

Full SAP Calculation Printout



Plot Reference	UNIT 13				Issued on Date	08/07/2026	
Assessment Reference	001		Plot Type Ref		UNIT 13		
Plot Address	UNIT 13, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS				SAP Version	10.2	
SAP Rating	79 C	DER	4.42	TER	16.22		
Environmental	96 A	% DER < TER				72.75	
CO ₂ Emissions (t/year)	0.37	DFEE	50.10	TFEE	52.66		
Compliance Check	See BREL	% DFEE < TFEE				4.86	
% DPER < TPER	46.05	DPER	46.62	TPER	86.40		
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	93.2000 (1b)	2.9000 (2b)	270.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	270.2800 (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			1.8900	1.0000	1.8900		(26)
1			46.8700	0.7940	37.2128		(27)
corridor below			0.7000	0.0900	0.0630	75.0000	52.5000 (28b)
exposed wall	90.4800	46.8700	43.6100	0.1500	6.5415	60.0000	2616.6002 (29a)
corridor wall	15.3700	1.8900	13.4800	0.2500	3.3700	9.0000	121.3200 (29a)
stair wall	18.8500		18.8500	0.1700	3.2045	9.0000	169.6500 (29a)
flat roof	93.2000		93.2000	0.1000	9.3200	9.0000	838.8000 (30)
Total net area of external elements A _{um} (A, m ²)			218.6000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	61.6018		(33)
Main dwelling							
pw			31.6100	0.0000	0.0000	110.0000	3477.1001 (32)
pf			92.5000			40.0000	3700.0000 (32d)
iw			204.1600			9.0000	1837.4400 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12813.4103 (34)

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

137.4829 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	18.4600	0.0500	0.9230
E3 Sill	17.5600	0.0500	0.8780
E4 Jamb	61.2000	0.0500	3.0600
E7 Party floor between dwellings (in blocks of flats)	28.0000	0.0700	1.9600
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	4.1000	0.0200	0.0820
E24 Eaves (insulation at ceiling level - inverted)	10.7000	0.0800	0.8560
E15 Flat roof with parapet	31.4000	0.5600	17.5840
E16 Corner (normal)	11.6000	0.0900	1.0440
E17 Corner (inverted - internal area greater than external area)	11.6000	-0.0900	-1.0440
E18 Party wall between dwellings	11.6000	0.0600	0.6960
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			26.0390 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	87.6408 (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	21.6933	21.4340	21.1748	19.8788	19.6195	18.3235	18.3235	18.0642	18.8419	19.6195	20.1380	20.6564 (38)
Heat transfer coeff	109.3341	109.0749	108.8157	107.5196	107.2604	105.9643	105.9643	105.7051	106.4827	107.2604	107.7788	108.2972 (39)
Average = Sum(39)m / 12 =												107.4548
HLP	1.1731	1.1703	1.1675	1.1536	1.1509	1.1370	1.1370	1.1342	1.1425	1.1509	1.1564	1.1620 (40)
HLP (average)												1.1529
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6670 (42)
Hot water usage for mixer showers	68.9372	67.9012	66.3916	63.5031	61.3715	58.9944	57.6433	59.1415	60.7838	63.3361	66.2866	68.6731 (42a)
Hot water usage for baths	29.7685	29.3264	28.7038	27.5559	26.6963	25.7432	25.2284	25.8466	26.5198	27.5396	28.7112	29.6678 (42b)
Hot water usage for other uses	41.9431	40.4179	38.8927	37.3675	35.8423	34.3171	34.3171	35.8423	37.3675	38.8927	40.4179	41.9431 (42c)
Average daily hot water use (litres/day)												129.2880 (43)
Daily hot water use	140.6488	137.6455	133.9881	128.4265	123.9102	119.0548	117.1888	120.8304	124.6711	129.7685	135.4157	140.2840 (44)
Energy conte	222.7533	196.0054	205.9347	175.8095	166.8069	146.3917	141.7297	149.6133	153.7319	176.0946	192.9245	219.6509 (45)
Energy content (annual)										Total = Sum(45)m =		2147.4464
Distribution loss (46)m = 0.15 x (45)m	33.4130	29.4008	30.8902	26.3714	25.0210	21.9588	21.2595	22.4420	23.0598	26.4142	28.9387	32.9476 (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	278.0301	245.9328	261.2115	229.3032	222.0837	199.8854	197.0065	204.8901	207.2256	231.3714	246.4181	274.9277 (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	278.0301	245.9328	261.2115	229.3032	222.0837	199.8854	197.0065	204.8901	207.2256	231.3714	246.4181	274.9277 (64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2798.2861 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	118.2869	105.1137	112.6947	101.2516	99.6847	91.4702	91.3466	93.9679	93.9108	102.7729	106.9423	117.2554 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.4953	136.7270	123.4953	127.6118	123.4953	127.6118	123.4953	123.4953	127.6118	123.4953	127.6118	123.4953 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	244.8433	247.3840	240.9815	227.3513	210.1457	193.9748	183.1717	180.6310	187.0335	200.6636	217.8693	234.0402 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352 (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)	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815 (71)
Water heating gains (Table 5)	158.9878	156.4192	151.4714	140.6272	133.9849	127.0419	122.7776	126.3009	130.4317	138.1356	148.5310	157.6013 (72)
Total internal gains	590.3320	603.5357	578.9538	558.5959	530.6314	511.6341	492.4502	493.4327	508.0825	525.3001	557.0177	578.1423 (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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North	7.2700	10.6334	0.5300	0.7000	0.7700	19.8753 (74)
Northeast	25.5700	11.2829	0.5300	0.7000	0.7700	74.1754 (75)
Southeast	10.7900	36.7938	0.5300	0.7000	0.7700	102.0713 (77)
Northwest	3.2400	11.2829	0.5300	0.7000	0.7700	9.3988 (81)

