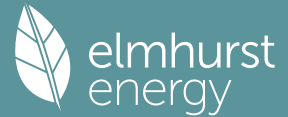


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Property Reference	UNIT 37				Issued on Date	02/07/2025	
Assessment Reference	UNIT 37			Prop Type Ref			
Property	Flat 38, Alexander House, 205 Kings Road, READING, RG1 4FW						
SAP Rating	82 B	DER	5.07	TER	10.85		
Environmental	96 A	% DER < TER				53.27	
CO ₂ Emissions (t/year)	0.25	DFEE	47.90	TFEE	40.00		
Compliance Check	See BREL	% DFEE < TFEE				-19.76	
% DPER < TPER	8.46	DPER	53.06	TPER	57.96		
Assessor Details	Mr. Ondrej Gajdos				Assessor ID	W452-0001	
Client							

SAP 10 WORKSHEET FOR New Build (As Built) (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	56.5000 (1b)	2.5000 (2b)	141.2500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	141.2500 (5)

2. Ventilation rate

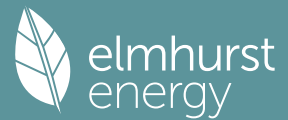
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (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) = 0.5813 (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	0.7411	0.7266	0.7120	0.6394	0.6248	0.5522	0.5522	0.5377	0.5813	0.6248	0.6539	0.6830 (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) =												79.2000 (23c)
Effective ac	0.8451	0.8306	0.8160	0.7434	0.7288	0.6562	0.6562	0.6417	0.6853	0.7288	0.7579	0.7870 (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							
1			6.5000	1.1450	7.4427		(27)
2			4.1000	1.1450	4.6947		(27)
1			2.1000	1.0000	2.1000		(26)
top floor exposed new	32.2500	6.5000	25.7500	0.2000	5.1500	18.0000	463.5000 (29a)
corridor new	25.5000	2.1000	23.4000	0.2300	5.3820	14.0000	327.6000 (29a)
exposed new	11.2500	4.1000	7.1500	0.2500	1.7875	60.0000	429.0000 (29a)
flat roof new	22.7000		22.7000	0.1300	2.9510	9.0000	204.3000 (30)
roof terrace new	21.4000		21.4000	0.1300	2.7820	9.0000	192.6000 (30)
pitched new	12.4000		12.4000	0.1100	1.3640	9.0000	111.6000 (30)
Total net area of external elements A _{um} (A, m ²)			125.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.6539		(33)
Main dwelling							
pw			26.2500	0.0000	0.0000	20.0000	525.0000 (32)
pf			55.2000			30.0000	1656.0000 (32d)
iw			49.5000			9.0000	445.5000 (32c)

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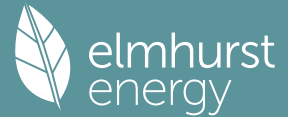


Heat capacity Cm = Sum(A x k)											
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K											
List of Thermal Bridges											
K1 Element											
E2 Other lintels (including other steel lintels)											
E3 Sill											
E4 Jamb											
E20 Exposed floor (normal)											
E7 Party floor between dwellings (in blocks of flats)											
E15 Flat roof with parapet											
E16 Corner (normal)											
E17 Corner (inverted - internal area greater than external area)											
E18 Party wall between dwellings											
E24 Eaves (insulation at ceiling level - inverted)											
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											
Point Thermal bridges											
Total fabric heat loss											
(28)...(30) + (32) + (32a)...(32e) = 4355.1000 (34)											
77.0814 (35)											
Length											
Psi-value											
Total											
6.3000 0.0470 0.2961											
5.3000 0.0150 0.0795											
12.2400 0.0470 0.5753											
0.0000 0.3200 0.0000											
10.0000 0.2800 2.8000											
18.0000 0.1970 3.5460											
5.0000 0.1800 0.9000											
5.0000 0.0000 0.0000											
5.0000 0.2400 1.2000											
7.0000 0.0500 0.3500											
9.7469 (36)											
(36a) = 0.0000											
(33) + (36) + (36a) = 43.4008 (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 39.3919 38.7146 38.0373 34.6506 33.9732 30.5865 30.5865 29.9092 31.9412 33.9732 35.3279 36.6826 (38)											
Heat transfer coeff 82.7927 82.1154 81.4380 78.0514 77.3740 73.9873 73.9873 73.3100 75.3420 77.3740 78.7287 80.0834 (39)											
Average = Sum(39)m / 12 = 77.8820											
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec											
HLP 1.4654 1.4534 1.4414 1.3814 1.3695 1.3095 1.3095 1.2975 1.3335 1.3695 1.3934 1.4174 (40)											
HLP (average) 1.3784											
Days in mont 31 28 31 30 31 30 31 31 30 31 30 31											

