

Full SAP Calculation Printout



Plot Reference	UNIT 11			Issued on Date	08/07/2026
Assessment Reference	001	Plot Type Ref	UNIT 11		
Plot Address	UNIT 11, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS			SAP Version	10.2
SAP Rating	82 B	DER	3.90	TER	15.00
Environmental	97 A	% DER < TER			74.00
CO ₂ Emissions (t/year)	0.19	DFEE	28.08	TFEE	31.29
Compliance Check	See BREL	% DFEE < TFEE			10.26
% DPER < TPER	47.89	DPER	42.05	TPER	80.71
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	51.6000 (1b)	2.7500 (2b)	141.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.6000		141.9000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	141.9000 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	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)

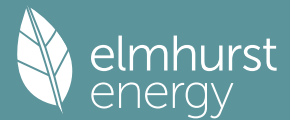
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1482	0.1453	0.1424	0.1279	0.1250	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			11.6500	0.7940	9.2496		(27)
exposed wall	41.2500	11.6500	29.6000	0.1500	4.4400	60.0000	1776.0000 (29a)
corridor wall	18.7000	2.1000	16.6000	0.2500	4.1500	9.0000	149.4000 (29a)
terraces	4.0000		4.0000	0.1000	0.4000	9.0000	36.0000 (30)
Total net area of external elements Aum(A, m ²)			63.9500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.3396		(33)
Main dwelling							
pw			21.4500	0.0000	0.0000	110.0000	2359.5001 (32)
pf			51.6000			40.0000	2063.9999 (32d)
pc			47.6000			30.0000	1428.0000 (32b)
iw			144.1000			9.0000	1296.9001 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9109.8000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		176.5465	(35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	7.4000	0.0500	0.3700
E2 Other lintels (including other steel lintels)	6.4000	0.0500	0.3200
E3 Sill	16.9000	0.0500	0.8450
E4 Jamb	33.6000	0.0700	2.3520
E7 Party floor between dwellings (in blocks of flats)	3.0000	0.0200	0.0600
E9 Balcony between dwellings, wall insulation continuous	3.4000	0.0200	0.0680
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.3000	0.2400	1.2720
E24 Eaves (insulation at ceiling level - inverted)	4.7000	0.1600	0.7520
E14 Flat roof	11.0000	0.0900	0.9900
E16 Corner (normal)	5.5000	-0.0900	-0.4950
E17 Corner (inverted - internal area greater than external area)	2.7500	0.0600	0.1650
E18 Party wall between dwellings	2.7500	0.0600	0.1650
E25 Staggered party wall between dwellings			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.8640 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss			27.2036 (37) (33) + (36) + (36a) =

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	11.3892	11.2531	11.1170	10.4366	10.3005	9.6200	9.6200	9.4839	9.8922	10.3005	10.5727	10.8448 (38)
Heat transfer coeff	38.5928	38.4567	38.3206	37.6402	37.5041	36.8236	36.8236	36.6875	37.0958	37.5041	37.7763	38.0485 (39)
Average = Sum(39)m / 12 =												37.6062
HLP	0.7479	0.7453	0.7426	0.7295	0.7268	0.7136	0.7136	0.7110	0.7189	0.7268	0.7321	0.7374 (40)
HLP (average)												0.7288
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7373 (42)
Hot water usage for mixer showers	53.3478	52.5461	51.3778	49.1426	47.4930	45.6535	44.6079	45.7673	47.0382	49.0133	51.2966	53.1434 (42a)	
Hot water usage for baths	23.0645	22.7220	22.2396	21.3502	20.6842	19.9458	19.5469	20.0259	20.5474	21.3376	22.2453	22.9866 (42b)	
Hot water usage for other uses	32.4214	31.2424	30.0635	28.8845	27.7055	26.5266	26.5266	27.7055	28.8845	30.0635	31.2424	32.4214 (42c)	
Average daily hot water use (litres/day)												100.0433 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	108.8337	106.5105	103.6809	99.3773	95.8828	92.1258	90.6814	93.4987	96.4701	100.4144	104.7844	108.5513 (44)	
Energy content (annual)	172.3660	151.6695	159.3537	136.0426	129.0767	113.2795	109.6712	115.7709	118.9573	136.2614	149.2845	169.9652 (45)	
Distribution loss (46)m = 0.15 x (45)m	25.8549	22.7504	23.9031	20.4064	19.3615	16.9919	16.4507	17.3656	17.8436	20.4392	22.3927	25.4948 (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	227.6428	201.5970	214.6305	189.5363	184.3535	166.7732	164.9480	171.0477	172.4510	191.5382	202.7782	225.2420 (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	227.6428	201.5970	214.6305	189.5363	184.3535	166.7732	164.9480	171.0477	172.4510	191.5382	202.7782	225.2420 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2312.5384 (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	101.5331	90.3721	97.2066	88.0291	87.1394	80.4604	80.6871	82.7153	82.3483	89.5284	92.4320	100.7349 (65)	

