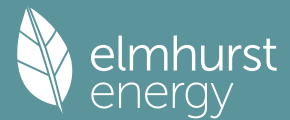


Full SAP Calculation Printout



Property Reference	UNIT 38				Issued on Date	28/06/2023
Assessment Reference	UNIT 38	Prop Type Ref				
Property	Alexander House, UNIT 38, 205-207 King's Road, RG1 4LS					
SAP Rating	82 B	DER	6.01	TER	16.34	
Environmental	96 A	% DER < TER				63.22
CO ₂ Emissions (t/year)	0.22	DFEE	37.17	TFEE	39.54	
Compliance Check	See BREL	% DFEE < TFEE				5.99
% DPER < TPER	26.44	DPER	63.53	TPER	86.36	
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	39.3000 (1b)	x 2.5000 (2b)	= 98.2500 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	39.3000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 98.2500 (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)
	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1550 (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	0.1976	0.1938	0.1899	0.1705	0.1666	0.1473	0.1473	0.1434	0.1550	0.1666	0.1744	0.1821 (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)			3.3800	1.2357	4.1768		(27)
2 (Uw = 1.30)			3.3800	1.2357	4.1768		(27)
1			2.1000	1.0000	2.1000		(26)
top floor exposed new	20.2500	6.7600	13.4900	0.1800	2.4282	18.0000	242.8200 (29a)

Full SAP Calculation Printout



corridor new	14.5000	2.1000	12.4000	0.2400	2.9760	60.0000	744.0000 (29a)
flat roof new	16.9000		16.9000	0.1300	2.1970	9.0000	152.1000 (30)
roof terrace new	22.4000		22.4000	0.1300	2.9120	9.0000	201.6000 (30)
Total net area of external elements Aum(A, m2)			74.0500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	20.9668			(33)
pw			27.2500	0.0000	0.0000	20.0000	545.0000 (32)
pf			39.3000			30.0000	1179.0000 (32d)
iw			56.5000			9.0000	508.5000 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 3573.0200 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 90.9165 (35)

List of Thermal Bridges							
K1 Element			Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)			3.7000	0.0500		0.1850	
E3 Sill			2.7000	0.0500		0.1350	
E4 Jamb			14.2000	0.0500		0.7100	
E7 Party floor between dwellings (in blocks of flats)			5.8000	0.0700		0.4060	
E14 Flat roof			16.6000	0.0800		1.3280	
E15 Flat roof with parapet			8.1000	0.1500		1.2150	
E16 Corner (normal)			2.5000	0.0900		0.2250	
E18 Party wall between dwellings			7.5000	0.0600		0.4500	
E24 Eaves (insulation at ceiling level - inverted)			2.7000	0.2400		0.6480	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						5.3020 (36)	
Point Thermal bridges						0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	26.2688 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	16.2112	16.2112	16.2112	16.2112	16.2112	16.2112	16.2112	16.2112	16.2112	16.2112	16.2112	16.2112	
Average = Sum(39)m / 12 =	42.4801	42.4801	42.4801	42.4801	42.4801	42.4801	42.4801	42.4801	42.4801	42.4801	42.4801	42.4801	(39)
	42.4801												(40)
HLP	1.0809	1.0809	1.0809	1.0809	1.0809	1.0809	1.0809	1.0809	1.0809	1.0809	1.0809	1.0809	(40)
HLP (average)													
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.3879 (42)
Hot water usage for mixer showers	47.4892	46.7755	45.7356	43.7458	42.2774	40.6399	39.7091	40.7412	41.8725	43.6308	45.6633	47.3073 (42a)	
Hot water usage for baths	20.5451	20.2400	19.8103	19.0181	18.4249	17.7671	17.4118	17.8384	18.3030	19.0069	19.8154	20.4757 (42b)	
Hot water usage for other uses	28.8430	27.7942	26.7454	25.6965	24.6477	23.5989	23.5989	24.6477	25.6965	26.7454	27.7942	28.8430 (42c)	
Average daily hot water use (litres/day)													89.0530 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	96.8774	94.8098	92.2913	88.4604	85.3500	82.0058	80.7197	83.2273	85.8721	89.3830	93.2729	96.6260 (44)	
Distribution loss (46)m = 0.15 x (45)m	153.4301	135.0078	141.8483	121.0979	114.8975	100.8357	97.6235	103.0528	105.8888	121.2919	132.8843	151.2930 (45)	
Store volume													1479.1515
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6210 (55)
Total storage loss	23.0145	20.2512	21.2772	18.1647	17.2346	15.1254	14.6435	15.4579	15.8833	18.1938	19.9327	22.6939 (46)	
If cylinder contains dedicated solar storage	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)	
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	195.9435	173.4070	184.3617	162.2399	157.4109	141.9777	140.1369	145.5662	147.0308	163.8053	174.0263	193.8064 (62)	
WVHRS	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	195.9435	173.4070	184.3617	162.2399	157.4109	141.9777	140.1369	145.5662	147.0308	163.8053	174.0263	193.8064 (64)	
12Total per year (kWh/year)													1979.7125 (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	85.0262	75.6095	81.1753	73.1787	72.2141	66.4415	66.4705	68.2758	68.1216	74.3403	77.0976	84.3156 (65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	