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.8812 (42)
Hot water usage for mixer showers												
	55.7603	54.9223	53.7013	51.3649	49.6408	47.7180	46.6251	47.8370	49.1654	51.2298	53.6164	55.5467 (42a)
Hot water usage for baths												
	24.1020	23.7440	23.2400	22.3106	21.6146	20.8430	20.4261	20.9267	21.4717	22.2974	23.2459	24.0205 (42b)
Hot water usage for other uses												
	33.8949	32.6624	31.4298	30.1973	28.9647	27.7322	27.7322	28.9647	30.1973	31.4298	32.6624	33.8949 (42c)
Average daily hot water use (litres/day)												104.5690 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	113.7572	111.3288	108.3711	103.8728	100.2202	96.2932	94.7835	97.7284	100.8343	104.9571	109.5247	113.4621 (44)
Energy content (annual)												
	180.1636	158.5307	166.5623	142.1966	134.9156	118.4037	114.6324	121.0082	124.3388	142.4257	156.0380	177.6542 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1736.8698
	27.0245	23.7796	24.9843	21.3295	20.2373	17.7606	17.1949	18.1512	18.6508	21.3639	23.4057	26.6481 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5500 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8370 (55)
Total storage loss												
	25.9470	23.4360	25.9470	25.1100	25.9470	25.1100	25.9470	25.9470	25.1100	25.9470	25.1100	25.9470 (56)
If cylinder contains dedicated solar storage												
	25.9470	23.4360	25.9470	25.1100	25.9470	25.1100	25.9470	25.9470	25.1100	25.9470	25.1100	25.9470 (57)
Primary loss												23.2624 (59)
	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 (61)
	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												
	229.3730	202.9779	215.7717	189.8186	184.1250	166.0257	163.8418	170.2176	171.9608	191.6351	203.6600	226.8636 (62)
WWHRS												0.0000 (63a)
	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 (63b)
	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 (63c)
	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 (63d)
	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												
	229.3730	202.9779	215.7717	189.8186	184.1250	166.0257	163.8418	170.2176	171.9608	191.6351	203.6600	226.8636 (64)
Total per year (kWh/year) = Sum(64)m =												2316.2708 (64)
12Total per year (kWh/year)												2316 (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												
	99.2719	88.2692	94.7495	85.3780	84.2270	77.4668	77.4828	79.6027	79.4403	86.7241	89.9802	98.4375 (65)

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South			6.5000		46.7521		0.6300		0.8000		0.7700		106.1397 (78)
South			4.1000		46.7521		0.6300		0.8000		0.7700		66.9497 (78)

