80.6030	82.6980	84.9945	88.5634	92.6891	96.0261 (42a)
Hot water usage for baths	31.8642	31.3910	30.7246	29.4958	28.5758	27.5556	27.0045	27.6663	28.3868	29.4784	30.7325	31.7565 (42b)
Hot water usage for other uses	44.9020	43.2692	41.6364	40.0036	38.3708	36.7380	36.7380	38.3708	40.0036	41.6364	43.2692	44.9020 (42c)
Average daily hot water use (litres/day)												159.2365 (43)
Daily hot water use	173.1616	169.6069	165.1968	158.2964	152.7629	146.7859	144.3455	148.7350	153.3848	159.6782	166.6907	172.6846 (44)
Energy conte	274.2457	241.5180	253.9013	216.6998	205.6482	180.4904	174.5734	184.1650	189.1388	216.6818	237.4815	270.3823 (45)
Energy content (annual)												Total = Sum(45)m = 2644.9263
Distribution loss (46)m = 0.15 x (45)m	41.1368	36.2277	38.0852	32.5050	30.8472	27.0736	26.1860	27.6248	28.3708	32.5023	35.6222	40.5573 (46)
Water storage loss:												110.0000 (47)
Store volume												0.0152 (51)
b) If manufacturer declared loss factor is not known:												1.0294 (52)
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.6000 (53)
Volume factor from Table 2a												1.0327 (55)
Temperature factor from Table 2b												
Enter (49) or (54) in (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	329.5225	291.4455	309.1781	270.1935	260.9250	233.9841	229.8502	239.4418	242.6325	271.9586	290.9751	325.6591 (62)
WVHRS	-73.1216	-64.6693	-67.7180	-56.0732	-52.2582	-44.7177	-41.9157	-44.5732	-46.2667	-54.5433	-61.7909	-71.7675 (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	256.4009	226.7761	241.4601	214.1203	208.6668	189.2664	187.9345	194.8687	196.3658	217.4153	229.1842	253.8916 (64)
12Total per year (kWh/year)												2616.3507 (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	135.4081	120.2467	128.6436	114.8476	112.5995	102.8080	102.2671	105.4563	105.6836	116.2681	121.7575	134.1236 (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	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	129.0428	142.8689	129.0428	133.3443	129.0428	133.3443	129.0428	129.0428	133.3443	129.0428	133.3443	129.0428 (67)

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	255.8419	258.4967	251.8066	237.5642	219.5856	202.6883	191.3999	188.7451	195.4352	209.6776	227.6562	244.5534 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837 (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)	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693 (71)
Water heating gains (Table 5)	182.0002	178.9385	172.9081	159.5106	151.3434	142.7889	137.4558	141.7424	146.7828	156.2744	169.1077	180.2736 (72)
Total internal gains	630.9358	644.3551	617.8085	594.4700	564.0228	542.8725	521.9495	523.5813	539.6132	559.0458	594.1591	617.9208 (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						
North	5.3500	10.6334	0.3300	0.8000	0.7700	10.4079 (74)						
East	15.1000	19.6403	0.3300	0.8000	0.7700	54.2577 (76)						
Solar gains	64.6656	126.0296	208.5948	309.2189	385.5583	398.1139	377.5791	319.5391	243.9320	149.6200	80.4925	53.2954 (83)
Total gains	695.0014	770.3847	826.4033	903.6889	949.5812	940.9864	899.5286	843.1203	783.5452	708.6658	674.6515	671.2163 (84)