Full SAP Calculation Printout



Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	60.9545	67.4853	60.9545	62.9863	60.9545	62.9863	60.9545	62.9863	60.9545	62.9863	60.9545	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	119.7770	121.0199	117.8878	111.2200	102.8030	94.8922	89.6074	88.3644	91.4965	98.1644	106.5814	114.4921 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	(71)
Water heating gains (Table 5)	114.2826	112.5141	109.1065	101.6370	97.0620	92.2798	89.3421	91.7685	94.6134	99.9197	107.0801	113.3275 (72)
Total internal gains	338.8319	344.8372	331.7667	319.6611	304.6373	293.9762	283.7218	284.9053	292.9141	302.8564	320.4656	332.5919 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W		
West				3.3800	19.6403	0.6300	0.8000	0.7700	23.1861 (80)			
West				3.3800	19.6403	0.6300	0.8000	0.7700	23.1861 (80)			
Solar gains	46.3722	90.7139	149.3928	217.8805	267.0208	273.3433	260.2340	223.5371	173.7500	107.6397	57.8207	38.1342 (83)
Total gains	385.2041	435.5510	481.1595	537.5417	571.6581	567.3195	543.9557	508.4424	466.6641	410.4961	378.2863	370.7262 (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)												
tau	23.3640	23.3640	23.3640	23.3640	23.3640	23.3640	23.3640	23.3640	23.3640	23.3640	23.3640	
alpha	2.5576	2.5576	2.5576	2.5576	2.5576	2.5576	2.5576	2.5576	2.5576	2.5576	2.5576	
util living area	0.8918	0.8567	0.8010	0.7026	0.5776	0.4382	0.3286	0.3631	0.5402	0.7448	0.8552	0.9003 (86)
Living	18.9396	19.2498	19.7016	20.2324	20.6348	20.8689	20.9540	20.9393	20.7690	20.2338	19.4967	18.8607
Non living	17.6396	18.0225	18.5764	19.2103	19.6689	19.9140	19.9900	19.9796	19.8229	19.2307	18.3381	17.5419
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	19.9460	19.2498	19.7016	20.2324	20.6348	20.8689	20.9540	20.9393	20.7690	20.2338	19.4967	19.1599 (87)
Th 2	20.0164	20.0164	20.0164	20.0164	20.0164	20.0164	20.0164	20.0164	20.0164	20.0164	20.0164	20.0164 (88)
util rest of house	0.8793	0.8408	0.7791	0.6710	0.5339	0.3806	0.2601	0.2921	0.4812	0.7096	0.8365	0.8886 (89)
MIT 2	19.0689	18.0225	18.5764	19.2103	19.6689	19.9140	19.9900	19.9796	19.8229	19.2307	18.3381	17.9878 (90)
Living area fraction	19.5777	18.7345	19.2292	19.8033	20.2293	20.4680	20.5493	20.5364	20.3718	19.8126	19.0103	18.6678 (92)
MIT	19.5777	18.7345	19.2292	19.8033	20.2293	20.4680	20.5493	20.5364	20.3718	19.8126	19.0103	18.6678 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5777	18.7345	19.2292	19.8033	20.2293	20.4680	20.5493	20.5364	20.3718	19.8126	19.0103	18.6678 (93)

8. Space heating requirement

Utilisation	0.8731	0.8165	0.7595	0.6636	0.5437	0.4076	0.2977	0.3303	0.5033	0.7015	0.8139	0.8695 (94)
Useful gains	336.3273	355.6128	365.4336	356.7036	310.8223	231.2508	161.9493	167.9416	234.8692	287.9800	307.8979	322.3371 (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	648.9990	587.6913	540.7369	463.1714	362.3243	249.2737	167.7654	175.7132	266.4249	391.3533	505.9495	614.5929 (97)
Space heating kWh	232.6277	155.9568	130.4256	76.6568	38.3174	0.0000	0.0000	0.0000	0.0000	76.9097	142.5972	217.4383 (98a)
Space heating requirement - total per year (kWh/year)												1070.9296
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	232.6277	155.9568	130.4256	76.6568	38.3174	0.0000	0.0000	0.0000	0.0000	76.9097	142.5972	217.4383 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1070.9296
Space heating per m2										(98c) / (4) =		27.2501 (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 %)												221.3276 (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												