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

Metabolic gains (Table 5), Watts												
(66)m	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	76.3447	84.5245	76.3447	78.8895	76.3447	78.8895	76.3447	76.3447	78.8895	76.3447	78.8895	76.3447 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	151.3882	152.9591	149.0004	140.5728	129.9344	119.9359	113.2562	111.6853	115.6440	124.0716	134.7100	144.7085 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863 (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)	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908 (71)
Water heating gains (Table 5)	136.4693	134.4822	130.6540	122.2626	117.1229	111.7505	108.4504	111.1765	114.3726	120.3338	128.3778	135.3963 (72)
Total internal gains	413.2612	421.0249	405.0581	390.7840	372.4611	359.6349	347.1104	348.2655	357.9651	369.8092	391.0364	405.5086 (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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Northeast			1.0800		11.2829		0.5300		0.7000		0.7700		3.1329 (75)
East			1.4400		19.6403		0.5300		0.7000		0.7700		7.2714 (76)
Southeast			9.1300		36.7938		0.5300		0.7000		0.7700		86.3680 (77)

Solar gains	96.7723	167.7182	236.2067	302.4439	346.5941	347.2420	333.4871	300.2591	259.2013	187.2671	116.4576	82.4512 (83)
Total gains	510.0335	588.7431	641.2648	693.2279	719.0552	706.8770	680.5975	648.5246	617.1664	557.0763	507.4940	487.9598 (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	65.5692	65.8012	66.0349	67.2287	67.4726	68.7195	68.7195	68.9744	68.2152	67.4726	66.9865	66.5073	
alpha	5.3713	5.3867	5.4023	5.4819	5.4982	5.5813	5.5813	5.5983	5.5477	5.4982	5.4658	5.4338	
util living area	0.9234	0.8639	0.7777	0.6329	0.4803	0.3329	0.2380	0.2601	0.4129	0.6673	0.8594	0.9338 (86)	
MIT	20.4809	20.6690	20.8294	20.9498	20.9898	20.9990	20.9999	20.9998	20.9966	20.9450	20.7328	20.4494 (87)	
Th 2	20.2987	20.3010	20.3033	20.3149	20.3172	20.3288	20.3288	20.3311	20.3242	20.3172	20.3126	20.3079 (88)	
util rest of house	0.9115	0.8459	0.7528	0.6019	0.4464	0.2982	0.2017	0.2223	0.3731	0.6308	0.8382	0.9232 (89)	
MIT 2	19.7131	19.9390	20.1257	20.2670	20.3087	20.3281	20.3287	20.3310	20.3218	20.2668	20.0284	19.6829 (90)	
Living area fraction									fLA = Living area / (4) =				0.3333 (91)
MIT	19.9691	20.1824	20.3603	20.4946	20.5357	20.5517	20.5525	20.5540	20.5467	20.4929	20.2632	19.9384 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.9691	20.1824	20.3603	20.4946	20.5357	20.5517	20.5525	20.5540	20.5467	20.4929	20.2632	19.9384 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9052	0.8427	0.7549	0.6101	0.4573	0.3097	0.2138	0.2349	0.3863	0.6404	0.8366	0.9169 (94)
Useful gains	461.7055	496.1246	484.0968	422.9588	328.8346	218.9454	145.5230	152.3632	238.3827	356.7434	424.5675	447.3949 (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	604.7128	587.7102	531.1338	436.4213	331.3759	219.1648	145.5438	152.3984	239.1455	371.0238	497.2558	598.8210 (97)
Space heating kWh	106.3975	61.5455	34.9955	9.6930	1.8907	0.0000	0.0000	0.0000	0.0000	10.6246	52.3356	112.6611 (98a)
Space heating requirement - total per year (kWh/year)												390.1435
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	106.3975	61.5455	34.9955	9.6930	1.8907	0.0000	0.0000	0.0000	0.0000	10.6246	52.3356	112.6611 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												390.1435
Space heating per m2										(98c) / (4) =		7.5609 (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	106.3975	61.5455	34.9955	9.6930	1.8907	0.0000	0.0000	0.0000	0.0000	10.6246	52.3356	112.6611 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	159.5962	92.3182	52.4933	14.5395	2.8361	0.0000	0.0000	0.0000	0.0000	15.9369	78.5034	168.9916
Space heating requirement	159.5962	92.3182	52.4933	14.5395	2.8361	0.0000	0.0000	0.0000	0.0000	15.9369	78.5034	168.9916 (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	227.6428	201.5970	214.6305	189.5363	184.3535	166.7732	164.9480	171.0477	172.4510	191.5382	202.7782	225.2420 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	341.4642	302.3955	321.9458	284.3044	276.5303	250.1597	247.4221	256.5716	258.6765	287.3073	304.1673	337.8630
Water heating fuel	341.4642	302.3955	321.9458	284.3044	276.5303	250.1597	247.4221	256.5716	258.6765	287.3073	304.1673	337.8630 (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	10.1893	9.2032	10.1893	9.8606	10.1893	9.8606	10.1893	10.1893	9.8606	10.1893	9.8606	10.1893 (331)
Lighting	15.8629	12.7258	11.4582	8.3948	6.4844	5.2978	5.9152	7.6889	9.9871	13.1036	14.8005	16.3038 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-2.2265	-3.9806	-7.4054	-10.5198	-13.2484	-13.1047	-12.8263	-10.9865	-8.1962	-5.2152	-2.6813	-1.8152 (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	-0.2495	-0.6642	-1.7369	-3.3042	-5.0361	-5.3273	-5.1725	-3.9649	-2.4022	-1.0701	-0.3599	-0.1847 (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												585.2152 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3468.8076 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												5.8522 (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)												119.9708 (330a)

