

Full SAP Calculation Printout



Plot Reference	UNIT 12			Issued on Date	08/07/2026
Assessment Reference	001	Plot Type Ref	UNIT 12		
Plot Address	UNIT 12, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS			SAP Version	10.2
SAP Rating	81 B	DER	4.31	TER	16.35
Environmental	97 A	% DER < TER			73.64
CO ₂ Emissions (t/year)	0.21	DFEE	35.95	TFEE	39.60
Compliance Check	See BREL	% DFEE < TFEE			9.22
% DPER < TPER	47.36	DPER	46.08	TPER	87.54
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	53.9000 (1b)	2.7500 (2b)	148.2250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	148.2250 (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			26.1800	0.7940	20.7858		(27)
exposed wall	47.3000	28.2800	19.0200	0.1500	2.8530	60.0000	1141.2000 (29a)
corridor wall	3.5750		3.5750	0.2500	0.8938	9.0000	32.1750 (29a)
flat roof	53.9000		53.9000	0.1000	5.3900	9.0000	485.1000 (30)
Total net area of external elements Aum(A, m ²)			104.7750				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		32.0226		(33)
Main dwelling							
pw			28.6000	0.0000	0.0000	110.0000	3146.0000 (32)
pf			53.9000			40.0000	2156.0001 (32d)
iw			128.1500			9.0000	1153.3499 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	8113.8250 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		150.5348 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	11.5800	0.0500	0.5790
E3 Sill	10.5800	0.0500	0.5290
E4 Jamb	38.7000	0.0500	1.9350
E7 Party floor between dwellings (in blocks of flats)	11.2000	0.0700	0.7840
E9 Balcony between dwellings, wall insulation continuous	2.8000	0.0200	0.0560
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.3000	0.0200	0.1060
E24 Eaves (insulation at ceiling level - inverted)	4.6000	0.0800	0.3680
E14 Flat roof	2.7000	0.1600	0.4320
E15 Flat roof with parapet	14.6000	0.5600	8.1760
E16 Corner (normal)	8.2500	0.0900	0.7425
E17 Corner (inverted - internal area greater than external area)	2.7500	-0.0900	-0.2475
E18 Party wall between dwellings	5.5000	0.0600	0.3300
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			13.7900 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	45.8126 (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	11.8969	11.7547	11.6125	10.9018	10.7596	10.0488	10.0488	9.9067	10.3331	10.7596	11.0439	11.3282	(38)
Heat transfer coeff	57.7094	57.5673	57.4251	56.7143	56.5722	55.8614	55.8614	55.7192	56.1457	56.5722	56.8565	57.1408	(39)
Average = Sum(39)m / 12 =												56.6788	
HLP	1.0707	1.0680	1.0654	1.0522	1.0496	1.0364	1.0364	1.0338	1.0417	1.0496	1.0549	1.0601	(40)
HLP (average)												1.0516	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.8051 (42)
Hot water usage for mixer showers	54.4845	53.6657	52.4725	50.1897	48.5050	46.6262	45.5583	46.7424	48.0404	50.0577	52.3896	54.2757	(42a)
Hot water usage for baths	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737	(42b)
Hot water usage for other uses	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156	(42c)
Average daily hot water use (litres/day)												102.1757	(43)
Daily hot water use	111.1535	108.7807	105.8907	101.4954	97.9264	94.0893	92.6141	95.4916	98.5264	102.5547	107.0178	110.8651	(44)
Energy conte	176.0399	154.9022	162.7501	138.9421	131.8278	115.6938	112.0087	118.2385	121.4929	139.1658	152.4665	173.5879	(45)
Energy content (annual)										Total = Sum(45)m =		1697.1161	
Distribution loss (46)m = 0.15 x (45)m	26.4060	23.2353	24.4125	20.8413	19.7742	17.3541	16.8013	17.7358	18.2239	20.8749	22.8700	26.0382	(46)
Water storage loss (or HIU loss):													
Store volume												110.0000	(47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152	(51)
Volume factor from Table 2a												1.0294	(52)
Temperature factor from Table 2b												0.6000	(53)
Enter (49) or (54) in (55)												1.0327	(55)
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	(56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	231.3167	204.8296	218.0269	192.4358	187.1046	169.1875	167.2855	173.5153	174.9866	194.4426	205.9601	228.8647	(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	231.3167	204.8296	218.0269	192.4358	187.1046	169.1875	167.2855	173.5153	174.9866	194.4426	205.9601	228.8647	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2347.9559	(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	102.7547	91.4469	98.3358	88.9932	88.0542	81.2631	81.4643	83.5357	83.1913	90.4941	93.4900	101.9394	(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	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.3632	87.8664	79.3632	82.0086	79.3632	82.0086	79.3632	79.3632	82.0086	79.3632	82.0086	79.3632	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	(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)	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	(71)
Water heating gains (Table 5)	138.1112	136.0817	132.1718	123.6017	118.3524	112.8655	109.4951	112.2792	115.5435	121.6318	129.8473	137.0154	(72)
Total internal gains	424.8967	433.0032	416.4756	401.7916	382.8398	369.6063	356.6479	357.7993	367.8235	380.0257	401.9436	416.8584	(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
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Southeast			10.8700		36.7938		0.5300		0.7000		0.7700		102.8281 (77)
South			8.2000		46.7521		0.5300		0.7000		0.7700		98.5648 (78)
Southwest			7.1100		36.7938		0.5300		0.7000		0.7700		67.2592 (79)

