

Full SAP Calculation Printout



Plot Reference	UNIT 10				Issued on Date	08/07/2026	
Assessment Reference	001			Plot Type Ref	UNIT 10		
Plot Address	UNIT 10, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS				SAP Version	10.2	
SAP Rating	81 B	DER	3.93	TER	14.39		
Environmental	97 A	% DER < TER				72.69	
CO ₂ Emissions (t/year)	0.22	DFEE	34.72	TFEE	33.36		
Compliance Check	See BREL	% DFEE < TFEE				-4.06	
% DPER < TPER	45.35	DPER	42.03	TPER	76.91		
Assessor Details	Mr. Ondrej Gajdos				Assessor ID	W452-0001	
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)
Main dwelling			
Ground floor	60.6000 (1b)	2.7500 (2b)	166.6500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	166.6500 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1162 (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	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (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) =												81.0000 (23c)
Effective ac	0.2432	0.2403	0.2374	0.2229	0.2200	0.2054	0.2054	0.2025	0.2112	0.2200	0.2258	0.2316 (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
Main dwelling							
dl			2.1000	1.0000	2.1000		(26)
l			32.8600	0.7940	26.0895		(27)
exposed wall	48.4000	32.8600	15.5400	0.1500	2.3310	60.0000	932.4001 (29a)
corridor wall	19.8000	2.1000	17.7000	0.2500	4.4250	9.0000	159.3000 (29a)
Total net area of external elements Aum(A, m ²)			68.2000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 34.9455		(33)
Main dwelling							
pw			38.2250	0.0000	0.0000	110.0000	4204.7498 (32)
pf			60.6000			40.0000	2423.9999 (32d)
pc			60.6000			30.0000	1818.0000 (32b)
iw			100.1000			9.0000	900.9000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 10439.3498 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							172.2665 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	12.9500	0.0500	0.6475
E3 Sill	11.9500	0.0500	0.5975
E4 Jamb	42.7000	0.0500	2.1350
E7 Party floor between dwellings (in blocks of flats)	34.5000	0.0700	2.4150
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	14.9000	0.0200	0.2980
E16 Corner (normal)	11.0000	0.0900	0.9900
E17 Corner (inverted - internal area greater than external area)	8.2500	-0.0900	-0.7425
E18 Party wall between dwellings	11.0000	0.0600	0.6600

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal Bridges (36a) = 7.0005 (36)
 Total fabric heat loss (33) + (36) + (36a) = 41.9460 (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	13.3757	13.2159	13.0560	12.2569	12.0971	11.2979	11.2979	11.1381	11.6176	12.0971	12.4167	12.7364 (38)
Average = Sum(39)m / 12 =	55.3217	55.1618	55.0020	54.2029	54.0430	53.2439	53.2439	53.0841	53.5636	54.0430	54.3627	54.6823 (39)
HLP (average)	0.9129	0.9103	0.9076	0.8944	0.8918	0.8786	0.8786	0.8760	0.8839	0.8918	0.8971	0.9023 (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	1.9985 (42)											
Hot water usage for mixer showers	57.7286	56.8611	55.5969	53.1781	51.3931	49.4025	48.2710	49.5256	50.9009	53.0382	55.5090	57.5075 (42a)
Hot water usage for baths	24.9484	24.5779	24.0561	23.0941	22.3737	21.5749	21.1435	21.6616	22.2257	23.0805	24.0623	24.8641 (42b)
Hot water usage for other uses	35.0971	33.8209	32.5446	31.2683	29.9921	28.7158	28.7158	29.9921	31.2683	32.5446	33.8209	35.0971 (42c)
Average daily hot water use (litres/day)	108.2615 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	117.7742	115.2599	112.1976	107.5405	103.7589	99.6932	98.1303	101.1793	104.3950	108.6633	113.3922	117.4687 (44)
Energy content (annual)	186.5255	164.1285	172.4436	147.2176	139.6794	122.5845	118.6801	125.2811	128.7295	147.4551	161.5479	183.9275 (45)
Distribution loss (46)m = 0.15 x (45)m	27.9788	24.6193	25.8665	22.0826	20.9519	18.3877	17.8020	18.7922	19.3094	22.1183	24.2322	27.5891 (46)
Water storage loss (or HIU 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	1.0327 (55)											
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	241.8023	214.0559	227.7204	200.7113	194.9562	176.0781	173.9569	180.5579	182.2232	202.7319	215.0416	239.2043 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
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	241.8023	214.0559	227.7204	200.7113	194.9562	176.0781	173.9569	180.5579	182.2232	202.7319	215.0416	239.2043 (64)
12Total per year (kWh/year)	2449.0402 (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	106.2412	94.5147	101.5589	91.7448	90.6649	83.5543	83.6826	85.8774	85.5975	93.2503	96.5096	105.3774 (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	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	87.9938	87.9938	87.9938	87.9938	87.9938	87.9938	87.9938	87.9938	87.9938	87.9938	87.9938	87.9938 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	174.4576	176.2679	171.7059	161.9941	149.7346	138.2124	130.5149	128.7045	133.2665	142.9784	155.2379	166.7600 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927 (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)	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419 (71)
Water heating gains (Table 5)	142.7973	140.6468	136.5040	127.4233	121.8614	116.0476	112.4766	115.4266	118.8854	125.3364	134.0412	141.6362 (72)
Total internal gains	458.2269	467.3147	449.1819	433.3226	412.5680	398.1651	383.9635	385.1032	396.0571	409.2867	433.1842	449.3683 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	16.6400	11.2829	0.5300	0.7000	0.7700	48.2706 (75)
East	2.0600	19.6403	0.5300	0.7000	0.7700	10.4021 (76)
Southeast	14.1600	36.7938	0.5300	0.7000	0.7700	133.9508 (77)