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Total electricity for the above, kWh/year	119.9708 (331)
Electricity for lighting (calculated in Appendix L)	128.0228 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-121.6788 (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	4180.3376 (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	1228.4918	0.1586	28.1325 (367)
Electrical energy for heat distribution (space & water)	5.8522	0.0000	5.8115 (372)
Overall CO2 factor for heat network			0.0449 (386)
Total CO2 associated with community systems			181.9165 (373)
Space and water heating			181.9165 (376)
Pumps, fans and electric keep-hot	119.9708	0.1387	16.6414 (378)
Energy for lighting	128.0228	0.1443	18.4777 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-92.2062	0.1304	-12.0227
PV Unit electricity exported	-29.4726	0.1205	-3.5527
Total			-15.5754 (380)
Total CO2, kg/year			201.4602 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.9000 (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	1228.4918	1.5872	281.4691 (467)
Electrical energy for heat distribution (space & water)	5.8522	0.0000	62.0323 (472)
Overall CO2 factor for heat network			0.4790 (486)
Total CO2 associated with community systems			1941.7975 (473)
Space and water heating			1941.7975 (476)
Pumps, fans and electric keep-hot	119.9708	1.5128	181.4918 (478)
Energy for lighting	128.0228	1.5338	196.3657 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-92.2062	1.4817	-136.6174
PV Unit electricity exported	-29.4726	0.4422	-13.0326
Total			-149.6499 (480)
Total Primary energy kWh/year			2170.0050 (483)
Dwelling Primary energy Rate (DPER)			42.0500 (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	51.6000 (1b)	x 2.7500 (2b)	= 141.9000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	141.9000 (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) = 0.1409 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3909 (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) = 0.3030 (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	0.3863	0.3787	0.3712	0.3333	0.3257	0.2878	0.2878	0.2803	0.3030	0.3257	0.3409	0.3560 (22b)
	0.5746	0.5717	0.5689	0.5555	0.5530	0.5414	0.5414	0.5393	0.5459	0.5530	0.5581	0.5634 (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			10.8000	1.1450	12.3664		(27)
exposed wall	41.2500	10.8000	30.4500	0.1800	5.4810		(29a)
corridor wall	18.7000	2.1000	16.6000	0.1800	2.9880		(29a)
terraces	4.0000		4.0000	0.1100	0.4400		(30)
Total net area of external elements Aum(A, m2)			63.9500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.3754	(33)
Main dwelling							
pw			21.4500	0.0000	0.0000		(32)

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

176.5465 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	7.4000	0.0500	0.3700
E3 Sill	6.4000	0.0500	0.3200
E4 Jamb	16.9000	0.0500	0.8450
E7 Party floor between dwellings (in blocks of flats)	33.6000	0.0700	2.3520
E9 Balcony between dwellings, wall insulation continuous	3.0000	0.0200	0.0600
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	3.4000	0.0200	0.0680
E24 Eaves (insulation at ceiling level - inverted)	5.3000	0.2400	1.2720
E14 Flat roof	4.7000	0.0800	0.3760
E16 Corner (normal)	11.0000	0.0900	0.9900
E17 Corner (inverted - internal area greater than external area)	5.5000	-0.0900	-0.4950
E18 Party wall between dwellings	2.7500	0.0600	0.1650
E25 Staggered party wall between dwellings	2.7500	0.0600	0.1650

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

6.4880 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 29.8634 (37)

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

(38)m	Jan 26.9075	Feb 26.7718	Mar 26.6388	Apr 26.0142	May 25.8973	Jun 25.3533	Jul 25.3533	Aug 25.2525	Sep 25.5628	Oct 25.8973	Nov 26.1337	Dec 26.3809 (38)
Heat transfer coeff	56.7709	56.6352	56.5022	55.8776	55.7607	55.2167	55.2167	55.1159	55.4262	55.7607	55.9971	56.2443 (39)
Average = Sum(39)m / 12 =												55.8770