7. Mean internal temperature (heating season)

tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	12.8109	12.8641	12.9177	13.1931	13.2497	13.5409	13.5409	13.6008	13.4228	13.2497	13.1370	13.0263
util living area	0.9986	0.9938	0.9678	0.8190	0.6057	0.4111	0.2957	0.3282	0.5373	0.8770	0.9916	0.9990 (86)
MIT	20.7135	20.8001	20.9069	20.9908	20.9998	21.0000	21.0000	21.0000	21.0000	20.9832	20.8484	20.7046 (87)
Th 2	20.3908	20.3934	20.3960	20.4089	20.4114	20.4244	20.4244	20.4270	20.4192	20.4114	20.4063	20.4011 (88)
util rest of house	0.9979	0.9909	0.9551	0.7839	0.5676	0.3741	0.2570	0.2873	0.4921	0.8389	0.9872	0.9985 (89)
MIT 2	20.1337	20.2213	20.3241	20.4034	20.4113	20.4244	20.4244	20.4270	20.4192	20.4018	20.2806	20.1342 (90)
Living area fraction	20.2585	20.3459	20.4495	20.5299	20.5380	20.5483	20.5483	20.5503	20.5442	20.5270	20.4028	20.2570 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2585	20.3459	20.4495	20.5299	20.5380	20.5483	20.5483	20.5503	20.5442	20.5270	20.4028	20.2570 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	694.0232	763.1636	790.3551	715.0463	546.7422	359.5340	238.6475	249.6666	393.1943	600.1224	665.9682	670.1388 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.6000	10.6000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1024.1993	986.8614	887.2510	723.0007	546.8973	359.5345	238.6475	249.6666	393.2131	614.2830	830.8277	1012.0636 (97)
Space heating kWh	245.6510	150.3250	72.0905	5.7272	0.1154	0.0000	0.0000	0.0000	0.0000	10.5355	118.6988	254.3920 (98a)
Space heating requirement - total per year (kWh/year)												857.5354
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	245.6510	150.3250	72.0905	5.7272	0.1154	0.0000	0.0000	0.0000	0.0000	10.5355	118.6988	254.3920 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												857.5354
Space heating per m2										(98c) / (4) =		8.6012 (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	1.0500 (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	
Space heat from Combined Heat and Power = (98) x 0.56 x 1.05 x 1.25	
307a	179.9087
Space heat from Boilers = (98) x 0.44 x 1.05 x 1.25	
307b	142.5083

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Space heating requirement	322.4169	197.3015	94.6188	7.5170	0.1514	0.0000	0.0000	0.0000	0.0000	0.0000	13.8278	155.7922	333.8895 (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	0.0000 (309)

Water heating

Annual water heating requirement	256.4009	226.7761	241.4601	214.1203	208.6668	189.2664	187.9345	194.8687	196.3658	217.4153	229.1842	253.8916 (64)	
Water heat from Combined Heat and Power = (64) x 0.56 x 1.05 x 1.25													
310a	187.7816	166.0852	176.8394	156.8163	152.8223	138.6140	137.6385	142.7169	143.8134	159.2295	167.8488	185.9439	
Water heat from Boilers = (64) x 0.44 x 1.05 x 1.25													
310b	148.7446	131.5585	140.0771	124.2165	121.0528	109.7982	109.0255	113.0482	113.9167	126.1281	132.9555	147.2889	
Water heating fuel	336.5261	297.6437	316.9164	281.0329	273.8752	248.4121	246.6640	255.7651	257.7302	285.3576	300.8043	333.2327 (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	16.6296	15.0203	16.6296	16.0932	16.6296	16.0932	16.6296	16.0932	16.6296	16.0932	16.6296	16.0932 (331)	
Lighting	23.7070	19.0187	17.1242	12.5459	9.6908	7.9175	8.8403	11.4909	14.9256	19.5832	22.1192	24.3659 (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													1125.5152 (307)
Space heating fuel - secondary													0.0000 (309)
Water heating fuel - community heating													3433.9603 (310)
Efficiency of water heater													0.0000 (311)
Electricity used for heat distribution													11.2552 (313)
Space cooling fuel													0.0000 (321)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.5875)	
mechanical ventilation fans (SFP = 0.5875)	195.8003 (330a)
Total electricity for the above, kWh/year	195.8003 (331)
Electricity for lighting (calculated in Appendix L)	191.3292 (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	4946.6050 (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 less credit emissions for electricity	1258.5921	0.2100	264.3043 (363)
Water heating from Combined Heat and Power less credit emissions for electricity	-402.7495	0.3400	-140.1568 (364)
Efficiency of heat source Boilers	3839.9796	0.2100	806.3957 (365)
Space and Water heating from Boilers	-1228.7935	0.3400	-427.6201 (366)
Electrical energy for heat distribution (space & water)	93.9000		93.9000 (367)
Overall CO2 factor for heat network	2146.2068	0.2100	111.2570 (368)
Total CO2 associated with community systems	11.2552	0.0000	6.6265 (372)
Space and water heating			0.2106 (386)
Pumps, fans and electric keep-hot	195.8003	0.1387	27.1599 (378)
Energy for lighting	191.3292	0.1443	27.6147 (379)
Total CO2, kg/year			1015.0277 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.1800 (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 less credit emissions for electricity	1258.5921	1.1300	1422.2091 (463)
Water heating from Combined Heat and Power less credit emissions for electricity	-402.7495	2.1490	-865.5086 (464)
Efficiency of heat source Boilers	3839.9796	1.1300	4339.1770 (465)
Space and Water heating from Boilers	-1228.7935	2.1490	-2640.6772 (466)
Electrical energy for heat distribution (space & water)	93.9000		93.9000 (467b)
Overall CO2 factor for heat network	2146.2068	1.1300	598.6686 (468)
Total CO2 associated with community systems	11.2552	0.0000	70.1034 (472)