Solar gains	173.0894	283.4758	361.0979	408.1190	425.2853	409.2792	399.8907	388.3493	377.2094	305.7553	205.1699	149.5652 (83)
Total gains	604.6389	723.5284	783.9815	815.8617	813.3661	783.6723	760.8345	750.4402	749.6927	690.8396	612.9517	572.7552 (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	14.6118	14.7323	14.8549	15.4994	15.6351	16.3508	16.3508	16.5018	16.0568	15.6351	15.3661	15.1061
alpha	1.9741	1.9822	1.9903	2.0333	2.0423	2.0901	2.0901	2.1001	2.0705	2.0423	2.0244	2.0071
util living area	0.8798	0.8357	0.7894	0.7180	0.6294	0.4985	0.3831	0.3990	0.5459	0.7210	0.8354	0.8880 (86)
Living	17.8427	18.3255	18.8955	19.6265	20.2013	20.6740	20.8660	20.8507	20.5687	19.8205	18.7802	17.8381
Non living	16.1706	16.7611	17.4588	18.3585	19.0344	19.5794	19.7579	19.7540	19.4614	18.6095	17.3505	16.1768
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	19.3862	18.3255	18.8955	19.6265	20.2013	20.6740	20.8660	20.8507	20.5687	19.8205	18.7802	18.2806 (87)
Th 2	19.7136	19.7227	19.7318	19.7776	19.7868	19.8334	19.8334	19.8428	19.8147	19.7868	19.7684	19.7500 (88)
util rest of house	0.8649	0.8164	0.7643	0.6836	0.5803	0.4295	0.2947	0.3129	0.4795	0.6808	0.8133	0.8742 (89)
MIT 2	18.2847	16.7611	17.4588	18.3585	19.0344	19.5794	19.7579	19.7540	19.4614	18.6095	17.3505	16.8156 (90)
Living area fraction												0.5894 (91)
MIT	18.9339	17.6831	18.3056	19.1058	19.7222	20.2245	20.4110	20.4004	20.1140	19.3232	18.1931	17.6790 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9339	17.6831	18.3056	19.1058	19.7222	20.2245	20.4110	20.4004	20.1140	19.3232	18.1931	17.6790 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8546	0.7783	0.7308	0.6623	0.5775	0.4538	0.3399	0.3558	0.4973	0.6635	0.7785	0.8455 (94)
Useful gains	516.7062	563.1277	572.9022	540.3260	469.7178	355.5978	258.5878	267.0070	372.7981	458.3480	477.1631	484.2386 (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	1211.5791	1049.6891	961.4228	796.5789	620.7062	416.1453	281.9663	293.2694	453.1078	674.9515	873.3454	1079.4468 (97)
Space heating kWh	516.9854	326.9693	289.0593	184.5021	112.3354	0.0000	0.0000	0.0000	0.0000	161.1530	285.2513	442.8349 (98a)
Space heating requirement - total per year (kWh/year)												2319.0906
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	516.9854	326.9693	289.0593	184.5021	112.3354	0.0000	0.0000	0.0000	0.0000	161.1530	285.2513	442.8349 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2319.0906
Space heating per m2										(98c) / (4) =		41.0459 (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 %)												240.0250 (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	516.9854	326.9693	289.0593	184.5021	112.3354	0.0000	0.0000	0.0000	0.0000	161.1530	285.2513	442.8349 (98)
Space heating efficiency (main heating system 1)	240.0250	240.0250	240.0250	240.0250	240.0250	0.0000	0.0000	0.0000	0.0000	240.0250	240.0250	240.0250 (210)
Space heating fuel (main heating system)	215.3881	136.2230	120.4288	76.8678	46.8015	0.0000	0.0000	0.0000	0.0000	67.1401	118.8423	184.4953 (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	229.3730	202.9779	215.7717	189.8186	184.1250	166.0257	163.8418	170.2176	171.9608	191.6351	203.6600	226.8636 (64)
Efficiency of water heater												321.1950 (216)
(217)m	321.1950	321.1950	321.1950	321.1950	321.1950	321.1950	321.1950	321.1950	321.1950	321.1950	321.1950	321.1950 (217)
Fuel for water heating, kWh/month	71.4124	63.1946	67.1778	59.0976	57.3250	51.6900	51.0101	52.9951	53.5378	59.6632	63.4070	70.6311 (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	9.8792	8.9231	9.8792	9.5605	9.8792	9.5605	9.8792	9.8792	9.5605	9.8792	9.5605	9.8792 (231)
Lighting	16.5520	13.2787	11.9560	8.7594	6.7660	5.5279	6.1722	8.0229	10.4209	13.6728	15.4434	17.0121 (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												966.1870 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	321.1950	
Water heating fuel used	721.1416	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6750)		
mechanical ventilation fans (SFP = 0.6750)	116.3194	(230a)
Total electricity for the above, kWh/year	116.3194	(231)
Electricity for lighting (calculated in Appendix L)	133.5843	(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	1937.2323	(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	966.1870	0.1549	149.6484	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	721.1416	0.1409	101.5809	(264)
Space and water heating			251.2293	(265)
Pumps, fans and electric keep-hot	116.3194	0.1387	16.1349	(267)
Energy for lighting	133.5843	0.1443	19.2803	(268)
Total CO2, kg/year			286.6446	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.0700	(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	966.1870	1.5734	1520.1545	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	721.1416	1.5209	1096.7496	(278)
Space and water heating			2616.9041	(279)
Pumps, fans and electric keep-hot	116.3194	1.5128	175.9680	(281)
Energy for lighting	133.5843	1.5338	204.8961	(282)
Total Primary energy kWh/year			2997.7682	(286)
Dwelling Primary energy Rate (DPER)			53.0600	(287)

