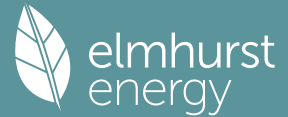


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Property Reference	4907-AU06-6316-032.R				Issued on Date	19/03/2025
Assessment Reference	Plot 032	Prop Type Ref	GF Flat-TC			
Property	FLAT 3, 38 Spey Road, Tilehurst, Reading, RG30 4NF					
SAP Rating	78 C	DER	6.17	TER	13.70	
Environmental	95 A	% DER < TER				54.96
CO ₂ Emissions (t/year)	0.33	DFEE	33.24	TFEE	36.98	
Compliance Check	See BREL	% DFEE < TFEE				10.12
% DPER < TPER	11.94	DPER	63.67	TPER	72.30	
Assessor Details	Mr. Paul Frearson				Assessor ID	AA61-0001
Client	Bellway Homes, Thames Valley					

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	62.9000 (1b)	2.4100 (2b)	151.5890 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		151.5890 (4)
Dwelling volume			151.5890 (5)

2. Ventilation rate

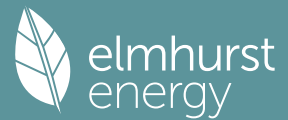
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.2900 (17)
Infiltration rate	0.1145 (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) = 0.0973 (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	0.1241	0.1217	0.1192	0.1071	0.1046	0.0925	0.0925	0.0900	0.0973	0.1046	0.1095	0.1144 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
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
Main dwelling							
Window			5.7300	1.2357	7.0808		(27)
French Door			4.0400	1.3258	5.3561		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
GF B&B J150 P/A=0.22			62.9000	0.1000	6.2900	75.0000	4717.5000 (28a)
EW Brick AAC018/019	59.3700	9.7700	49.6000	0.2600	12.8960	60.0000	2975.9999 (29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600 (29a)
Total net area of external elements Aum(A, m ²)			126.5500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.1649		(33)
Main dwelling							
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500 (32)
Party Ceiling			62.9000			30.0000	1887.0000 (32b)
GF Timber			167.9200			9.0000	1511.2800 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 12187.8400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							193.7653 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.6500	0.0370	0.1351
E2 Other lintels (including other steel lintels)	1.9200	0.0410	0.0787
E3 Sill	3.6400	0.0090	0.0328
E4 Jamb	16.6700	0.0140	0.2334
E5 Ground floor (normal)	8.0100	0.0380	0.3044
E7 Party floor between dwellings (in blocks of flats)	23.0100	0.0390	0.8974
E5 Ground floor (normal)	15.0000	0.0450	0.6750
E16 Corner (normal)	7.7400	0.0410	0.3173
E18 Party wall between dwellings	2.5800	0.0390	0.1006
P1 Party wall - Ground floor	7.0900	0.0470	0.3332
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	1.0200	0.0270	0.0275
E4 Jamb	4.2000	0.0850	0.3570
E5 Ground floor (normal)	1.6600	0.0450	0.0747
E7 Party floor between dwellings (in blocks of flats)	1.6600	0.0330	0.0548
E25 Staggered party wall between dwellings	2.5800	0.0380	0.0980
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.7199 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	37.8848 (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	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122
Heat transfer coeff	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970
Average = Sum(39)m / 12 =												62.8970 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
HLP (average)												1.0000 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0623 (42)
Hot water usage for mixer showers												
58.7981	57.9145	56.6268	54.1632	52.3452	50.3177	49.1652	50.4431	51.8439	54.0208	56.5373	58.5728	(42a)
Hot water usage for baths												
25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224	(42b)
Hot water usage for other uses												
35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503	(42c)
Average daily hot water use (litres/day)												110.2677 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	119.9567	117.3957	114.2767	109.5333	105.6816	101.5406	99.9487	103.0543	106.3296	110.6770	115.4935	119.6455 (44)
Energy conte	189.9821	167.1700	175.6391	149.9457	142.2677	124.8560	120.8793	127.6027	131.1150	150.1877	164.5417	187.3360 (45)
Energy content (annual)										Total = Sum(45)m =		1831.5229
Distribution loss (46)m = 0.15 x (45)m												
28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004	(46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	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												
216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874	(62)
WWHRS	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	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h												
216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874	(64)
12Total per year (kWh/year)												2148.8539 (64)
Electric shower(s)												2149 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month												
63.1691	55.5840	58.4000	49.8569	47.3040	41.5146	40.1924	42.4279	43.5957	49.9374	54.7101	62.2892	(65)

