

Full SAP Calculation Printout



Property Reference	UNIT 37				Issued on Date	28/06/2023
Assessment Reference	UNIT 37			Prop Type Ref		
Property	Alexander House, UNIT 37, 205-207 King's Road, RG1 4LS					
SAP Rating	82 B	DER	4.67	TER	12.48	
Environmental	96 A	% DER < TER			62.58	
CO ₂ Emissions (t/year)	0.3	DFEE	34.94	TFEE	38.10	
Compliance Check	See BREL	% DFEE < TFEE			8.29	
% DPER < TPER	24.63	DPER	49.21	TPER	65.29	
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)
Ground floor	68.6000 (1b)	x 2.5000 (2b)	= 171.5000 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.6000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 171.5000 (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)

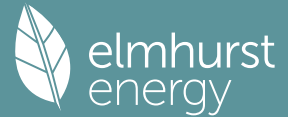
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour
Pressure test	0.0000 / (5) = 0.0000 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	4.0000 (17)
Number of sides sheltered	0.2000 (18)
	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1700 (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	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998 (22b)
Mechanical extract ventilation - centralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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
1 (Uw = 1.30)			6.5000	1.2357	8.0323		(27)
2 (Uw = 1.30)			3.3800	1.2357	4.1768		(27)
3 (Uw = 1.30)			6.5000	1.2357	8.0323		(27)
1			2.1000	1.0000	2.1000		(26)

Full SAP Calculation Printout



top floor exposed new	42.2500	16.3800	25.8700	0.1800	4.6566	18.0000	465.6600 (29a)
corridor new	18.2500	2.1000	16.1500	0.2400	3.8760	60.0000	969.0000 (29a)
flat roof new	31.6000		31.6000	0.1300	4.1080	9.0000	284.4000 (30)
roof terrace new	37.0000		37.0000	0.1300	4.8100	9.0000	333.0000 (30)
Total net area of external elements Aum(A, m2)			129.1000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	39.7920			(33)
pw			27.2500	0.0000	0.0000	20.0000	545.0000 (32)
pf			66.4000			30.0000	1992.0000 (32d)
iw			87.5000			9.0000	787.5000 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5376.5600 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 78.3755 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	7.5500	0.0500	0.3775
E2 Other lintels (including other steel lintels)	6.5500	0.0500	0.3275
E3 Sill	19.2000	0.0500	0.9600
E4 Jamb	1.2000	0.3200	0.3840
E20 Exposed floor (normal)	5.8000	0.0700	0.4060
E7 Party floor between dwellings (in blocks of flats)	17.7000	0.0800	1.4160
E14 Flat roof	17.7000	0.1500	2.6550
E15 Flat roof with parapet	5.0000	0.0900	0.4500
E16 Corner (normal)	5.0000	0.0600	0.3000
E18 Party wall between dwellings	5.7000	0.2400	1.3680
E24 Eaves (insulation at ceiling level - inverted)			8.6440 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.0000 (36a) =
Point Thermal bridges			(33) + (36) + (36a) = 48.4360 (37)
Total fabric heat loss			

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.2975	28.2975	28.2975	28.2975	28.2975	28.2975	28.2975	28.2975	28.2975	28.2975	28.2975	28.2975	(38)
Heat transfer coeff	76.7335	76.7335	76.7335	76.7335	76.7335	76.7335	76.7335	76.7335	76.7335	76.7335	76.7335	76.7335	(39)
Average = Sum(39)m / 12 =													76.7335

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1186	1.1186	1.1186	1.1186	1.1186	1.1186	1.1186	1.1186	1.1186	1.1186	1.1186	1.1186	(40)
HLP (average)													1.1186
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2117 (42)
Hot water usage for mixer showers	61.3019	60.3807	59.0382	56.4697	54.5742	52.4604	51.2589	52.5911	54.0516	56.3212	58.9449	61.0671	(42a)
Hot water usage for baths	26.4851	26.0917	25.5378	24.5165	23.7518	22.9038	22.4458	22.9958	23.5947	24.5020	25.5444	26.3955	(42b)
Hot water usage for other uses	37.2796	35.9240	34.5684	33.2128	31.8571	30.5015	30.5015	31.8571	33.2128	34.5684	35.9240	37.2796	(42c)
Average daily hot water use (litres/day)													114.9647 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	125.0666	122.3964	119.1444	114.1990	110.1831	105.8657	104.2061	107.4441	110.8590	115.3916	120.4133	124.7422	(44)
Energy conte	198.0749	174.2908	183.1206	156.3327	148.3277	130.1742	126.0283	133.0382	136.7002	156.5853	171.5508	195.3161	(45)
Energy content (annual)										Total = Sum(45)m =			1909.5399
Distribution loss (46)m = 0.15 x (45)m	29.7112	26.1436	27.4681	23.4499	22.2492	19.5261	18.9042	19.9557	20.5050	23.4878	25.7326	29.2974	(46)