Solar gains	268.6521	451.1453	602.0348	723.5719	792.3285	779.2356	754.2854	703.7104	644.0276	494.3147	320.5582	230.7283 (83)
Total gains	693.5488	884.1485	1018.5105	1125.3635	1175.1684	1148.8418	1110.9333	1061.5097	1011.8511	874.3404	722.5019	647.5867 (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	39.0550	39.1514	39.2483	39.7402	39.8401	40.3470	40.3470	40.4499	40.1427	39.8401	39.6409	39.4436
alpha	3.6037	3.6101	3.6166	3.6493	3.6560	3.6898	3.6898	3.6967	3.6762	3.6560	3.6427	3.6296
util living area	0.8902	0.8012	0.6986	0.5663	0.4343	0.3083	0.2206	0.2405	0.3759	0.6115	0.8183	0.9070 (86)
MIT	19.9735	20.3520	20.6406	20.8542	20.9530	20.9900	20.9978	20.9970	20.9788	20.8399	20.4075	19.8925 (87)
Th 2	20.0249	20.0270	20.0292	20.0400	20.0422	20.0531	20.0531	20.0553	20.0488	20.0422	20.0379	20.0335 (88)
util rest of house	0.8740	0.7771	0.6675	0.5293	0.3929	0.2637	0.1734	0.1915	0.3263	0.5673	0.7916	0.8928 (89)
MIT 2	18.8789	19.3277	19.6597	19.9018	20.0032	20.0467	20.0522	20.0539	20.0341	19.8963	19.4127	18.7878 (90)
Living area fraction									flA = Living area / (4) =			0.2968 (91)
MIT	19.2038	19.6317	19.9509	20.1845	20.2852	20.3267	20.3329	20.3338	20.3145	20.1764	19.7080	19.1157 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2038	19.6317	19.9509	20.1845	20.2852	20.3267	20.3329	20.3338	20.3145	20.1764	19.7080	19.1157 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8582	0.7665	0.6649	0.5350	0.4035	0.2767	0.1874	0.2060	0.3403	0.5737	0.7815	0.8768 (94)
Useful gains	595.1974	677.6854	677.2239	602.0505	474.2273	317.8343	208.1701	218.6796	344.3249	501.6245	564.6471	567.8330 (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	860.0890	848.0662	772.4181	639.9929	485.6809	319.9026	208.5235	219.1901	348.9194	541.7584	716.8477	852.2976 (97)
Space heating kWh	197.0793	114.4959	70.8245	27.3185	8.5215	0.0000	0.0000	0.0000	0.0000	29.8596	109.5845	211.6416 (98a)
Space heating requirement - total per year (kWh/year)												769.3255
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	197.0793	114.4959	70.8245	27.3185	8.5215	0.0000	0.0000	0.0000	0.0000	29.8596	109.5845	211.6416 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												769.3255
Space heating per m2										(98c) / (4) =		14.2732 (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	197.0793	114.4959	70.8245	27.3185	8.5215	0.0000	0.0000	0.0000	0.0000	29.8596	109.5845	211.6416 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	295.6190	171.7439	106.2368	40.9777	12.7823	0.0000	0.0000	0.0000	0.0000	44.7894	164.3767	317.4625
Space heating requirement	295.6190	171.7439	106.2368	40.9777	12.7823	0.0000	0.0000	0.0000	0.0000	44.7894	164.3767	317.4625 (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	231.3167	204.8296	218.0269	192.4358	187.1046	169.1875	167.2855	173.5153	174.9866	194.4426	205.9601	228.8647 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	346.9751	307.2445	327.0403	288.6537	280.6568	253.7812	250.9283	260.2730	262.4798	291.6639	308.9402	343.2971
Water heating fuel	346.9751	307.2445	327.0403	288.6537	280.6568	253.7812	250.9283	260.2730	262.4798	291.6639	308.9402	343.2971 (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	10.6435	9.6135	10.6435	10.3001	10.6435	10.3001	10.6435	10.6435	10.3001	10.6435	10.3001	10.6435 (331)
Lighting	16.4901	13.2290	11.9112	8.7267	6.7407	5.5072	6.1491	7.9929	10.3819	13.6217	15.3856	16.9484 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-2.3626	-4.2214	-7.8478	-11.1395	-14.0200	-13.8642	-13.5699	-11.6279	-8.6804	-5.5283	-2.8445	-1.9263 (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	-0.2682	-0.7137	-1.8658	-3.5485	-5.4073	-5.7198	-5.5539	-4.2580	-2.5804	-1.1498	-0.3869	-0.1985 (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												1153.9882 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3521.9339 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												11.5399 (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)												125.3183 (330a)
Total electricity for the above, kWh/year												125.3183 (331)