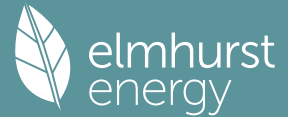
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
95.3878	105.6079	95.3878	98.5674	95.3878	95.3878	95.3878	95.3878	98.5674	95.3878	98.5674	95.3878	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
180.1971	182.0670	177.3549	167.3236	154.6607	142.7595	134.8087	132.9388	137.6509	147.6822	160.3451	172.2463	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	(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)												
-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	(71)
Water heating gains (Table 5)												
84.9046	82.7143	78.4946	69.2457	63.5807	57.6592	54.0220	57.0268	60.5496	67.1202	75.9863	83.7221	(72)
Total internal gains												
414.4245	424.3242	405.1723	389.0716	367.5642	352.9210	338.1535	339.2883	350.7029	364.1252	388.8337	405.2912	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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				m2	Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W
				1.9100	36.7938	0.4600		0.0000		0.7700		24.8918 (77)
Southeast				3.8200	11.2829	0.4600		0.0000		0.7700		15.2663 (81)
Northwest				4.0400	11.2829	0.6000		0.7000		0.7700		13.2674 (81)
Solar gains	53.4256	100.4812	162.6574	243.7369	311.5207	326.2094	307.4504	254.2906	190.3266	117.8409	65.7175	44.6043 (83)
Total gains	467.8501	524.8054	567.8298	632.8086	679.0849	679.1304	645.6039	593.5790	541.0295	481.9661	454.5512	449.8955 (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	53.8263	53.8263	53.8263	53.8263	53.8263	53.8263	53.8263	53.8263	53.8263	53.8263	53.8263	53.8263
alpha	4.5884	4.5884	4.5884	4.5884	4.5884	4.5884	4.5884	4.5884	4.5884	4.5884	4.5884	4.5884
util living area	0.9863	0.9758	0.9538	0.8877	0.7549	0.5696	0.4236	0.4780	0.7207	0.9208	0.9755	0.9885 (86)
MIT	19.7372	19.9268	20.2058	20.5727	20.8450	20.9663	20.9930	20.9880	20.9055	20.5490	20.0762	19.6879 (87)
Th 2	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834 (88)
util rest of house	0.9830	0.9701	0.9427	0.8616	0.7046	0.4964	0.3378	0.3871	0.6495	0.8963	0.9687	0.9857 (89)
MIT 2	18.6174	18.8566	19.2055	19.6481	19.9492	20.0620	20.0806	20.0782	20.0148	19.6308	19.0480	18.5549 (90)
Living area fraction	fLA = Living area / (4) = 0.3930 (91)											
MIT	19.0575	19.2772	19.5987	20.0115	20.3012	20.4174	20.4392	20.4357	20.3648	19.9917	19.4521	19.0002 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.0575	19.2772	19.5987	20.0115	20.3012	20.4174	20.4392	20.4357	20.3648	19.9917	19.4521	19.0002 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9781	0.9637	0.9356	0.8593	0.7173	0.5237	0.3714	0.4226	0.6726	0.8934	0.9627	0.9813 (94)
Useful gains	457.6199	505.7559	531.2737	543.7542	487.1034	355.6938	239.8058	250.8628	363.9209	430.6064	437.5803	441.4829 (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	928.2017	904.2805	823.8658	698.8783	540.9919	365.8979	241.4711	253.8360	394.0376	590.7087	776.9101	930.8851 (97)
Space heating kWh	350.1129	267.8086	217.6886	111.6893	40.0931	0.0000	0.0000	0.0000	0.0000	119.1161	244.3175	364.1153 (98a)
Space heating requirement - total per year (kWh/year)	1714.9413											
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	350.1129	267.8086	217.6886	111.6893	40.0931	0.0000	0.0000	0.0000	0.0000	119.1161	244.3175	364.1153 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1714.9413											
Space heating per m2	(98c) / (4) = 27.2646 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (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	350.1129	267.8086	217.6886	111.6893	40.0931	0.0000	0.0000	0.0000	0.0000	119.1161	244.3175	364.1153 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	350.1129	267.8086	217.6886	111.6893	40.0931	0.0000	0.0000	0.0000	0.0000	119.1161	244.3175	364.1153 (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)
Space heating fuel used, main 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)
Water heating												
Water heating requirement	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (64)
Efficiency of water heater (217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200 (216)
Fuel for water heating, kWh/month	66.8475	59.0143	62.4277	54.2425	52.1444	46.5111	45.5537	47.6255	48.4399	54.5849	58.7402	66.0321 (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	3.5184	3.1779	3.5184	3.4049	3.5184	3.4049	3.5184	3.5184	3.4049	3.5184	3.4049	3.5184 (231)
Lighting	18.6601	14.9699	13.4787	9.8751	7.6278	6.2320	6.9583	9.0447	11.7482	15.4142	17.4103	19.1788 (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)												

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(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												1714.9413	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												324.5200	
Water heating fuel used												662.1638	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2240)													
mechanical ventilation fans (SFP = 0.2240)												41.4262	(230a)
Total electricity for the above, kWh/year												41.4262	(231)
Electricity for lighting (calculated in Appendix L)												150.5981	(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												2569.1294	(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	1714.9413	0.1556	266.9305	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	662.1638	0.1412	93.4677	(264)
Space and water heating			360.3982	(265)
Pumps, fans and electric keep-hot	41.4262	0.1387	5.7463	(267)
Energy for lighting	150.5981	0.1443	21.7360	(268)
Total CO2, kg/year			387.8805	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.1700	(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	1714.9413	1.5763	2703.1768	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	662.1638	1.5220	1007.7817	(278)
Space and water heating			3710.9585	(279)
Pumps, fans and electric keep-hot	41.4262	1.5128	62.6696	(281)
Energy for lighting	150.5981	1.5338	230.9923	(282)
Total Primary energy kWh/year			4004.6204	(286)
Dwelling Primary energy Rate (DPER)			63.6700	(287)