Full SAP Calculation Printout



Space heating efficiency (main heating system 1)	232.6277	155.9568	130.4256	76.6568	38.3174	0.0000	0.0000	0.0000	0.0000	76.9097	142.5972	217.4383 (98)
Space heating fuel (main heating system)	221.3276	221.3276	221.3276	221.3276	221.3276	0.0000	0.0000	0.0000	0.0000	221.3276	221.3276	221.3276 (210)
Space heating efficiency (main heating system 2)	105.1056	70.4642	58.9288	34.6350	17.3125	0.0000	0.0000	0.0000	0.0000	34.7493	64.4281	98.2428 (211)
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 (212)
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 (213)
Water heating requirement	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)
Efficiency of water heater (217)m	195.9435	173.4070	184.3617	162.2399	157.4109	141.9777	140.1369	145.5662	147.0308	163.8053	174.0263	193.8064 (64)
Fuel for water heating, kWh/month	190.8179	190.8179	190.8179	190.8179	190.8179	190.8179	190.8179	190.8179	190.8179	190.8179	190.8179	190.8179 (216)
Space cooling fuel requirement (221)m	102.6861	90.8757	96.6166	85.0234	82.4927	74.4048	73.4401	76.2854	77.0530	85.8438	91.2002	101.5661 (219)
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 (221)
Lighting	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)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	12.6651	10.1604	9.1483	6.7025	5.1772	4.2298	4.7228	6.1389	7.9738	10.4620	11.8169	13.0171 (232)
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 (233a)
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 (234a)
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 (235a)
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 (235c)
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 (233b)
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 (234b)
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 (235b)
Annual totals 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 (235d)
Space heating fuel - main system 1												483.8663 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												190.8179
Water heating fuel used												1037.4879 (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)												102.2149 (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												1623.5691 (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	483.8663	0.1553	75.1288 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1037.4879	0.1409	146.1338 (264)
Space and water heating			221.2626 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	102.2149	0.1443	14.7528 (268)
Total CO2, kg/year			236.0153 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.0100 (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	483.8663	1.5748	761.9876 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1037.4879	1.5208	1577.8353 (278)
Space and water heating			2339.8229 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	102.2149	1.5338	156.7806 (282)
Total Primary energy kWh/year			2496.6035 (286)
Dwelling Primary energy Rate (DPER)			63.5300 (287)

Full SAP Calculation Printout



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	39.3000 (1b)	2.5000 (2b)	98.2500 (1b) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	39.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	98.2500 (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) = 0.2036 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4536 (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) = 0.3515 (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	0.4482	0.4394	0.4306	0.3867	0.3779	0.3339	0.3339	0.3251	0.3515	0.3779	0.3954	0.4130 (22b)
Effective ac	0.6004	0.5965	0.5927	0.5748	0.5714	0.5558	0.5558	0.5529	0.5618	0.5714	0.5782	0.5853 (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)			6.7600	1.1450	7.7405		(27)
top floor exposed new	20.2500	6.7600	13.4900	0.1800	2.4282		(29a)
corridor new	14.5000	2.1000	12.4000	0.1800	2.2320		(29a)
flat roof new	16.9000		16.9000	0.1100	1.8590		(30)
roof terrace new	22.4000		22.4000	0.1100	2.4640		(30)
Total net area of external elements Aum(A, m ²)			74.0500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	18.8237		(33)
pw			27.2500	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 90.9165 (35)

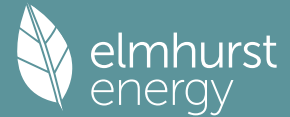
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.7000	0.0500	0.1850
E3 Sill	2.7000	0.0500	0.1350
E4 Jamb	14.2000	0.0500	0.7100
E7 Party floor between dwellings (in blocks of flats)	5.8000	0.0700	0.4060
E14 Flat roof	16.6000	0.0800	1.3280
E15 Flat roof with parapet	8.1000	0.5600	4.5360
E16 Corner (normal)	2.5000	0.0900	0.2250
E18 Party wall between dwellings	7.5000	0.0600	0.4500
E24 Eaves (insulation at ceiling level - inverted)	2.7000	0.2400	0.6480
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.6230 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 27.4467 (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	19.4675	19.3410	19.2171	18.6350	18.5260	18.0190	18.0190	17.9251	18.2143	18.5260	18.7464	18.9767 (38)