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Electricity for lighting (calculated in Appendix L)	133.0846 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-129.2838 (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	4805.0412 (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	1416.9461	0.1578	55.1893 (367)
Electrical energy for heat distribution (space & water)	11.5399	0.0000	6.7796 (372)
Overall CO2 factor for heat network			0.0454 (386)
Total CO2 associated with community systems			212.2207 (373)
Space and water heating			212.2207 (376)
Pumps, fans and electric keep-hot	125.3183	0.1387	17.3832 (378)
Energy for lighting	133.0846	0.1443	19.2082 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-97.6330	0.1304	-12.7315
PV Unit electricity exported	-31.6508	0.1205	-3.8154
Total			-16.5469 (380)
Total CO2, kg/year			232.2652 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.3100 (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	1416.9461	1.5842	553.9770 (467)
Electrical energy for heat distribution (space & water)	11.5399	0.0000	71.8344 (472)
Overall CO2 factor for heat network			0.4809 (486)
Total CO2 associated with community systems			2248.6347 (473)
Space and water heating			2248.6347 (476)
Pumps, fans and electric keep-hot	125.3183	1.5128	189.5815 (478)
Energy for lighting	133.0846	1.5338	204.1296 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-97.6330	1.4817	-144.6624
PV Unit electricity exported	-31.6508	0.4422	-13.9963
Total			-158.6588 (480)
Total Primary energy kWh/year			2483.6871 (483)
Dwelling Primary energy Rate (DPER)			46.0800 (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	53.9000 (1b)	2.7500 (2b)	148.2250 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.9000		148.2250 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	148.2250 (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) = 0.1349 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3849 (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) = 0.2983 (21)

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

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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												
Effective ac	0.3804	0.3729	0.3654	0.3282	0.3207	0.2834	0.2834	0.2759	0.2983	0.3207	0.3356	0.3505 (22b)
	0.5723	0.5695	0.5668	0.5538	0.5514	0.5402	0.5402	0.5381	0.5445	0.5514	0.5563	0.5614 (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			11.3700	1.1450	13.0191		(27)
exposed wall	47.3000	13.4700	33.8300	0.1800	6.0894		(29a)
corridor wall	3.5750		3.5750	0.1800	0.6435		(29a)
flat roof	53.9000		53.9000	0.1100	5.9290		(30)
Total net area of external elements Aum(A, m2)			104.7750				(31)
Fabric heat loss, W/K = Sum (A x U)					27.7810		(33)
Main dwelling							
pw			28.6000	0.0000	0.0000		(32)

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

List of Thermal Bridges 150.5348 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	11.5800	0.0500	0.5790
E3 Sill	10.5800	0.0500	0.5290
E4 Jamb	38.7000	0.0500	1.9350
E7 Party floor between dwellings (in blocks of flats)	11.2000	0.0700	0.7840
E9 Balcony between dwellings, wall insulation continuous	2.8000	0.0200	0.0560
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.3000	0.0200	0.1060
E24 Eaves (insulation at ceiling level - inverted)	4.6000	0.2400	1.1040
E14 Flat roof	2.7000	0.0800	0.2160
E15 Flat roof with parapet	14.6000	0.5600	8.1760
E16 Corner (normal)	8.2500	0.0900	0.7425
E17 Corner (inverted - internal area greater than external area)	2.7500	-0.0900	-0.2475
E18 Party wall between dwellings	5.5000	0.0600	0.3300