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Overall CO2 factor for heat network			1.0419 (486)
Total CO2 associated with community systems			4750.5173 (473)
Space and water heating			4750.5173 (476)
Pumps, fans and electric keep-hot	195.8003	1.5128	296.2067 (478)
Energy for lighting	191.3292	1.5338	293.4672 (479)
Total Primary energy kWh/year			5340.1912 (483)
Dwelling Primary energy Rate (DPER)			53.5600 (484)

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	99.7000 (1b)	x 2.7400 (2b)	= 273.1780 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.7000		273.1780 (5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 273.1780 (5)

2. Ventilation rate

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)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1098 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000 (17)	
Infiltration rate	0.3598 (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) =	0.3058 (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	1.1750 (22a)	
Adj infilt rate												
Effective ac	0.3900	0.3823	0.3747	0.3364	0.3288	0.2906	0.2906	0.2829	0.3058	0.3288	0.3441	0.3594 (22b)
	0.5760	0.5731	0.5702	0.5566	0.5540	0.5422	0.5422	0.5400	0.5468	0.5540	0.5592	0.5646 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opening Type (Uw = 1.20)			20.4500	1.1450	23.4160		(27)
External Wall 1	66.4998	20.4500	46.0498	0.1800	8.2890		(29a)
Total net area of external elements Aum(A, m2)			66.4998				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.7050		(33)
Party Wall 1			66.4700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							420.5598 (35)
List of Thermal Bridges							
K1 Element			Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)			11.4100	0.0500	0.5705		
E3 Sill			7.9000	0.0500	0.3950		
E4 Jamb			24.9000	0.0500	1.2450		
E7 Party floor between dwellings (in blocks of flats)			48.5400	0.0700	3.3978		
E8 Balcony within a dwelling, wall insulation continuous			6.6000	0.0000	0.0000		
E16 Corner (normal)			5.4800	0.0900	0.4932		
E18 Party wall between dwellings			5.4800	0.0600	0.3288		
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)					6.1837 (36)		
Point Thermal bridges					(36a) = 0.0000		

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Total fabric heat loss	(33) + (36) + (36a) =												37.8887 (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	51.9285	51.6624	51.4015	50.1761	49.9469	48.8796	48.8796	48.6820	49.2907	49.9469	50.4107	50.8955 (38)	
Average = Sum(39)m / 12 =	89.8172	89.5511	89.2902	88.0648	87.8356	86.7683	86.7683	86.5707	87.1794	87.8356	88.2994	88.7842 (39)	88.0637