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Solar gains	192.6235	346.7728	522.7271	726.4203	883.9612	908.0802	862.8194	740.8972	592.7196	396.3964	234.1493	162.6084 (83)
Total gains	650.8504	814.0874	971.9090	1159.7428	1296.5292	1306.2454	1246.7829	1126.0003	988.7766	805.6832	667.3335	611.9767 (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	52.4174	52.5693	52.7221	53.4994	53.6576	54.4629	54.4629	54.6269	54.1379	53.6576	53.3421	53.0303
alpha	4.4945	4.5046	4.5148	4.5666	4.5772	4.6309	4.6309	4.6418	4.6092	4.5772	4.5561	4.5354
util living area	0.9283	0.8520	0.7298	0.5465	0.3845	0.2605	0.1878	0.2167	0.3713	0.6507	0.8670	0.9409 (86)
MIT	20.2047	20.5158	20.7801	20.9449	20.9899	20.9987	20.9998	20.9996	20.9938	20.9055	20.5576	20.1446 (87)
Th 2	20.1565	20.1588	20.1610	20.1722	20.1745	20.1857	20.1857	20.1880	20.1812	20.1745	20.1700	20.1655 (88)
util rest of house	0.9163	0.8317	0.7007	0.5131	0.3513	0.2275	0.1531	0.1785	0.3281	0.6092	0.8447	0.9306 (89)
MIT 2	19.2600	19.6329	19.9361	20.1211	20.1663	20.1849	20.1856	20.1878	20.1770	20.0889	19.6994	19.1939 (90)
Living area fraction	19.7947	20.1327	20.4138	20.5874	20.6325	20.6456	20.6465	20.6473	20.6393	fLA = Living area / (4) =	20.5511	0.5660 (91)
MIT	19.7947	20.1327	20.4138	20.5874	20.6325	20.6456	20.6465	20.6473	20.6393	20.5511	20.1852	19.7320 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7947	20.1327	20.4138	20.5874	20.6325	20.6456	20.6465	20.6473	20.6393	20.5511	20.1852	19.7320 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9105	0.8310	0.7097	0.5300	0.3698	0.2461	0.1728	0.2001	0.3523	0.6285	0.8452	0.9245 (94)
Useful gains	592.5737	676.5380	689.7764	614.6745	479.4321	321.5192	215.3963	225.3597	348.3692	506.3829	564.0149	565.7658 (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	857.1921	840.2612	765.2876	633.4909	482.7378	321.8890	215.4488	225.4630	350.2677	537.7898	711.3457	849.3271 (97)
Space heating kWh	196.8761	110.0220	56.1803	13.5478	2.4595	0.0000	0.0000	0.0000	0.0000	23.3667	106.0782	210.9696 (98a)
Space heating requirement - total per year (kWh/year)												719.5002
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	196.8761	110.0220	56.1803	13.5478	2.4595	0.0000	0.0000	0.0000	0.0000	23.3667	106.0782	210.9696 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												719.5002
Space heating per m2										(98c) / (4) =		11.8729 (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 Heat pump-Space and Water												1.0000 (303a)
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												1.5000 (306)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating:												
Space heating requirement	196.8761	110.0220	56.1803	13.5478	2.4595	0.0000	0.0000	0.0000	0.0000	23.3667	106.0782	210.9696 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	295.3141	165.0330	84.2705	20.3217	3.6892	0.0000	0.0000	0.0000	0.0000	35.0501	159.1173	316.4545
Space heating requirement	295.3141	165.0330	84.2705	20.3217	3.6892	0.0000	0.0000	0.0000	0.0000	35.0501	159.1173	316.4545 (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	241.8023	214.0559	227.7204	200.7113	194.9562	176.0781	173.9569	180.5579	182.2232	202.7319	215.0416	239.2043 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	362.7035	321.0839	341.5806	301.0670	292.4343	264.1172	260.9354	270.8369	273.3347	304.0978	322.5624	358.8065
Water heating fuel	362.7035	321.0839	341.5806	301.0670	292.4343	264.1172	260.9354	270.8369	273.3347	304.0978	322.5624	358.8065 (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	11.9665	10.8085	11.9665	11.5805	11.9665	11.5805	11.9665	11.9665	11.5805	11.9665	11.5805	11.9665 (331)
Lighting	18.2834	14.6676	13.2066	9.6757	7.4738	6.1061	6.8178	8.8621	11.5110	15.1030	17.0588	18.7915 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-2.6387	-4.7133	-8.7589	-12.4270	-15.6341	-15.4572	-15.1286	-12.9665	-9.6837	-6.1706	-3.1764	-2.1516 (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	-0.3016	-0.8025	-2.0976	-3.9890	-6.0788	-6.4308	-6.2451	-4.7884	-2.9019	-1.2932	-0.4351	-0.2233 (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												1079.2503 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3673.5603 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												10.7925 (313)
Space cooling fuel												0.0000 (321)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 0.6930)												
mechanical ventilation fans (SFP = 0.6930)												140.8959 (330a)
Total electricity for the above, kWh/year												140.8959 (331)
Electricity for lighting (calculated in Appendix L)												147.5573 (332)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-144.4936 (333)