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 14.3100 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 42.0910 (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	27.9954	27.8580	27.7233	27.0908	26.9724	26.4215	26.4215	26.3195	26.6337	26.9724	27.2118	27.4622 (38)
Heat transfer coeff	70.0864	69.9490	69.8143	69.1818	69.0634	68.5125	68.5125	68.4104	68.7247	69.0634	69.3028	69.5531 (39)
Average = Sum(39)m / 12 =												69.1812

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3003	1.2978	1.2953	1.2835	1.2813	1.2711	1.2711	1.2692	1.2750	1.2813	1.2858	1.2904 (40)
HLP (average)												1.2835
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

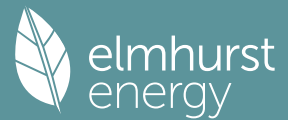
Assumed occupancy												1.8051 (42)
Hot water usage for mixer showers												
	54.4845	53.6657	52.4725	50.1897	48.5050	46.6262	45.5583	46.7424	48.0404	50.0577	52.3896	54.2757 (42a)
Hot water usage for baths												
	23.5533	23.2035	22.7109	21.8027	21.1226	20.3685	19.9612	20.4503	20.9829	21.7898	22.7168	23.4737 (42b)
Hot water usage for other uses												
	33.1156	31.9114	30.7072	29.5030	28.2988	27.0946	27.0946	28.2988	29.5030	30.7072	31.9114	33.1156 (42c)
Average daily hot water use (litres/day)												102.1757 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	111.1535	108.7807	105.8907	101.4954	97.9264	94.0893	92.6141	95.4916	98.5264	102.5547	107.0178	110.8651 (44)
Energy content (annual)	176.0399	154.9022	162.7501	138.9421	131.8278	115.6938	112.0087	118.2385	121.4929	139.1658	152.4665	173.5879 (45)
Distribution loss (46)m = 0.15 x (45)m	26.4060	23.2353	24.4125	20.8413	19.7742	17.3541	16.8013	17.7358	18.2239	20.8749	22.8700	26.0382 (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												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	49.3151	49.9022	46.4002	47.1951	48.6615	48.5883	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month												
WWHRS	226.9988	200.9296	213.7090	188.2572	181.7300	162.0940	159.2039	166.9000	170.0812	190.1247	201.7815	224.5468 (62)
PV diverter	-24.9080	-22.0289	-23.0674	-19.1007	-17.8012	-15.2326	-14.2781	-15.1833	-15.7602	-18.5795	-21.0484	-24.4468 (63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	202.0908	178.9007	190.6416	169.1565	163.9288	146.8614	144.9257	151.7166	154.3210	171.5451	180.7332	200.1001 (64)
12Total per year (kWh/year)												2054.9217 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	71.2730	63.0118	66.8541	58.5270	56.3083	50.0682	49.0417	51.4797	52.5435	59.0124	63.0239	70.4577 (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	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531	90.2531 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	79.5564	88.0803	79.5564	82.2083	79.5564	82.2083	79.5564	79.5564	82.2083	79.5564	82.2083	79.5564 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	157.3464	158.9792	154.8647	146.1054	135.0483	124.6562	117.7137	116.0809	120.1954	128.9547	140.0118	150.4039 (68)

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Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253	32.0253 (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 (70)
Losses e.g. evaporation (negative values) (Table 5)	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025	-72.2025 (71)
Water heating gains (Table 5)	95.7970	93.7676	89.8577	81.2875	75.6832	69.5392	65.9162	69.1931	72.9770	79.3177	87.5331 (72)
Total internal gains	385.7758	393.9030	377.3547	362.6771	343.3638	326.4797	313.2623	314.9064	325.4567	340.9047	362.8291 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF Specific data or Table 6c	Access factor Table 6d	Gains W		

Southeast				4.7300	36.7938	0.6300	0.7000	0.7700		53.1873 (77)		
South				3.5600	46.7521	0.6300	0.7000	0.7700		50.8654 (78)		
Southwest				3.0800	36.7938	0.6300	0.7000	0.7700		34.6336 (79)		