HLP	Jan 1.1002	Feb 1.0976	Mar 1.0950	Apr 1.0829	May 1.0806	Jun 1.0701	Jul 1.0701	Aug 1.0681	Sep 1.0742	Oct 1.0806	Nov 1.0852	Dec 1.0900 (40)
HLP (average)												1.0829
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7373 (42)
Hot water usage for mixer showers	53.3478	52.5461	51.3778	49.1426	47.4930	45.6535	44.6079	45.7673	47.0382	49.0133	51.2966	53.1434 (42a)
Hot water usage for baths	23.0645	22.7220	22.2396	21.3502	20.6842	19.9458	19.5469	20.0259	20.5474	21.3376	22.2453	22.9866 (42b)
Hot water usage for other uses	32.4214	31.2424	30.0635	28.8845	27.7055	26.5266	26.5266	27.7055	28.8845	30.0635	31.2424	32.4214 (42c)
Average daily hot water use (litres/day)												100.0433 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	108.8337	106.5105	103.6809	99.3773	95.8828	92.1258	90.6814	93.4987	96.4701	100.4144	104.7844	108.5513 (44)
Distribution loss (46)m = 0.15 x (45)m	172.3660	151.6695	159.3537	136.0426	129.0767	113.2795	109.6712	115.7709	118.9573	136.2614	149.2845	169.9652 (45)
Water storage loss (or HIU loss):	25.8549	22.7504	23.9031	20.4064	19.3615	16.9919	16.4507	17.3656	17.8436	20.4392	22.3927	25.4948 (46)
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	49.0080	48.8608	45.4319	46.2102	47.6459	47.5743	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	223.3249	197.6969	210.3126	185.0506	177.9376	158.7114	155.8815	163.4169	166.5317	187.2203	198.5996	220.9241 (62)
WWHRS	-24.3884	-21.5693	-22.5861	-18.7022	-17.4298	-14.9148	-13.9802	-14.8666	-15.4314	-18.1919	-20.6092	-23.9368 (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	198.9365	176.1276	187.7265	166.3484	160.5078	143.7966	141.9012	148.5503	151.1002	169.0284	177.9903	196.9873 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2019.0012 (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)
Heat gains from water heating, kWh/month	70.0514	61.9370	65.7248	57.4862	55.1332	49.0234	48.0182	50.4053	51.4469	58.0466	61.9659	69.2531 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan 86.8635	Feb 86.8635	Mar 86.8635	Apr 86.8635	May 86.8635	Jun 86.8635	Jul 86.8635	Aug 86.8635	Sep 86.8635	Oct 86.8635	Nov 86.8635	Dec 86.8635 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
76.5856	84.7912	76.5856	79.1384	76.5856	79.1384	76.5856	76.5856	76.5856	79.1384	76.5856	79.1384	76.5856 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												