Full SAP Calculation Printout



Heat transfer coeff	46.9141	46.7877	46.6637	46.0816	45.9727	45.4657	45.4657	45.3718	45.6610	45.9727	46.1930	46.4234 (39)
Average = Sum(39)m / 12 =												46.0811
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1937	1.1905	1.1874	1.1726	1.1698	1.1569	1.1569	1.1545	1.1619	1.1698	1.1754	1.1813 (40)
HLP (average)												1.1725
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3879 (42)
Hot water usage for mixer showers	47.4892	46.7755	45.7356	43.7458	42.2774	40.6399	39.7091	40.7412	41.8725	43.6308	45.6633	47.3073 (42a)
Hot water usage for baths	20.5451	20.2400	19.8103	19.0181	18.4249	17.7671	17.4118	17.8384	18.3030	19.0069	19.8154	20.4757 (42b)
Hot water usage for other uses	28.8430	27.7942	26.7454	25.6965	24.6477	23.5989	23.5989	24.6477	25.6965	26.7454	27.7942	28.8430 (42c)
Average daily hot water use (litres/day)												89.0530 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	96.8774	94.8098	92.2913	88.4604	85.3500	82.0058	80.7197	83.2273	85.8721	89.3830	93.2729	96.6260 (44)
Energy conte	153.4301	135.0078	141.8483	121.0979	114.8975	100.8357	97.6235	103.0528	105.8888	121.2919	132.8843	151.2930 (45)
Energy content (annual)												Total = Sum(45)m = 1479.1515
Distribution loss (46)m = 0.15 x (45)m	23.0145	20.2512	21.2772	18.1647	17.2346	15.1254	14.6435	15.4579	15.8833	18.1938	19.9327	22.6939 (46)
Water storage loss:												150.0000 (47)
Store volume												1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7527 (55)
Enter (49) or (54) in (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	200.0250	177.0936	188.4432	166.1898	161.4924	145.9275	144.2184	149.6477	150.9807	167.8868	177.9762	197.8879 (62)
WWHRS	-21.7101	-19.2006	-20.1057	-16.6483	-15.5157	-13.2769	-12.4449	-13.2339	-13.7367	-16.1941	-18.3460	-21.3080 (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	178.3149	157.8930	168.3374	149.5414	145.9767	132.6507	131.7734	136.4137	137.2439	151.6927	159.6302	176.5798 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 1826.0479 (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	88.2914	78.5587	84.4405	76.3385	75.4793	69.6013	69.7357	71.5410	71.2815	77.6055	80.2575	87.5808 (65)

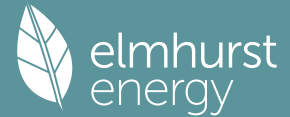
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929	69.3929 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	62.1779	68.8398	62.1779	64.2505	62.1779	64.2505	62.1779	62.1779	64.2505	62.1779	64.2505	62.1779 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	119.7770	121.0199	117.8878	111.2200	102.8030	94.8922	89.6074	88.3644	91.4965	98.1644	106.5814	114.4921 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393	29.9393 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143	-55.5143 (71)
Water heating gains (Table 5)	118.6713	116.9028	113.4953	106.0257	101.4507	96.6685	93.7308	96.1572	99.0021	104.3084	111.4688	117.7162 (72)
Total internal gains	347.4441	353.5804	340.3789	328.3141	313.2495	299.6291	289.3339	290.5174	298.5670	311.4686	329.1185	341.2041 (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			
West				6.7600	19.6403	0.6300	0.7000	0.7700	40.5757 (80)			
Solar gains	40.5757	79.3746	130.7187	190.6455	233.6432	239.1754	227.7047	195.5950	152.0313	94.1847	50.5931	33.3675 (83)
Total gains	388.0198	432.9551	471.0976	518.9596	546.8927	538.8045	517.0386	486.1124	450.5983	405.6533	379.7116	374.5715 (84)