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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	4896.7702 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			330.0000 (367)
Space and Water heating from Heat pump	1440.2456	0.1586	51.8798 (367)
Electrical energy for heat distribution (space & water)	10.7925	0.0000	6.8850 (372)
Overall CO2 factor for heat network			0.0453 (386)
Total CO2 associated with community systems			215.5218 (373)
Space and water heating			215.5218 (376)
Pumps, fans and electric keep-hot	140.8959	0.1387	19.5440 (378)
Energy for lighting	147.5573	0.1443	21.2971 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-108.9065	0.1304	-14.2024
PV Unit electricity exported	-35.5872	0.1205	-4.2899
Total			-18.4923 (380)
Total CO2, kg/year			237.8706 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.9300 (384)

13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Efficiency of heat source Heat pump			330.0000 (467a)
Space and Water heating from Heat pump	1440.2456	1.5871	519.0660 (467)
Electrical energy for heat distribution (space & water)	10.7925	0.0000	72.9924 (472)
Overall CO2 factor for heat network			0.4807 (486)
Total CO2 associated with community systems			2284.8845 (473)
Space and water heating			2284.8845 (476)
Pumps, fans and electric keep-hot	140.8959	1.5128	213.1473 (478)
Energy for lighting	147.5573	1.5338	226.3283 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-108.9065	1.4817	-161.3695
PV Unit electricity exported	-35.5872	0.4422	-15.7367
Total			-177.1063 (480)
Total Primary energy kWh/year			2547.2538 (483)
Dwelling Primary energy Rate (DPER)			42.0300 (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)
Main dwelling	60.6000 (1b)	x 2.7500 (2b)	= 166.6500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	166.6500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2868 (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	0.3656	0.3584	0.3513	0.3154	0.3083	0.2724	0.2724	0.2653	0.2868	0.3083	0.3226	0.3369 (22b)

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Effective ac 0.5668 0.5642 0.5617 0.5497 0.5475 0.5371 0.5371 0.5352 0.5411 0.5475 0.5520 0.5568 (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
Main dwelling							
TER Opaque door			2.1000	1.0000	2.1000		(26)
TER Opening Type			13.0600	1.1450	14.9542		(27)
exposed wall	48.4000	13.0600	35.3400	0.1800	6.3612		(29a)
corridor wall	19.8000	2.1000	17.7000	0.1800	3.1860		(29a)
Total net area of external elements Aum(A, m2)			68.2000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.6014		(33)
Main dwelling							
pw			38.2250	0.0000	0.0000		(32)