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Cooking gains	151.3882	152.9591	149.0004	140.5728	129.9344	119.9359	113.2562	111.6853	115.6440	124.0716	134.7100	144.7085 (68)
Pumps, fans	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863 (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 (Table 5)	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908 (71)
Total internal gains	94.1551	92.1681	88.3398	79.8419	74.1038	68.0881	64.5406	67.7491	71.4540	78.0197	86.0637	93.0822 (72)
	374.1879	381.9775	365.9849	351.6122	332.6829	316.2214	303.4415	305.0790	315.2955	330.7359	351.9712	366.4353 (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
Northeast				1.0000	11.2829	0.6300	0.7000				0.7700			3.4482 (75)
East				1.3300	19.6403	0.6300	0.7000				0.7700			7.9831 (76)
Southeast				8.4700	36.7938	0.6300	0.7000				0.7700			95.2424 (77)
Solar gains	106.6737	184.8686	260.3385	333.3137	381.9490	382.6552	367.5006	330.8973	285.6719	206.4102	128.3711			90.8885 (83)
Total gains	480.8616	566.8460	626.3234	684.9259	714.6319	698.8766	670.9421	635.9763	600.9674	537.1461	480.3423			457.3239 (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	44.5739	44.6807	44.7858	45.2865	45.3814	45.8286	45.8286	45.9123	45.6553	45.3814	45.1898	44.9912
alpha	3.9716	3.9787	3.9857	4.0191	4.0254	4.0552	4.0552	4.0608	4.0437	4.0254	4.0127	3.9994
util living area	0.9656	0.9370	0.8906	0.7955	0.6572	0.4894	0.3583	0.3929	0.5949	0.8305	0.9394	0.9709 (86)
MIT	19.6753	19.9569	20.2830	20.6392	20.8655	20.9687	20.9930	20.9899	20.9314	20.6318	20.1010	19.6250 (87)
Th 2	20.0007	20.0028	20.0049	20.0148	20.0167	20.0253	20.0253	20.0269	20.0220	20.0167	20.0129	20.0090 (88)
util rest of house	0.9584	0.9247	0.8698	0.7598	0.6038	0.4206	0.2807	0.3124	0.5236	0.7918	0.9254	0.9647 (89)
MIT 2	18.4880	18.8383	19.2369	19.6596	19.9029	20.0055	20.0225	20.0225	19.9741	19.6645	19.0305	18.4311 (90)
Living area fraction	18.8837	19.2111	19.5856	19.9861	20.2238	20.3266	20.3460	20.3450	20.2932	19.9869	19.3873	18.8290 (92)
MIT	18.8837	19.2111	19.5856	19.9861	20.2238	20.3266	20.3460	20.3450	20.2932	19.9869	19.3873	18.8290 (93)
Temperature adjustment												0.0000
adjusted MIT	18.8837	19.2111	19.5856	19.9861	20.2238	20.3266	20.3460	20.3450	20.2932	19.9869	19.3873	18.8290 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	455.8915	517.4365	538.4927	519.6233	439.9104	309.1303	205.6276	215.5905	327.0108	424.6206	439.2768	436.8437 (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	827.9324	810.5144	739.3667	619.4654	475.2923	316.2029	206.8418	217.4300	343.2642	523.4209	688.0538	822.8008 (97)
Space heating kWh	276.7984	196.9484	149.4502	71.8863	26.3241	0.0000	0.0000	0.0000	0.0000	73.5074	179.1195	287.1521 (98a)
Space heating requirement - total per year (kWh/year)												1261.1864
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	276.7984	196.9484	149.4502	71.8863	26.3241	0.0000	0.0000	0.0000	0.0000	73.5074	179.1195	287.1521 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1261.1864