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

1. Overall dwelling characteristics

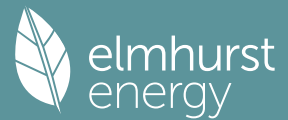
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	56.5000	2.5000	141.2500	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.5000			
Dwelling volume			141.2500	(5)

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)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1416 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3916	(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) =	0.3035 (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	0.3869	0.3794	0.3718	0.3338	0.3262	0.2883	0.2883	0.2807	0.3035	0.3262	0.3414	0.3566	(22b)

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Effective ac 0.5749 0.5720 0.5691 0.5557 0.5532 0.5416 0.5416 0.5394 0.5461 0.5532 0.5583 0.5636 (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			10.6000	1.1450	12.1374		(27)
top floor exposed new	32.2500	6.5000	25.7500	0.1800	4.6350		(29a)
corridor new	25.5000	2.1000	23.4000	0.1800	4.2120		(29a)
exposed new	11.2500	4.1000	7.1500	0.1800	1.2870		(29a)
flat roof new	22.7000		22.7000	0.1100	2.4970		(30)
roof terrace new	21.4000		21.4000	0.1100	2.3540		(30)
pitched new	12.4000		12.4000	0.1100	1.3640		(30)
Total net area of external elements Aum(A, m2)			125.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.5864		(33)
Main dwelling							
pw			26.2500	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 77.0814 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	6.3000	0.0500	0.3150
E2 Other lintels (including other steel lintels)	5.3000	0.0500	0.2650
E3 Sill	12.2400	0.0500	0.6120
E4 Jamb	0.0000	0.3200	0.0000
E20 Exposed floor (normal)	10.0000	0.0700	0.7000
E7 Party floor between dwellings (in blocks of flats)	18.0000	0.5600	10.0800
E15 Flat roof with parapet	5.0000	0.0900	0.4500
E16 Corner (normal)	5.0000	-0.0900	-0.4500
E17 Corner (inverted - internal area greater than external area)	5.0000	0.0600	0.3000
E18 Party wall between dwellings	7.0000	0.2400	1.6800
E24 Eaves (insulation at ceiling level - inverted)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 13.9520 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 44.5384 (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	26.7958	26.6603	26.5274	25.9036	25.7869	25.2435	25.2435	25.1429	25.4528	25.7869	26.0230	26.2699
Heat transfer coeff	71.3342	71.1987	71.0659	70.4420	70.3253	69.7819	69.7819	69.6813	69.9912	70.3253	70.5614	70.8083
Average = Sum(39)m / 12 =												70.4414

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2626	1.2602	1.2578	1.2468	1.2447	1.2351	1.2351	1.2333	1.2388	1.2447	1.2489	1.2532
HLP (average)												1.2468
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8812 (42)

Hot water usage for mixer showers 55.7603 54.9223 53.7013 51.3649 49.6408 47.7180 46.6251 47.8370 49.1654 51.2298 53.6164 55.5467 (42a)

Hot water usage for baths 24.1020 23.7440 23.2400 22.3106 21.6146 20.8430 20.4261 20.9267 21.4717 22.2974 23.2459 24.0205 (42b)

Hot water usage for other uses 33.8949 32.6624 31.4298 30.1973 28.9647 27.7322 27.7322 28.9647 30.1973 31.4298 32.6624 33.8949 (42c)