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9009	0.8982	0.8956	0.8833	0.8810	0.8703	0.8703	0.8683	0.8744	0.8810	0.8857	0.8905 (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													2.7367 (42)
Hot water usage for mixer showers	70.1058	69.0522	67.5170	64.5796	62.4119	59.9944	58.6204	60.1440	61.8142	64.4097	67.4102	69.8372 (42a)	
Hot water usage for baths	30.2710	29.8214	29.1883	28.0211	27.1470	26.1778	25.6543	26.2830	26.9674	28.0045	29.1958	30.1687 (42b)	
Hot water usage for other uses	42.6569	41.1057	39.5545	38.0034	36.4522	34.9011	34.9011	36.4522	38.0034	39.5545	41.1057	42.6569 (42c)	
Average daily hot water use (litres/day)													131.4801 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	143.0336	139.9794	136.2599	130.6040	126.0111	121.0733	119.1758	122.8792	126.7850	131.9688	137.7118	142.6627 (44)	
Energy content (annual)	226.5303	199.3287	209.4264	178.7904	169.6352	148.8738	144.1327	152.1501	156.3386	179.0804	196.1957	223.3753 (45)	
Distribution loss (46)m = 0.15 x (45)m	33.9795	29.8993	31.4140	26.8186	25.4453	22.3311	21.6199	22.8225	23.4508	26.8621	29.4294	33.5063 (46)	
Water storage loss:													
Store volume													0.0000 (47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)													1.4400 (51)
Volume factor from Table 2a													0.0000 (52)
Temperature factor from Table 2b													1.0000 (53)
Enter (49) or (54) in (55)													1.4400 (55)
Total storage loss	44.6400	40.3200	44.6400	43.2000	44.6400	43.2000	44.6400	44.6400	43.2000	44.6400	43.2000	44.6400 (56)	
If cylinder contains dedicated solar storage	44.6400	40.3200	44.6400	43.2000	44.6400	43.2000	44.6400	44.6400	43.2000	44.6400	43.2000	44.6400 (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	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	271.1703	239.6487	254.0664	221.9904	214.2752	192.0738	188.7727	196.7901	199.5386	223.7204	239.3957	268.0153 (62)	
WMHRS	-32.0494	-28.3448	-29.6810	-24.5771	-22.9049	-19.5999	-18.3718	-19.5366	-20.2788	-23.9065	-27.0832	-31.4559 (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	239.1209	211.3040	224.3853	197.4133	191.3702	172.4739	170.4010	177.2535	179.2598	199.8139	212.3125	236.5594 (64)	
12Total per year (kWh/year)													2411.6677 (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	111.0333	98.5328	105.3463	94.0078	92.1157	84.0605	83.6361	86.3019	86.5426	95.2562	99.7951	109.9843 (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	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366	136.8366 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	129.6372	143.5269	129.6372	133.9585	129.6372	133.9585	129.6372	129.6372	133.9585	129.6372	133.9585	129.6372 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	255.8419	258.4967	251.8066	237.5642	219.5856	202.6883	191.3999	188.7451	195.4352	209.6776	227.6562	244.5534 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837	36.6837 (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)	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693	-109.4693 (71)
Water heating gains (Table 5)	149.2383	146.6262	141.5944	130.5664	123.8114	116.7507	112.4142	115.9972	120.1980	128.0326	138.6043	147.8283 (72)
Total internal gains	598.7684	612.7008	587.0892	566.1400	537.0852	517.4485	497.5023	498.4305	513.6426	531.3984	564.2698	586.0700 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
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	W/m2		or Table 6b		or Table 6c		Table 6d					
North	5.3500		10.6334		0.6300		0.7000		17.3859 (74)			
East	15.1000		19.6403		0.6300		0.7000		90.6350 (76)			
Solar gains	108.0209	210.5267	348.4481	516.5362	644.0577	665.0312	630.7288	533.7755	407.4774	249.9334	134.4590	89.0276 (83)
Total gains	706.7893	823.2275	935.5373	1082.6761	1181.1429	1182.4797	1128.2310	1032.2059	921.1200	781.3318	698.7288	675.0976 (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	129.6763	130.0617	130.4418	132.2568	132.6020	134.2330	134.2330	134.5395	133.6000	132.6020	131.9055	131.1851
alpha	9.6451	9.6708	9.6961	9.8171	9.8401	9.9489	9.9489	9.9693	9.9067	9.8401	9.7937	9.7457
util living area	0.9996	0.9981	0.9877	0.9002	0.6858	0.4695	0.3384	0.3858	0.6497	0.9619	0.9983	0.9998 (86)
MIT	20.4290	20.5536	20.7331	20.9344	20.9951	20.9999	21.0000	21.0000	20.9978	20.8832	20.6180	20.4115 (87)
Th 2	20.1668	20.1690	20.1713	20.1817	20.1837	20.1928	20.1928	20.1945	20.1893	20.1837	20.1797	20.1756 (88)
util rest of house	0.9994	0.9970	0.9812	0.8640	0.6284	0.4104	0.2763	0.3182	0.5753	0.9378	0.9971	0.9996 (89)
MIT 2	19.5030	19.6641	19.8915	20.1279	20.1809	20.1928	20.1928	20.1945	20.1884	20.0827	19.7558	19.4880 (90)
Living area fraction	fLA = Living area / (4) =											0.2152 (91)
MIT	19.7023	19.8556	20.0726	20.3015	20.3562	20.3665	20.3666	20.3679	20.3626	20.2550	19.9413	19.6868 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.7023	19.8556	20.0726	20.3015	20.3562	20.3665	20.3666	20.3679	20.3626	20.2550	19.9413	19.6868 (93)
8. Space heating requirement												
Utilisation	0.9992	0.9965	0.9802	0.8698	0.6407	0.4231	0.2897	0.3328	0.5914	0.9403	0.9966	0.9995 (94)
Useful gains	706.2573	820.3447	917.0310	941.6809	756.7385	500.2948	326.8173	343.4990	544.7177	734.7038	696.3765	674.7622 (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	1383.3936	1339.2865	1211.9024	1004.0709	760.3194	500.3503	326.8183	343.5029	545.9715	848.0521	1133.8825	1374.9854 (97)
Space heating kWh	503.7895	348.7289	219.3843	44.9208	2.6642	0.0000	0.0000	0.0000	0.0000	84.3311	315.0043	520.9661 (98a)
Space heating requirement - total per year (kWh/year)												2039.7892
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	503.7895	348.7289	219.3843	44.9208	2.6642	0.0000	0.0000	0.0000	0.0000	84.3311	315.0043	520.9661 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2039.7892
Space heating per m2												(98c) / (4) = 20.4593 (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	503.7895	348.7289	219.3843	44.9208	2.6642	0.0000	0.0000	0.0000	0.0000	84.3311	315.0043	520.9661 (98)
Space heat from Combined Heat and Power = (98) x 0.56 x 1.00 x 1.25												307a
Space heat from Boilers = (98) x 0.44 x 1.00 x 1.25												307b
Space heating requirement	629.7368	435.9111	274.2304	56.1510	3.3302	0.0000	0.0000	0.0000	0.0000	105.4139	393.7554	651.2076 (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	239.1209	211.3040	224.3853	197.4133	191.3702	172.4739	170.4010	177.2535	179.2598	199.8139	212.3125	236.5594 (64)
Water heat from Combined Heat and Power = (64) x 0.56 x 1.00 x 1.25												310a
Water heat from Boilers = (64) x 0.44 x 1.00 x 1.25												310b
Water heating fuel	298.9011	264.1300	280.4817	246.7667	239.2128	215.5923	213.0012	221.5669	224.0747	249.7674	265.3906	295.6992 (310)
Cooling System Energy Efficiency Ratio												
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 (314)
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 (315)
Lighting	26.9361	21.6091	19.4566	14.2547	11.0108	8.9959	10.0444	13.0561	16.9586	22.2505	25.1319	27.6847 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												