Water storage loss:

Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.1500 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6210 (55)
Total storage loss	19.2510	17.3880	19.2510	18.6300	19.2510	18.6300	19.2510	19.2510	18.6300	19.2510	18.6300	19.2510	(56)

If cylinder contains dedicated solar storage

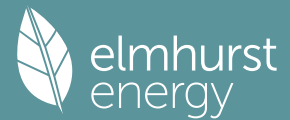
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	240.5883	212.6900	225.6340	197.4747	190.8411	171.3162	168.5417	175.5516	177.8422	199.0987	212.6928	237.8295	(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	240.5883	212.6900	225.6340	197.4747	190.8411	171.3162	168.5417	175.5516	177.8422	199.0987	212.6928	237.8295	(64)
Total per year (kWh/year) = Sum(64)m =													2410.1009 (64)
12Total per year (kWh/year)													2410 (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	99.8706	88.6711	94.8983	84.8942	83.3297	76.1965	75.9151	78.2459	78.3664	86.0753	89.9542	98.9533	(65)

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

Metabolic gains (Table 5), Watts

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	97.8546	108.3390	97.8546	101.1164	97.8546	101.1164	97.8546	97.8546	101.1164	97.8546	101.1164	97.8546	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.0077	196.0209	190.9477	180.1475	166.5142	153.7008	145.1407	143.1275	148.2007	159.0009	172.6342	185.4476	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	(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)	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	(71)
Water heating gains (Table 5)	134.2347	131.9510	127.5515	117.9086	112.0022	105.8285	102.0365	105.1693	108.8423	115.6927	124.9364	133.0018	(72)
Total internal gains	482.2720	492.4859	472.5288	455.3475	432.5460	416.8207	401.2067	402.3263	414.3343	428.7231	454.8620	472.4789	(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			
South				6.5000	46.7521	0.6300	0.8000	0.7700	106.1397 (78)			
West				3.3800	19.6403	0.6300	0.8000	0.7700	23.1861 (80)			
South				6.5000	46.7521	0.6300	0.8000	0.7700	106.1397 (78)			
Solar gains	235.4655	393.0160	517.5523	609.4636	655.0867	638.6178	620.5489	588.0459	549.4903	428.8027	280.5339	202.4961 (83)
Total gains	717.7375	885.5018	990.0811	1064.8111	1087.6327	1055.4385	1021.7556	990.3722	963.8246	857.5258	735.3959	674.9750 (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	19.4633	19.4633	19.4633	19.4633	19.4633	19.4633	19.4633	19.4633	19.4633	19.4633	19.4633	19.4633
alpha	2.2976	2.2976	2.2976	2.2976	2.2976	2.2976	2.2976	2.2976	2.2976	2.2976	2.2976	2.2976
util living area	0.8637	0.8023	0.7363	0.6478	0.5420	0.4187	0.3126	0.3342	0.4768	0.6713	0.8130	0.8778 (86)
Living	18.7108	19.1833	19.6723	20.1739	20.5705	20.8297	20.9369	20.9240	20.7579	20.2306	19.3779	18.5893
Non living	17.3491	17.9267	18.5211	19.1189	19.5740	19.8500	19.9483	19.9385	19.7823	19.2020	18.1808	17.1994
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.8289	19.1833	19.6723	20.1739	20.5705	20.8297	20.9369	20.9240	20.7579	20.2306	19.3779	18.9265 (87)
Th 2	19.9857	19.9857	19.9857	19.9857	19.9857	19.9857	19.9857	19.9857	19.9857	19.9857	19.9857	19.9857 (88)
util rest of house	0.8496	0.7835	0.7120	0.6155	0.4993	0.3626	0.2460	0.2671	0.4210	0.6340	0.7918	0.8648 (89)
MIT 2	18.9344	17.9267	18.5211	19.1189	19.5740	19.8500	19.9483	19.9385	19.7823	19.2020	18.1808	17.7015 (90)
Living area fraction	19.4325	18.6264	19.1622	19.7064	20.1289	20.3955	20.4988	20.4873	20.3256	19.7748	18.8474	18.3836 (92)
MIT	19.4325	18.6264	19.1622	19.7064	20.1289	20.3955	20.4988	20.4873	20.3256	19.7748	18.8474	18.3836 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4325	18.6264	19.1622	19.7064	20.1289	20.3955	20.4988	20.4873	20.3256	19.7748	18.8474	18.3836 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8410	0.7546	0.6902	0.6060	0.5056	0.3858	0.2803	0.3009	0.4403	0.6256	0.7640	0.8402	(94)
Useful gains	603.6294	668.1961	683.3131	645.3036	549.9032	407.2176	286.3609	298.0143	424.4115	536.4991	561.8575	567.1187	(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													
	1161.1734	1053.2760	971.6120	829.2132	646.7806	444.7127	299.1697	313.6314	477.7102	704.0137	901.4222	1088.3616	(97)
Space heating kWh					72.0768	0.0000	0.0000	0.0000	0.0000	124.6308	244.4866	387.8047	(98a)
Space heating requirement - total per year (kWh/year)												1849.4946	
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													
	414.8127	258.7737	214.4944	132.4149	72.0768	0.0000	0.0000	0.0000	0.0000	124.6308	244.4866	387.8047	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1849.4946	
Space heating per m2											(98c) / (4) =	26.9606	(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 %)	242.3935 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