Space heating per m ²										(98c) / (4) =		24.4416 (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)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
276.7984	196.9484	149.4502	71.8863	26.3241	0.0000	0.0000	0.0000	0.0000	0.0000	73.5074	179.1195	287.1521 (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)	299.5653	213.1476	161.7427	77.7991	28.4893	0.0000	0.0000	0.0000	0.0000	79.5535	193.8523	310.7707 (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	198.9365	176.1276	187.7265	166.3484	160.5078	143.7966	141.9012	148.5503	151.1002	169.0284	177.9903	196.9873 (64)
Water heating requirement	85.0893	84.6215	83.8974	82.7145	81.4096	80.3000	80.3000	80.3000	80.3000	82.7254	84.3950	85.1878 (217)
Efficiency of water heater (217)m	233.7974	208.1359	223.7573	201.1116	197.1607	179.0742	176.7139	184.9941	188.1697	204.3246	210.9015	231.2388 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement (221)m	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)
Pumps and Fa	15.9130	12.7660	11.4943	8.4213	6.5048	5.3145	5.9339	7.7131	10.0186	13.1449	14.8472	16.3552 (232)
Lighting	Electricity generated by PVs (Appendix M) (negative quantity)											

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(233a)m	-9.8504	-14.9527	-23.1257	-28.0490	-32.0951	-30.6566	-30.2971	-27.6773	-23.3969	-17.9762	-11.2048	-8.3975	(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	-2.7417	-5.9543	-12.1892	-18.8385	-25.4332	-25.7364	-25.4213	-21.2720	-15.2738	-8.6724	-3.7107	-2.1536	(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												1364.9204	(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												2439.3797	(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)												128.4268	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-425.0765	(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												3593.6503	(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	1364.9204	0.2100	286.6333 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2439.3797	0.2100	512.2697 (264)
Space and water heating			798.9030 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	128.4268	0.1443	18.5360 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-257.6794	0.1331	-34.2854
PV Unit electricity exported	-167.3972	0.1251	-20.9384
Total			-55.2237 (269)
Total CO2, kg/year			774.1445 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.0000 (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	1364.9204	1.1300	1542.3600 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2439.3797	1.1300	2756.4990 (278)
Space and water heating			4298.8590 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	128.4268	1.5338	196.9853 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-257.6794	1.4917	-384.3697
PV Unit electricity exported	-167.3972	0.4591	-76.8518
Total			-461.2214 (283)
Total Primary energy kWh/year			4164.7237 (286)
Target Primary Energy Rate (TPER)			80.7100 (287)