Solar gains	205.5209	381.9657	608.9301	901.7862	1146.4189	1198.6092	1130.3805	938.2912	708.6577	445.2690	251.9347	172.1717 (83)
Total gains	795.8528	985.5015	1187.8839	1460.3821	1677.0503	1710.2433	1622.8307	1431.7240	1216.7402	970.5691	808.9524	750.3141 (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	32.5542	32.6315	32.7093	33.1036	33.1836	33.5894	33.5894	33.6718	33.4259	33.1836	33.0239	32.8659
alpha	3.1703	3.1754	3.1806	3.2069	3.2122	3.2393	3.2393	3.2448	3.2284	3.2122	3.2016	3.1911
util living area	0.9581	0.9230	0.8558	0.7165	0.5436	0.3843	0.2837	0.3328	0.5506	0.8127	0.9308	0.9643 (86)
MIT	19.1138	19.4973	20.0029	20.5460	20.8469	20.9626	20.9895	20.9825	20.8841	20.4168	19.6721	19.0501 (87)
Th 2	19.9416	19.9438	19.9460	19.9573	19.9595	19.9708	19.9708	19.9730	19.9663	19.9595	19.9550	19.9505 (88)
util rest of house	0.9507	0.9102	0.8333	0.6789	0.4938	0.3264	0.2188	0.2612	0.4825	0.7753	0.9170	0.9579 (89)
MIT 2	17.7711	18.2492	18.8671	19.5056	19.8273	19.9458	19.9660	19.9645	19.8800	19.3837	18.4830	17.6969 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	18.1572	18.6081	19.1937	19.8048	20.1205	20.2382	20.2603	20.2572	20.1687	19.6807	18.8249	18.0860 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.1572	18.6081	19.1937	19.8048	20.1205	20.2382	20.2603	20.2572	20.1687	19.6807	18.8249	18.0860 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9338	0.8900	0.8147	0.6730	0.5018	0.3417	0.2372	0.2813	0.4964	0.7639	0.8981	0.9424 (94)
Useful gains	743.1847	877.0733	967.7941	982.9046	841.5478	584.4110	384.9939	402.7533	604.0261	741.4578	726.5011	707.0807 (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	1515.0632	1495.2119	1381.2726	1172.4747	903.1819	597.4468	387.8616	407.7299	646.2162	974.0026	1263.7002	1503.8145 (97)
Space heating kWh	574.2776	415.3892	307.6280	136.4905	45.8558	0.0000	0.0000	0.0000	0.0000	173.0134	386.7834	592.7699 (98a)
Space heating requirement - total per year (kWh/year)	2632.2076											
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	574.2776	415.3892	307.6280	136.4905	45.8558	0.0000	0.0000	0.0000	0.0000	173.0134	386.7834	592.7699 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2632.2076											
Space heating per m2	(98c) / (4) = 28.2426 (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												
574.2776	415.3892	307.6280	136.4905	45.8558	0.0000	0.0000	0.0000	0.0000	173.0134	386.7834	592.7699 (98)	
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
861.4164	623.0837	461.4420	204.7357	68.7837	0.0000	0.0000	0.0000	0.0000	259.5201	580.1751	889.1549	
Space heating requirement												
861.4164	623.0837	461.4420	204.7357	68.7837	0.0000	0.0000	0.0000	0.0000	259.5201	580.1751	889.1549 (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												
278.0301	245.9328	261.2115	229.3032	222.0837	199.8854	197.0065	204.8901	207.2256	231.3714	246.4181	274.9277 (64)	
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
417.0452	368.8992	391.8172	343.9548	333.1256	299.8281	295.5097	307.3352	310.8384	347.0570	369.6272	412.3916	
Water heating fuel												
417.0452	368.8992	391.8172	343.9548	333.1256	299.8281	295.5097	307.3352	310.8384	347.0570	369.6272	412.3916 (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 (315)	
Pumps and Fa	19.4078	17.5296	19.4078	18.7817	19.4078	18.7817	19.4078	19.4078	18.7817	19.4078	19.4078 (331)	
Lighting	25.6599	20.5853	18.5348	13.5794	10.4891	8.5697	9.5685	12.4375	16.1551	21.1964	23.9413 (332)	
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-4.0068	-7.1402	-13.2322	-18.7153	-23.4859	-23.1956	-22.7032	-19.4884	-14.5925	-9.3320	-4.8184 -3.2685 (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 (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 (335a)	
Electricity generated by PVs (Appendix M) (negative quantity)												
(333b)m	-0.4810	-1.2786	-3.3382	-6.3407	-9.6548	-10.2124	-9.9197	-7.6110	-4.6171	-2.0602	-0.6940 -0.3562 (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 (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 (335b)	
Annual totals kWh/year												
Space heating fuel - community heating												3948.3114 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												4197.4292 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												39.4831 (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)												228.5109 (330a)