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

172.2665 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	12.9500	0.0500	0.6475
E3 Sill	11.9500	0.0500	0.5975
E4 Jamb	42.7000	0.0500	2.1350
E7 Party floor between dwellings (in blocks of flats)	34.5000	0.0700	2.4150
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	14.9000	0.0200	0.2980
E16 Corner (normal)	11.0000	0.0900	0.9900
E17 Corner (inverted - internal area greater than external area)	8.2500	-0.0900	-0.7425
E18 Party wall between dwellings	11.0000	0.0600	0.6600
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.0005 (36)
Point Thermal Bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	33.6019 (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	31.1730	31.0303	30.8903	30.2332	30.1103	29.5379	29.5379	29.4319	29.7584	30.1103	30.3590	30.6190 (38)
Heat transfer coeff	64.7749	64.6322	64.4922	63.8351	63.7122	63.1398	63.1398	63.0338	63.3603	63.7122	63.9609	64.2209 (39)
Average = Sum(39)m / 12 =												63.8345

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0689	1.0665	1.0642	1.0534	1.0514	1.0419	1.0419	1.0402	1.0455	1.0514	1.0555	1.0598 (40)
HLP (average)												1.0534
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9985 (42)
Hot water usage for mixer showers	57.7286	56.8611	55.5969	53.1781	51.3931	49.4025	48.2710	49.5256	50.9009	53.0382	55.5090	57.5075 (42a)
Hot water usage for baths	24.9484	24.5779	24.0561	23.0941	22.3737	21.5749	21.1435	21.6616	22.2257	23.0805	24.0623	24.8641 (42b)
Hot water usage for other uses	35.0971	33.8209	32.5446	31.2683	29.9921	28.7158	28.7158	29.9921	31.2683	32.5446	33.8209	35.0971 (42c)
Average daily hot water use (litres/day)												108.2615 (43)
Daily hot water use	117.7742	115.2599	112.1976	107.5405	103.7589	99.6932	98.1303	101.1793	104.3950	108.6633	113.3922	117.4687 (44)
Energy conte	186.5255	164.1285	172.4436	147.2176	139.6794	122.5845	118.6801	125.2811	128.7295	147.4551	161.5479	183.9275 (45)
Energy content (annual)										Total = Sum(45)m =		1798.2004
Distribution loss (46)m = 0.15 x (45)m	27.9788	24.6193	25.8665	22.0826	20.9519	18.3877	17.8020	18.7922	19.3094	22.1183	24.2322	27.5891 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.1638	50.0061	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	237.4844	210.1559	223.4025	196.5327	190.6383	171.7483	168.6862	176.2400	178.0445	198.4140	210.8630	234.8864 (62)
WWHRS	-26.3911	-23.3405	-24.4409	-20.2380	-18.8611	-16.1396	-15.1283	-16.0874	-16.6986	-19.6858	-22.3016	-25.9024 (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	211.0933	186.8154	198.9617	176.2947	171.7772	155.6087	153.5580	160.1526	161.3459	178.7282	188.5614	208.9841 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2151.8811 (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	74.7595	66.0796	70.0772	61.2786	59.1831	53.0503	51.9627	54.3957	55.1313	61.7685	66.0435	73.8956 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274	99.9274 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	88.0981	97.5372	88.0981	91.0347	88.0981	91.0347	88.0981	88.0981	91.0347	88.0981	91.0347	88.0981 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	174.4576	176.2679	171.7059	161.9941	149.7346	138.2124	130.5149	128.7045	133.2665	142.9784	155.2379	166.7600 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927	32.9927 (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)	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419	-79.9419 (71)
Water heating gains (Table 5)	100.4832	98.3327	94.1898	85.1092	79.5472	73.6809	69.8423	73.1125	76.5713	83.0222	91.7270	99.3221 (72)
Total internal gains	419.0171	428.1160	409.9721	394.1162	373.3581	355.9063	341.4335	342.8934	353.8507	370.0769	393.9778	410.1585 (73)