Full SAP Calculation Printout



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Space heating requirement	414.8127	258.7737	214.4944	132.4149	72.0768	0.0000	0.0000	0.0000	0.0000	124.6308	244.4866	387.8047	(98)
Space heating efficiency (main heating system 1)	242.3935	242.3935	242.3935	242.3935	242.3935	0.0000	0.0000	0.0000	0.0000	242.3935	242.3935	242.3935	(210)
Space heating fuel (main heating system)	171.1319	106.7577	88.4902	54.6281	29.7354	0.0000	0.0000	0.0000	0.0000	51.4167	100.8635	159.9897	(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	240.5883	212.6900	225.6340	197.4747	190.8411	171.3162	168.5417	175.5516	177.8422	199.0987	212.6928	237.8295	(64)
Efficiency of water heater	190.7563	190.7563	190.7563	190.7563	190.7563	190.7563	190.7563	190.7563	190.7563	190.7563	190.7563	190.7563	(216)
Fuel for water heating, kWh/month	126.1234	111.4983	118.2839	103.5220	100.0444	89.8089	88.3544	92.0292	93.2301	104.3733	111.4997	124.6771	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	20.3323	16.3113	14.6865	10.7600	8.3113	6.7904	7.5819	9.8552	12.8009	16.7955	18.9705	20.8974	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												763.0132	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												190.7563	
Water heating fuel used												1263.4448	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												164.0930	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2190.5509	(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	763.0132	0.1554	118.5530 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1263.4448	0.1410	178.1241 (264)
Space and water heating			296.6771 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	164.0930	0.1443	23.6837 (268)
Total CO2, kg/year			320.3608 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6700 (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	763.0132	1.5752	1201.8680 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1263.4448	1.5213	1922.0885 (278)
Space and water heating			3123.9565 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	164.0930	1.5338	251.6913 (282)
Total Primary energy kWh/year			3375.6477 (286)
Dwelling Primary energy Rate (DPER)			49.2100 (287)

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SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	68.6000 (1b)	2.5000 (2b)	171.5000 (1b) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	171.5000 (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	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) =	0.1166 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000 (17)	
Infiltration rate	0.3666 (18)	
Number of sides sheltered	2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3116 (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	0.3973	0.3895	0.3817	0.3428	0.3350	0.2960	0.2960	0.2883	0.3116	0.3350	0.3506	0.3662 (22b)
Effective ac	0.5789	0.5759	0.5729	0.5588	0.5561	0.5438	0.5438	0.5415	0.5486	0.5561	0.5615	0.5670 (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
TER Opaque door			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.20)			15.0500	1.1450	17.2328		(27)
top floor exposed new	42.2500	15.0500	27.2000	0.1800	4.8960		(29a)
corridor new	18.2500	2.1000	16.1500	0.1800	2.9070		(29a)
flat roof new	31.6000		31.6000	0.1100	3.4760		(30)
roof terrace new	37.0000		37.0000	0.1100	4.0700		(30)
Total net area of external elements Aum(A, m ²)			129.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.6818		(33)
pw			27.2500	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 78.3755 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	7.5500	0.0500	0.3775
E3 Sill	6.5500	0.0500	0.3275
E4 Jamb	19.2000	0.0500	0.9600
E20 Exposed floor (normal)	1.2000	0.3200	0.3840
E7 Party floor between dwellings (in blocks of flats)	5.8000	0.0700	0.4060
E14 Flat roof	17.7000	0.0800	1.4160
E15 Flat roof with parapet	17.7000	0.5600	9.9120
E16 Corner (normal)	5.0000	0.0900	0.4500
E18 Party wall between dwellings	5.0000	0.0600	0.3000
E24 Eaves (insulation at ceiling level - inverted)	5.7000	0.2400	1.3680
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			15.9010 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 50.5828 (37)