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Total electricity for the above, kWh/year	228.5109 (331)
Electricity for lighting (calculated in Appendix L)	207.0900 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-220.5429 (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	8360.7986 (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	2468.4062	0.1562	186.9379 (367)
Electrical energy for heat distribution (space & water)	39.4831	0.0000	12.0836 (372)
Overall CO2 factor for heat network			0.0464 (386)
Total CO2 associated with community systems			378.2537 (373)
Space and water heating			378.2537 (376)
Pumps, fans and electric keep-hot	228.5109	0.1387	31.6973 (378)
Energy for lighting	207.0900	0.1443	29.8895 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-163.9790	0.1305	-21.3925
PV Unit electricity exported	-56.5640	0.1206	-6.8196
Total			-28.2121 (380)
Total CO2, kg/year			411.6284 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.4200 (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	2468.4062	1.5784	1888.5044 (467)
Electrical energy for heat distribution (space & water)	39.4831	0.0000	126.1652 (472)
Overall CO2 factor for heat network			0.4848 (486)
Total CO2 associated with community systems			3949.3546 (473)
Space and water heating			3949.3546 (476)
Pumps, fans and electric keep-hot	228.5109	1.5128	345.6913 (478)
Energy for lighting	207.0900	1.5338	317.6415 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-163.9790	1.4819	-243.0023
PV Unit electricity exported	-56.5640	0.4423	-25.0168
Total			-268.0191 (480)
Total Primary energy kWh/year			4344.6685 (483)
Dwelling Primary energy Rate (DPER)			46.6200 (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	93.2000 (1b)	2.9000 (2b)	270.2800 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	270.2800 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1110 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3610 (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) = 0.2798 (21)