Full SAP Calculation Printout



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	21.1558	21.2130	21.2693	21.5380	21.5890	21.8298	21.8298	21.8750	21.7364	21.5890	21.4860	21.3794
alpha	2.4104	2.4142	2.4180	2.4359	2.4393	2.4553	2.4553	2.4583	2.4491	2.4393	2.4324	2.4253
util living area	0.8979	0.8685	0.8217	0.7339	0.6179	0.4779	0.3630	0.3970	0.5757	0.7649	0.8637	0.9045 (86)
MIT	18.6498	18.9595	19.4324	20.0381	20.5117	20.8168	20.9322	20.9137	20.6959	20.0855	19.2917	18.6062 (87)
Th 2	19.9250	19.9276	19.9301	19.9420	19.9442	19.9546	19.9546	19.9566	19.9506	19.9442	19.9397	19.9350 (88)
util rest of house	0.8853	0.8527	0.8001	0.7019	0.5717	0.4142	0.2845	0.3169	0.5125	0.7293	0.8448	0.8927 (89)
MIT 2	17.2249	17.6101	18.1948	18.9322	19.4802	19.8122	19.9164	19.9050	19.6968	19.0090	18.0394	17.1768 (90)
Living area fraction									fLA = Living area / (4) =			0.5802 (91)
MIT	18.0515	18.3930	18.9128	19.5738	20.0786	20.3950	20.5057	20.4902	20.2764	19.6335	18.7659	18.0061 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0515	18.3930	18.9128	19.5738	20.0786	20.3950	20.5057	20.4902	20.2764	19.6335	18.7659	18.0061 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8579	0.8254	0.7764	0.6897	0.5779	0.4419	0.3267	0.3588	0.5331	0.7175	0.8197	0.8657 (94)
Useful gains	332.8744	357.3751	365.7466	357.9329	316.0407	238.0863	168.9065	174.4268	240.2324	291.0660	311.2675	324.2732 (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	645.1419	631.3045	579.2257	491.8653	385.1883	263.4733	177.5761	185.5808	282.0209	415.2964	538.8844	640.9264 (97)
Space heating kWh	232.3270	184.0805	158.8285	96.4313	51.4458	0.0000	0.0000	0.0000	0.0000	92.4275	163.8841	235.5900 (98a)
Space heating requirement - total per year (kWh/year)												1215.0147
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	232.3270	184.0805	158.8285	96.4313	51.4458	0.0000	0.0000	0.0000	0.0000	92.4275	163.8841	235.5900 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1215.0147
Space heating per m2										(98c) / (4) =		30.9164 (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 %)												92.3000 (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	232.3270	184.0805	158.8285	96.4313	51.4458	0.0000	0.0000	0.0000	0.0000	92.4275	163.8841	235.5900 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	251.7085	199.4372	172.0785	104.4759	55.7376	0.0000	0.0000	0.0000	0.0000	100.1381	177.5559	255.2438 (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	178.3149	157.8930	168.3374	149.5414	145.9767	132.6507	131.7734	136.4137	137.2439	151.6927	159.6302	176.5798 (64)
Efficiency of water heater (217)m	84.6542	84.4048	83.9296	83.1020	81.9648	79.8000	79.8000	79.8000	79.8000	82.9844	84.1188	79.8000 (216)
Fuel for water heating, kWh/month	210.6393	187.0663	200.5699	179.9493	178.0969	166.2289	165.1296	170.9445	171.9849	182.7967	189.7675	208.4591 (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	12.9193	10.3644	9.3320	6.8370	5.2811	4.3147	4.8176	6.2621	8.1338	10.6720	12.0540	13.2784 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-18.9687	-27.0495	-39.3501	-44.8408	-48.9264	-45.9499	-45.4538	-42.6652	-37.7753	-31.2704	-20.9896	-16.3695 (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	-9.8028	-20.7205	-41.3405	-62.2916	-82.5192	-82.9017	-81.8563	-69.1783	-50.5826	-29.6186	-13.0905	-7.7387 (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)

Full SAP Calculation Printout



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	(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	(235d)
Annual totals kWh/year											
Space heating fuel - main system 1											1316.3756 (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											2211.6330 (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)											104.2665 (232)
Energy saving/generation technologies (Appendices M ,N and Q)											
PV generation											-971.2505 (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											2747.0246 (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	1316.3756	0.2100	276.4389 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2211.6330	0.2100	464.4429 (264)
Space and water heating			740.8818 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	104.2665	0.1443	15.0489 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-419.6091	0.1343	-56.3478
PV Unit electricity exported	-551.6414	0.1258	-69.4086
Total			-125.7564 (269)
Total CO2, kg/year			642.1035 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.3400 (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	1316.3756	1.1300	1487.5044 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2211.6330	1.1300	2499.1453 (278)
Space and water heating			3986.6497 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	104.2665	1.5338	159.9274 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-419.6091	1.4963	-627.8537
PV Unit electricity exported	-551.6414	0.4619	-254.7767
Total			-882.6303 (283)
Total Primary energy kWh/year			3394.0476 (286)
Target Primary Energy Rate (TPER)			86.3600 (287)