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(333a)m	-14.4370	-22.0056	-34.1563	-41.5519	-47.6106	-45.4456	-44.8621	-40.9265	-34.5465	-26.4648	-16.4377	-12.2948 (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	-3.8106	-8.2913	-17.0196	-26.3940	-35.7554	-36.2752	-35.8811	-30.0073	-21.4921	-12.1525	-5.1767	-2.9952 (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												2549.7365 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3014.5846 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												25.4974 (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)												217.3894 (332)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-615.9903 (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												5165.7202 (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	2851.2084	0.2100	598.7538 (363)									
less credit emissions for electricity	-912.3867	0.3480	-317.5106 (364)									
Water heating from Combined Heat and Power	3371.0184	0.2100	707.9139 (365)									
less credit emissions for electricity	-1078.7259	0.3480	-375.3966 (366)									
Efficiency of heat source Boilers			93.9000 (367)									
Space and Water heating from Boilers	2619.2012	0.2100	550.0410 (368)									
Electrical energy for heat distribution (space & water)	25.4974	0.0000	8.2743 (372)									
Overall CO2 factor for heat network			0.2106 (386)									
Total CO2 associated with community systems			1172.0670 (373)									
Space and water heating			1172.0670 (376)									
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (378)									
Energy for lighting	217.3894	0.1443	31.3760 (379)									
Energy saving/generation technologies												
PV Unit electricity used in dwelling	-380.7394	0.1330	-50.6435									
PV Unit electricity exported	-235.2509	0.1249	-29.3944									
Total			-80.0379 (380)									
Total CO2, kg/year			1123.4051 (383)									
EPC Target Carbon Dioxide Emission Rate (TER)			11.2700 (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	2851.2084	1.1300	3221.8654 (463)									
less credit emissions for electricity	-912.3867	2.1490	-1960.7190 (464)									
Water heating from Combined Heat and Power	3371.0184	1.1300	3809.2508 (465)									
less credit emissions for electricity	-1078.7259	2.1490	-2318.1820 (466)									
Efficiency of heat source Boilers			93.9000 (467b)									
Space and Water heating from Boilers	2619.2012	1.1300	2960.2209 (468)									
Electrical energy for heat distribution (space & water)	25.4974	0.0000	86.2550 (472)									
Overall CO2 factor for heat network			1.0420 (486)									
Total CO2 associated with community systems			5798.1677 (473)									
Space and water heating			5798.1677 (476)									
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (478)									
Energy for lighting	217.3894	1.5338	333.4391 (479)									
Energy saving/generation technologies												
PV Unit electricity used in dwelling	-380.7394	1.4915	-567.8750									
PV Unit electricity exported	-235.2509	0.4586	-107.8861									
Total			-675.7611 (480)									
Total Primary energy kWh/year			5455.8456 (483)									
Target Primary Energy Rate (TPER)			54.7200 (484)									