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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	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	0.3567	0.3497	0.3427	0.3077	0.3008	0.2658	0.2658	0.2588	0.2798	0.3008	0.3147	0.3287 (22b)
	0.5636	0.5612	0.5587	0.5474	0.5452	0.5353	0.5353	0.5335	0.5391	0.5452	0.5495	0.5540 (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			1.8900	1.0000	1.8900		(26)
TER Opening Type			21.4200	1.1450	24.5267		(27)
corridor below			0.7000	0.1300	0.0910		(28b)
exposed wall	90.4800	21.4200	69.0600	0.1800	12.4308		(29a)
corridor wall	15.3700	1.8900	13.4800	0.1800	2.4264		(29a)
stair wall	18.8500		18.8500	0.1800	3.3930		(29a)
flat roof	93.2000		93.2000	0.1100	10.2520		(30)
Total net area of external elements Aum(A, m2)			218.6000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	55.0099	(33)
Main dwelling							
pw			31.6100	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							137.4829 (35)

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

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	18.4600	0.0500	0.9230
E3 Sill	17.5600	0.0500	0.8780
E4 Jamb	61.2000	0.0500	3.0600
E7 Party floor between dwellings (in blocks of flats)	28.0000	0.0700	1.9600
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	4.1000	0.0200	0.0820
E24 Eaves (insulation at ceiling level - inverted)	10.7000	0.2400	2.5680
E15 Flat roof with parapet	31.4000	0.5600	17.5840
E16 Corner (normal)	11.6000	0.0900	1.0440
E17 Corner (inverted - internal area greater than external area)	11.6000	-0.0900	-1.0440
E18 Party wall between dwellings	11.6000	0.0600	0.6960
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			27.7510 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 82.7609 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan 50.2707	Feb 50.0503	Mar 49.8344	Apr 48.8199	May 48.6301	Jun 47.7465	Jul 47.7465	Aug 47.5829	Sep 48.0868	Oct 48.6301	Nov 49.0141	Dec 49.4155 (38)
Heat transfer coeff	133.0316	132.8113	132.5953	131.5808	131.3910	130.5074	130.5074	130.3438	130.8478	131.3910	131.7750	132.1764 (39)
Average = Sum(39)m / 12 =												131.5799
HLP	Jan 1.4274	Feb 1.4250	Mar 1.4227	Apr 1.4118	May 1.4098	Jun 1.4003	Jul 1.4003	Aug 1.3985	Sep 1.4039	Oct 1.4098	Nov 1.4139	Dec 1.4182 (40)
HLP (average)												1.4118
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6670 (42)
Hot water usage for mixer showers												
68.9372	67.9012	66.3916	63.5031	61.3715	58.9944	57.6433	59.1415	60.7838	63.3361	66.2866	68.6731 (42a)	
Hot water usage for baths												
29.7685	29.3264	28.7038	27.5559	26.6963	25.7432	25.2284	25.8466	26.5198	27.5396	28.7112	29.6678 (42b)	
Hot water usage for other uses												
41.9431	40.4179	38.8927	37.3675	35.8423	34.3171	34.3171	35.8423	37.3675	38.8927	40.4179	41.9431 (42c)	
Average daily hot water use (litres/day)												129.2880 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
140.6488	137.6455	133.9881	128.4265	123.9102	119.0548	117.1888	120.8304	124.6711	129.7685	135.4157	140.2840 (44)	
Energy content (annual)	222.7533	196.0054	205.9347	175.8095	166.8069	146.3917	141.7297	149.6133	153.7319	176.0946	192.9245	219.6509 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2147.4464
33.4130	29.4008	30.8902	26.3714	25.0210	21.9588	21.2595	22.4420	23.0598	26.4142	28.9387	32.9476 (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 (59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month												
273.7122	242.0328	256.8936	225.1246	217.7658	195.7068	192.6886	200.5722	203.0470	227.0535	242.2395	270.6098 (62)	
WWHRS	-31.5152	-27.8723	-29.1863	-24.1674	-22.5231	-19.2732	-18.0656	-19.2109	-19.9408	-23.5080	-26.6317	-30.9316 (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 (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 (63c)	
FGHRS	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	242.1970	214.1604	227.7073	200.9572	195.2427	176.4336	174.6230	181.3613	183.1062	203.5455	215.6078	239.6782 (64)
12Total per year (kWh/year)												2454.6202 (64)
Electric shower(s)												2455 (64)
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	86.8052	76.6786	81.2130	70.7854	68.2030	61.0040	59.8648	62.4861	63.4446	71.2912	76.4762	85.7737 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan 133.3518	Feb 133.3518	Mar 133.3518	Apr 133.3518	May 133.3518	Jun 133.3518	Jul 133.3518	Aug 133.3518	Sep 133.3518	Oct 133.3518	Nov 133.3518	Dec 133.3518 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
123.4953	136.7270	123.4953	127.6118	123.4953	127.6118	123.4953	123.4953	123.4953	127.6118	123.4953	127.6118	123.4953 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												