Average daily hot water use (litres/day) 104.5690 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	113.7572	111.3288	108.3711	103.8728	100.2202	96.2932	94.7835	97.7284	100.8343	104.9571	109.5247	113.4621

Energy conte 180.1636 158.5307 166.5623 142.1966 134.9156 118.4037 114.6324 121.0082 124.3388 142.4257 156.0380 177.6542 (45)

Energy content (annual) Total = Sum(45)m = 1736.8698

Distribution loss (46)m = 0.15 x (45)m 27.0245 23.7796 24.9843 21.3295 20.2373 17.7606 17.1949 18.1512 18.6508 21.3639 23.4057 26.6481 (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 226.7585 200.6164 213.1572 187.2885 181.5105 163.4955 161.2273 167.6031 169.4307 189.0206 201.1298 224.2491 (62)

WWHRS -25.4913 -22.5447 -23.6075 -19.5480 -18.2180 -15.5893 -14.6125 -15.5389 -16.1293 -19.0146 -21.5412 -25.0192 (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 201.2672 178.0717 189.5497 167.7405 163.2925 147.9063 146.6148 152.0642 153.3014 170.0060 179.5885 199.2299 (64)

12Total per year (kWh/year) Total per year (kWh/year) = Sum(64)m = 2048.6328 (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 97.1803 86.3800 92.6579 83.3539 82.1354 75.4427 75.3912 77.5111 77.4161 84.6325 87.9561 96.3459 (65)

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

Metabolic gains (Table 5), Watts

(66)m 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 83.9825 92.9806 83.9825 86.7819 83.9825 86.7819 83.9825 83.9825 86.7819 83.9825 86.7819 83.9825 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

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

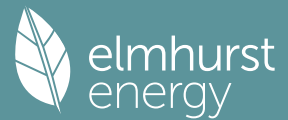
Metabolic gains (Table 5), Watts

(66)m 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 94.0577 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 83.9825 92.9806 83.9825 86.7819 83.9825 86.7819 83.9825 83.9825 86.7819 83.9825 86.7819 83.9825 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