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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	
Northeast	6.6200		11.2829		0.6300		0.7000		0.7700		22.8272	(75)
East	0.8200		19.6403		0.6300		0.7000		0.7700		4.9219	(76)
Southeast	5.6200		36.7938		0.6300		0.7000		0.7700		63.1951	(77)
Solar gains	90.9441	163.7382	246.8562	343.1031	417.5550	428.9648	407.5775	349.9571	279.9281	187.1793	110.5526	76.7712 (83)
Total gains	509.9612	591.8543	656.8283	737.2193	790.9131	784.8710	749.0110	692.8505	633.7788	557.2563	504.5305	486.9296 (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	44.7676	44.8665	44.9638	45.4267	45.5144	45.9270	45.9270	46.0042	45.7672	45.5144	45.3374	45.1538
alpha	3.9845	3.9911	3.9976	4.0284	4.0343	4.0618	4.0618	4.0669	4.0511	4.0343	4.0225	4.0103
util living area	0.9729	0.9518	0.9125	0.8194	0.6727	0.4974	0.3667	0.4114	0.6337	0.8641	0.9530	0.9770 (86)
MIT	19.5991	19.8575	20.1958	20.5957	20.8547	20.9670	20.9925	20.9881	20.9144	20.5649	20.0201	19.5537 (87)
Th 2	20.0263	20.0283	20.0302	20.0391	20.0408	20.0486	20.0486	20.0500	20.0455	20.0408	20.0374	20.0338 (88)
util rest of house	0.9673	0.9420	0.8952	0.7864	0.6207	0.4295	0.2893	0.3296	0.5628	0.8307	0.9418	0.9721 (89)
MIT 2	18.4134	18.7375	19.1555	19.6344	19.9158	20.0273	20.0454	20.0446	19.9837	19.6136	18.9523	18.3616 (90)
Living area fraction									fLA = Living area / (4) =			0.5660 (91)
MIT	19.0845	19.3715	19.7444	20.1785	20.4472	20.5592	20.5814	20.5786	20.5105	20.1520	19.5567	19.0364 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0845	19.3715	19.7444	20.1785	20.4472	20.5592	20.5814	20.5786	20.5105	20.1520	19.5567	19.0364 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9603	0.9342	0.8894	0.7915	0.6434	0.4665	0.3330	0.3755	0.5984	0.8350	0.9351	0.9657 (94)
Useful gains	489.7291	552.8975	584.1924	583.5336	508.9008	366.1298	249.3983	260.1750	379.2762	465.3128	471.7796	470.2228 (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	957.6670	935.3218	854.1584	719.9649	557.3034	376.2612	251.3871	263.3952	406.1707	608.5803	796.7390	952.8044 (97)
Space heating kWh	348.1458	256.9891	200.8547	98.2305	36.0116	0.0000	0.0000	0.0000	0.0000	106.5910	233.9708	359.0407 (98a)
Space heating requirement - total per year (kWh/year)												1639.8342
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	348.1458	256.9891	200.8547	98.2305	36.0116	0.0000	0.0000	0.0000	0.0000	106.5910	233.9708	359.0407 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1639.8342
Space heating per m ²										(98c) / (4) =		27.0600 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.4000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	348.1458	256.9891	200.8547	98.2305	36.0116	0.0000	0.0000	0.0000	0.0000	106.5910	233.9708	359.0407 (98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000 (210)
Space heating fuel (main heating system)	376.7811	278.1268	217.3752	106.3101	38.9736	0.0000	0.0000	0.0000	0.0000	115.3583	253.2151	388.5722 (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	211.0933	186.8154	198.9617	176.2947	171.7772	155.6087	153.5580	160.1526	161.3459	178.7282	188.5614	208.9841 (64)
Efficiency of water heater	85.4458	85.0651	84.4018	83.1792	81.6692	80.3000	80.3000	80.3000	80.3000	83.3108	84.8449	80.3000 (216)
Fuel for water heating, kWh/month	247.0494	219.6146	235.7317	211.9456	210.3329	193.7842	191.2303	199.4429	200.9289	214.5317	222.2424	244.3404 (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	18.3051	14.6850	13.2222	9.6872	7.4826	6.1134	6.8259	8.8726	11.5246	15.1209	17.0790	18.8138 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-13.4945	-20.2737	-31.0347	-37.2415	-42.2548	-40.2237	-39.7431	-36.4737	-31.0857	-24.1964	-15.2752	-11.5264 (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)	-4.2516	-9.1906	-18.7347	-28.8371	-38.8201	-39.2512	-38.7810	-32.5107	-23.4129	-13.3596	-5.7452	-3.3434 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

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(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												1774.7123	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												80.3000	
Water heating fuel used												2591.1751	(219)
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)												147.7322	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-599.0614	(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												4000.5583	(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	1774.7123	0.2100	372.6896	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2591.1751	0.2100	544.1468	(264)
Space and water heating			916.8364	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	147.7322	0.1443	21.3223	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-342.8233	0.1333	-45.6868	
PV Unit electricity exported	-256.2380	0.1252	-32.0786	
Total			-77.7653	(269)
Total CO2, kg/year			872.3226	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.3900	(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	1774.7123	1.1300	2005.4249	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2591.1751	1.1300	2928.0278	(278)
Space and water heating			4933.4527	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	147.7322	1.5338	226.5967	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-342.8233	1.4925	-511.6480	
PV Unit electricity exported	-256.2380	0.4595	-117.7418	
Total			-629.3898	(283)
Total Primary energy kWh/year			4660.7604	(286)
Target Primary Energy Rate (TPER)			76.9100	(287)