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Cooking gains	244.8433	247.3840	240.9815	227.3513	210.1457	193.9748	183.1717	180.6310	187.0335	200.6636	217.8693	234.0402 (68)
Pumps, fans	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352 (69)
Losses e.g. evaporation	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Water heating gains	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815 (71)
Total internal gains	116.6737	114.1051	109.1573	98.3131	91.6707	84.7278	80.4635	83.9868	88.1175	95.8215	106.2169	115.2872 (72)
	551.0178	564.2216	539.6396	519.2818	491.3173	469.3200	450.1361	451.1186	465.7684	485.9860	517.7035	538.8282 (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				3.3200	10.6334	0.6300	0.7000	0.7700			10.7890 (74)	
Northeast				11.6900	11.2829	0.6300	0.7000	0.7700			40.3096 (75)	
Southeast				4.9300	36.7938	0.6300	0.7000	0.7700			55.4362 (77)	
Northwest				1.4800	11.2829	0.6300	0.7000	0.7700			5.1034 (81)	
Solar gains	111.6382	207.4862	330.7832	489.8797	622.7800	651.1346	614.0688	509.7135	384.9611	241.8753	136.8507	93.5226 (83)
Total gains	662.6560	771.7078	870.4228	1009.1615	1114.0973	1120.4546	1064.2049	960.8321	850.7295	727.8613	654.5543	632.3508 (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	26.7552	26.7995	26.8432	27.0502	27.0892	27.2726	27.2726	27.3069	27.2017	27.0892	27.0103	26.9283
alpha	2.7837	2.7866	2.7895	2.8033	2.8059	2.8182	2.8182	2.8205	2.8134	2.8059	2.8007	2.7952
util living area	0.9756	0.9619	0.9369	0.8761	0.7703	0.6225	0.4914	0.5497	0.7593	0.9122	0.9633	0.9785 (86)
MIT	18.3922	18.6874	19.1647	19.8231	20.3950	20.7702	20.9144	20.8809	20.5721	19.8315	19.0043	18.3416 (87)
Th 2	19.7424	19.7442	19.7460	19.7543	19.7558	19.7631	19.7631	19.7645	19.7603	19.7558	19.7527	19.7494 (88)
util rest of house	0.9706	0.9541	0.9235	0.8488	0.7181	0.5346	0.3710	0.4278	0.6848	0.8868	0.9544	0.9740 (89)
MIT 2	16.7444	17.1185	17.7199	18.5350	19.2043	19.6030	19.7246	19.7057	19.4224	18.5660	17.5299	16.6843 (90)
Living area fraction	17.2182	17.5696	18.1354	18.9054	19.5467	19.9387	20.0667	20.0436	19.7530	18.9299	17.9539	17.1608 (91)
MIT	17.2182	17.5696	18.1354	18.9054	19.5467	19.9387	20.0667	20.0436	19.7530	18.9299	17.9539	17.1608 (92)
Temperature adjustment												0.0000
adjusted MIT	17.2182	17.5696	18.1354	18.9054	19.5467	19.9387	20.0667	20.0436	19.7530	18.9299	17.9539	17.1608 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9555	0.9349	0.9003	0.8259	0.7080	0.5482	0.4023	0.4575	0.6842	0.8647	0.9360	0.9602 (94)
Ext temp.	633.1694	721.4904	783.6626	833.4171	788.8329	614.2146	428.1587	439.6142	582.1032	629.3981	612.6434	607.1709 (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	1718.5344	1682.6694	1542.7934	1316.5151	1030.9802	696.7364	452.4330	474.9211	739.6771	1094.4743	1430.2702	1713.1171 (97)
Space heating requirement - total per year (kWh/year)	807.5116	645.9123	564.7933	347.8306	180.1575	0.0000	0.0000	0.0000	0.0000	346.0167	588.6913	822.8239 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98c)
Space heating kWh	807.5116	645.9123	564.7933	347.8306	180.1575	0.0000	0.0000	0.0000	0.0000	346.0167	588.6913	822.8239 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4303.7373
Space heating per m ²												(98c) / (4) = 46.1774 (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	807.5116	645.9123	564.7933	347.8306	180.1575	0.0000	0.0000	0.0000	0.0000	346.0167	588.6913	822.8239 (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)	873.9303	699.0393	611.2482	376.4400	194.9757	0.0000	0.0000	0.0000	0.0000	374.4770	637.1118	890.5021 (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	242.1970	214.1604	227.7073	200.9572	195.2427	176.4336	174.6230	181.3613	183.1062	203.5455	215.6078	239.6782 (64)
Efficiency of water heater (217)m	86.7562	86.5908	86.2460	85.5451	84.2094	80.3000	80.3000	80.3000	80.3000	85.5082	86.4189	86.3000 (216)
Fuel for water heating, kWh/month	279.1697	247.3247	264.0207	234.9137	231.8537	219.7180	217.4633	225.8547	228.0276	238.0421	249.4914	276.1177 (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	25.6599	20.5853	18.5348	13.5794	10.4891	8.5697	9.5685	12.4375	16.1551	21.1964	23.9413	26.3731 (232)