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Cooking gains	164.0419	165.7441	161.4546	152.3225	140.7950	129.9607	122.7227	121.0205	125.3101	134.4421	145.9697	156.8039 (68)
	32.4058	32.4058	32.4058	32.4058	32.4058	32.4058	32.4058	32.4058	32.4058	32.4058	32.4058	32.4058 (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)	-75.2462	-75.2462	-75.2462	-75.2462	-75.2462	-75.2462	-75.2462	-75.2462	-75.2462	-75.2462	-75.2462	-75.2462 (71)
Water heating gains (Table 5)	130.6187	128.5417	124.5402	115.7692	110.3970	104.7815	101.3322	104.1816	107.5224	113.7533	122.1612	129.4972 (72)
Total internal gains	432.8604	441.4837	424.1945	409.0909	389.3917	372.7414	359.2547	360.4019	370.8317	386.3952	409.1301	424.5010 (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				10.6000	46.7521	0.6300	0.7000			0.7700			151.4532 (78)
Solar gains	151.4532	248.0413	315.9607	357.1041	372.1246	358.1193	349.9043	339.8056	330.0582	267.5359	179.5237	130.8695	(83)
Total gains	584.3136	689.5251	740.1551	766.1951	761.5163	730.8607	709.1591	700.2075	700.8899	653.9311	588.6538	555.3705	(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	16.9589	16.9912	17.0229	17.1737	17.2022	17.3361	17.3361	17.3612	17.2843	17.2022	17.1446	17.0849
alpha	2.1306	2.1327	2.1349	2.1449	2.1468	2.1557	2.1557	2.1574	2.1523	2.1468	2.1430	2.1390
util living area	0.8749	0.8308	0.7847	0.7176	0.6290	0.5069	0.3895	0.4075	0.5499	0.7195	0.8324	0.8849 (86)
MIT	18.2761	18.7011	19.1957	19.7808	20.2942	20.6917	20.8751	20.8574	20.6059	19.9479	19.0239	18.1939 (87)
Th 2	19.8703	19.8722	19.8740	19.8828	19.8844	19.8920	19.8920	19.8935	19.8891	19.8844	19.8811	19.8776 (88)
util rest of house	0.8607	0.8127	0.7613	0.6853	0.5830	0.4404	0.3041	0.3236	0.4869	0.6817	0.8115	0.8718 (89)
MIT 2	16.7593	17.2813	17.8891	18.6019	19.2058	19.6464	19.8192	19.8061	19.5586	18.8160	17.6973	16.6610 (90)
Living area fraction	17.6532	18.1181	18.6592	19.2967	19.8473	20.2625	20.4415	20.4258	20.1758	19.4831	18.4792	17.5645 (92)
MIT	17.6532	18.1181	18.6592	19.2967	19.8473	20.2625	20.4415	20.4258	20.1758	19.4831	18.4792	17.5645 (93)
Temperature adjustment												0.0000
adjusted MIT	17.6532	18.1181	18.6592	19.2967	19.8473	20.2625	20.4415	20.4258	20.1758	19.4831	18.4792	17.5645 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	482.5302	537.0262	541.7715	510.6692	442.7377	338.8452	246.5971	255.7752	353.3092	435.8410	459.0211	465.0322 (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	952.5426	941.1129	864.1034	732.3658	572.9595	395.1370	268.0695	280.5199	425.2559	624.7092	802.9297	946.3144 (97)
Space heating kWh	349.6892	271.5463	239.8150	159.6216	96.8850	0.0000	0.0000	0.0000	0.0000	140.5179	247.6142	358.0740 (98a)
Space heating requirement - total per year (kWh/year)												1863.7632
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	349.6892	271.5463	239.8150	159.6216	96.8850	0.0000	0.0000	0.0000	0.0000	140.5179	247.6142	358.0740 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1863.7632
Space heating per m2										(98c) / (4) =		32.9870 (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	349.6892	271.5463	239.8150	159.6216	96.8850	0.0000	0.0000	0.0000	0.0000	140.5179	247.6142	358.0740 (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)	378.8616	294.1997	259.8212	172.9378	104.9675	0.0000	0.0000	0.0000	0.0000	152.2404	268.2711	387.9458 (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	201.2672	178.0717	189.5497	167.7405	163.2925	147.9063	146.6148	152.0642	153.3014	170.0060	179.5885	199.2299 (64)
Efficiency of water heater (217)m	85.2862	85.0031	84.5884	83.9486	82.9299	79.8000	79.8000	79.8000	79.8000	83.6358	84.7804	79.8000 (216)
Fuel for water heating, kWh/month	235.9903	209.4884	224.0847	199.8133	196.9043	185.3462	183.7279	190.5566	192.1070	203.2694	211.8278	233.4037 (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	17.4499	13.9990	12.6045	9.2346	7.1331	5.8278	6.5070	8.4581	10.9862	14.4145	16.2811	17.9349 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-44.5608	-59.0260	-79.8246	-84.3478	-86.7483	-79.6121	-78.6849	-76.2984	-71.5310	-64.8836	-47.6499	-38.9953 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

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(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	-38.1663	-78.3280	-152.1865	-223.6919	-291.1997	-290.8772	-287.3723	-245.2872	-182.5261	-110.1917	-50.3412	-30.3234	(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												2019.2450	(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												2466.5197	(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)												140.8306	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2792.6541	(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												1919.9413	(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	2019.2450	0.2100	424.0415	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2466.5197	0.2100	517.9691	(264)
Space and water heating			942.0106	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	140.8306	0.1443	20.3262	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-812.1626	0.1359	-110.3685	
PV Unit electricity exported	-1980.4914	0.1266	-250.6338	
Total			-361.0023	(269)
Total CO2, kg/year			613.2638	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.8500	(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	2019.2450	1.1300	2281.7469	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2466.5197	1.1300	2787.1672	(278)
Space and water heating			5068.9141	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	140.8306	1.5338	216.0107	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-812.1626	1.5023	-1220.1233	
PV Unit electricity exported	-1980.4914	0.4646	-920.0573	
Total			-2140.1806	(283)
Total Primary energy kWh/year			3274.8450	(286)
Target Primary Energy Rate (TPER)			57.9600	(287)