Solar gains	138.6863	232.8959	310.7927	373.5385	409.0369	402.2791	389.3980	363.2865	332.4723	255.1821	165.4821	119.1088 (83)
Total gains	524.4621	626.7989	688.1474	736.2156	752.4007	728.7588	702.6603	678.1928	657.9290	596.0869	528.3112	496.8462 (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	32.1580	32.2212	32.2834	32.5785	32.6344	32.8968	32.8968	32.9459	32.7952	32.6344	32.5216	32.4046
alpha	3.1439	3.1481	3.1522	3.1719	3.1756	3.1931	3.1931	3.1964	3.1863	3.1756	3.1681	3.1603
util living area	0.9541	0.9231	0.8812	0.8067	0.6973	0.5480	0.4121	0.4418	0.6257	0.8260	0.9267	0.9603 (86)
MIT	19.1306	19.4714	19.8661	20.3185	20.6702	20.8900	20.9666	20.9576	20.8244	20.3668	19.6734	19.0663 (87)
Th 2	19.8406	19.8426	19.8446	19.8538	19.8555	19.8635	19.8635	19.8650	19.8604	19.8555	19.8520	19.8484 (88)
util rest of house	0.9452	0.9091	0.8595	0.7712	0.6416	0.4669	0.3126	0.3415	0.5478	0.7864	0.9107	0.9526 (89)
MIT 2	17.7161	18.1395	18.6251	19.1704	19.5660	19.7902	19.8492	19.8455	19.7326	19.2422	18.4053	17.6407 (90)
Living area fraction	FLA = Living area / (4) = 0.2968 (91)											
MIT	18.1360	18.5348	18.9935	19.5112	19.8938	20.1167	20.1809	20.1756	20.0567	19.5761	18.7817	18.0639 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.1360	18.5348	18.9935	19.5112	19.8938	20.1167	20.1809	20.1756	20.0567	19.5761	18.7817	18.0639 (93)

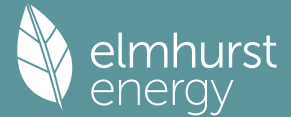
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9279	0.8891	0.8404	0.7592	0.6436	0.4859	0.3412	0.3699	0.5621	0.7752	0.8919	0.9363 (94)
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	969.7133	953.7432	872.2240	734.1038	565.8897	377.9603	245.3368	258.2894	409.3729	619.9168	809.5777	964.2764 (97)
Space heating kWh	359.4169	266.4091	218.6759	126.1173	60.7158	0.0000	0.0000	0.0000	0.0000	117.4245	243.6369	371.2991 (98a)
Space heating requirement - total per year (kWh/year)	1763.6956											
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	359.4169	266.4091	218.6759	126.1173	60.7158	0.0000	0.0000	0.0000	0.0000	117.4245	243.6369	371.2991 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1763.6956											
Space heating per m2	(98c) / (4) = 32.7216 (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	359.4169	266.4091	218.6759	126.1173	60.7158	0.0000	0.0000	0.0000	0.0000	117.4245	243.6369	371.2991 (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)	388.9793	288.3216	236.6622	136.4906	65.7098	0.0000	0.0000	0.0000	0.0000	127.0828	263.6763	401.8388 (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	202.0908	178.9007	190.6416	169.1565	163.9288	146.8614	144.9257	151.7166	154.3210	171.5451	180.7332	200.1001 (64)
Efficiency of water heater (217)m	85.6005	85.2328	84.6762	83.7609	82.4559	80.3000	80.3000	80.3000	80.3000	83.5858	85.0220	80.3000 (216)
Fuel for water heating, kWh/month	236.0860	209.8967	225.1419	201.9517	198.8079	182.8910	180.4804	188.9373	192.1806	205.2325	212.5722	233.5263 (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	16.5302	13.2612	11.9402	8.7479	6.7571	5.5206	6.1641	8.0123	10.4072	13.6548	15.4231	16.9897 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-12.0407	-18.1104	-27.7568	-33.3531	-37.8881	-36.0898	-35.6650	-32.7125	-27.8486	-21.6391	-13.6386	-10.2827 (233a)

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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	-3.7434	-8.0963	-16.5101	-25.4198	-34.2230	-34.5982	-34.1774	-28.6449	-20.6246	-11.7646	-5.0577	-2.9431	(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												1908.7615	(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												2467.7044	(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)												133.4086	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-532.8285	(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												4063.0459	(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	1908.7615	0.2100	400.8399	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2467.7044	0.2100	518.2179	(264)
Space and water heating			919.0578	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	133.4086	0.1443	19.2550	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0253	0.1332	-40.9072	
PV Unit electricity exported	-225.8032	0.1252	-28.2677	
Total			-69.1749	(269)
Total CO2, kg/year			881.0672	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.3500	(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	1908.7615	1.1300	2156.9005	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2467.7044	1.1300	2788.5059	(278)
Space and water heating			4945.4064	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	133.4086	1.5338	204.6265	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-307.0253	1.4923	-458.1875	
PV Unit electricity exported	-225.8032	0.4595	-103.7545	
Total			-561.9421	(283)
Total Primary energy kWh/year			4718.1916	(286)
Target Primary Energy Rate (TPER)			87.5400	(287)