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Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-20.4094	-30.4757	-46.3617	-55.2596	-62.3433	-59.1863	-58.4473	-53.7933	-46.0967	-36.1850	-23.0283	-17.4511	(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	-6.8832	-14.8390	-30.1814	-46.3662	-62.3460	-63.0424	-62.3192	-52.3015	-37.7197	-21.5744	-9.3001	-5.4179	(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												4657.7243	(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												2911.9972	(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)												207.0900	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-921.3287	(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												6941.4829	(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	4657.7243	0.2100	978.1221	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2911.9972	0.2100	611.5194	(264)
Space and water heating			1589.6415	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	207.0900	0.1443	29.8895	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-509.0377	0.1334	-67.9092	
PV Unit electricity exported	-412.2910	0.1252	-51.6323	
Total			-119.5415	(269)
Total CO2, kg/year			1511.9187	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.2200	(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	4657.7243	1.1300	5263.2285	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2911.9972	1.1300	3290.5569	(278)
Space and water heating			8553.7854	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	207.0900	1.5338	317.6415	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-509.0377	1.4930	-759.9845	
PV Unit electricity exported	-412.2910	0.4597	-189.5126	
Total			-949.4971	(283)
Total Primary energy kWh/year			8052.0306	(286)
Target Primary Energy Rate (TPER)			86.4000	(287)