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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	32.7647	32.5912	32.4212	31.6226	31.4731	30.7776	30.7776	30.6487	31.0455	31.4731	31.7754	32.0914	(38)
Heat transfer coeff	83.3475	83.1740	83.0040	82.2054	82.0560	81.3604	81.3604	81.2316	81.6283	82.0560	82.3582	82.6743	(39)
Average = Sum(39)m / 12 =												82.2047	
HLP	1.2150	1.2124	1.2100	1.1983	1.1962	1.1860	1.1860	1.1841	1.1899	1.1962	1.2006	1.2052	(40)
HLP (average)												1.1983	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2117 (42)
Hot water usage for mixer showers	61.3019	60.3807	59.0382	56.4697	54.5742	52.4604	51.2589	52.5911	54.0516	56.3212	58.9449	61.0671	(42a)
Hot water usage for baths	26.4851	26.0917	25.5378	24.5165	23.7518	22.9038	22.4458	22.9958	23.5947	24.5020	25.5444	26.3955	(42b)
Hot water usage for other uses	37.2796	35.9240	34.5684	33.2128	31.8571	30.5015	30.5015	31.8571	33.2128	34.5684	35.9240	37.2796	(42c)
Average daily hot water use (litres/day)												114.9647	(43)
Daily hot water use	125.0666	122.3964	119.1444	114.1990	110.1831	105.8657	104.2061	107.4441	110.8590	115.3916	120.4133	124.7422	(44)
Energy conte	198.0749	174.2908	183.1206	156.3327	148.3277	130.1742	126.0283	133.0382	136.7002	156.5853	171.5508	195.3161	(45)
Energy content (annual)										Total = Sum(45)m =		1909.5399	
Distribution loss (46)m = 0.15 x (45)m	29.7112	26.1436	27.4681	23.4499	22.2492	19.5261	18.9042	19.9557	20.5050	23.4878	25.7326	29.2974	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(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	244.6698	216.3766	229.7155	201.4246	194.9226	175.2661	172.6232	179.6331	181.7921	203.1802	216.6426	241.9110	(62)
WWHRS	-28.0247	-24.7853	-25.9537	-21.4907	-20.0285	-17.1386	-16.0647	-17.0832	-17.7322	-20.9043	-23.6821	-27.5057	(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	216.6452	191.5913	203.7618	179.9339	174.8940	158.1275	156.5585	162.5499	164.0599	182.2759	192.9605	214.4053	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2197.7637	(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	103.1358	91.6203	98.1635	88.0541	86.5949	79.3564	79.1803	81.5111	81.5263	89.3405	93.1141	102.2185	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	110.5831	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	97.8973	108.3863	97.8973	101.1606	97.8973	101.1606	97.8973	97.8973	101.1606	97.8973	101.1606	97.8973	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.0077	196.0209	190.9477	180.1475	166.5142	153.7008	145.1407	143.1275	148.2007	159.0009	172.6342	185.4476	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	34.0583	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	-88.4665	(71)
Water heating gains (Table 5)	138.6234	136.3397	131.9402	122.2974	116.3910	110.2172	106.4252	109.5580	113.2310	120.0814	129.3251	137.3905	(72)
Total internal gains	489.7034	499.9219	479.9602	462.7804	439.9774	421.2535	405.6381	406.7577	418.7672	436.1545	462.2948	479.9104	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W
South	11.9400	46.7521	0.6300	0.7000	0.7700	170.5992 (78)

elmhurst
energy

SAP 10 Online 2.7.11 Page 7 of 8

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(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	-17.9839	-37.8560	-75.2789	-113.1133	-149.6034	-150.3141	-148.5346	-125.7398	-92.1390	-54.1434	-24.0147	-14.2186	(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													2309.5649 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													79.8000
Water heating fuel used													2643.5027 (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)													164.1646 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-1695.3634 (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													3507.8688 (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	2309.5649	0.2100	485.0086	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2643.5027	0.2100	555.1356	(264)
Space and water heating			1040.1442	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	164.1646	0.1443	23.6940	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-692.4236	0.1345	-93.1568	
PV Unit electricity exported	-1002.9398	0.1259	-126.2554	
Total			-219.4122	(269)
Total CO2, kg/year			856.3553	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.4800	(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	2309.5649	1.1300	2609.8083	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2643.5027	1.1300	2987.1581	(278)
Space and water heating			5596.9664	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	164.1646	1.5338	251.8011	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-692.4236	1.4972	-1036.7133	
PV Unit electricity exported	-1002.9398	0.4621	-463.4439	
Total			-1500.1572	(283)
Total Primary energy kWh/year			4478.7112	(286)
Target Primary Energy Rate (TPER)			65.2900	(287)