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

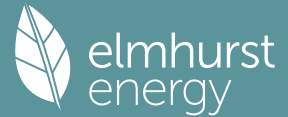
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	62.9000	2.4100	151.5890	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000			(5)
Dwelling volume				

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	Air changes per hour	
Pressure test	20.0000 / (5) =	0.1319 (8)
Pressure Test Method	Yes	
Measured/design AP50	Blower Door	
Infiltration rate	5.0000	(17)
Number of sides sheltered	0.3819	(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) =	0.3246 (21)

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Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4139	0.4058	0.3977	0.3571	0.3490	0.3084	0.3084	0.3003	0.3246	0.3490	0.3652	0.3815 (22b)
	0.5857	0.5823	0.5791	0.5638	0.5609	0.5476	0.5476	0.5451	0.5527	0.5609	0.5667	0.5728 (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			2.0800	1.0000	2.0800		(26)
TER Opening Type			9.7700	1.1450	11.1870		(27)
GF B&B J150 P/A=0.22			62.9000	0.1300	8.1770		(28a)
EW Brick AAC018/019	59.3700	9.7700	49.6000	0.1800	8.9280		(29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.1800	0.3960		(29a)
Total net area of external elements Aum(A, m2)			126.5500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.7680		(33)
Main dwelling							
Party Wall			18.2900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							203.7653 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.6500	0.0500	0.1825
E2 Other lintels (including other steel lintels)	1.9200	0.0500	0.0960
E3 Sill	3.6400	0.0500	0.1820
E4 Jamb	16.6700	0.0500	0.8335
E5 Ground floor (normal)	8.0100	0.1600	1.2816
E7 Party floor between dwellings (in blocks of flats)	23.0100	0.0700	1.6107
E5 Ground floor (normal)	15.0000	0.1600	2.4000
E16 Corner (normal)	7.7400	0.0900	0.6966
E18 Party wall between dwellings	2.5800	0.0600	0.1548
P1 Party wall - Ground floor	7.0900	0.0800	0.5672
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	1.0200	0.0500	0.0510
E4 Jamb	4.2000	0.0500	0.2100
E5 Ground floor (normal)	1.6600	0.1600	0.2656
E7 Party floor between dwellings (in blocks of flats)	1.6600	0.0700	0.1162
E25 Staggered party wall between dwellings	2.5800	0.0600	0.1548
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.8025 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		39.5705 (37)

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

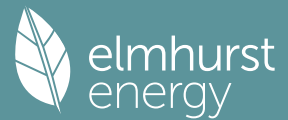
(38)m	Jan 29.2976	Feb 29.1312	Mar 28.9681	Apr 28.2019	May 28.0586	Jun 27.3913	Jul 27.3913	Aug 27.2677	Sep 27.6483	Oct 28.0586	Nov 28.3486	Dec 28.6517 (38)
Heat transfer coeff	68.8681	68.7017	68.5386	67.7724	67.6291	66.9618	66.9618	66.8383	67.2189	67.6291	67.9191	68.2222 (39)
Average = Sum(39)m / 12 =												67.7718

HLP	Jan 1.0949	Feb 1.0922	Mar 1.0896	Apr 1.0775	May 1.0752	Jun 1.0646	Jul 1.0646	Aug 1.0626	Sep 1.0687	Oct 1.0752	Nov 1.0798	Dec 1.0846 (40)
HLP (average)												1.0775
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0623 (42)
Hot water usage for mixer showers												
58.7981	57.9145	56.6268	54.1632	52.3452	50.3177	49.1652	50.4431	51.8439	54.0208	56.5373	58.5728 (42a)	
Hot water usage for baths												
25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224 (42b)	
Hot water usage for other uses												
35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503 (42c)	
Average daily hot water use (litres/day)												110.2677 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
119.9567	117.3957	114.2767	109.5333	105.6816	101.5406	99.9487	103.0543	106.3296	110.6770	115.4935	119.6455 (44)	
Energy content (annual)	189.9821	167.1700	175.6391	149.9457	142.2677	124.8560	120.8793	127.6027	131.1150	150.1877	164.5417	187.3360 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1831.5229
28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004 (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 (61)	
Total heat required for water heating calculated for each month												
236.5770	209.2557	222.2340	195.0375	188.8626	169.9478	167.4742	174.1976	176.2069	196.7826	209.6335	233.9309 (62)	
WWHRS	-26.8800	-23.7729	-24.8936	-20.6129	-19.2105	-16.4386	-15.4085	-16.3854	-17.0080	-20.0505	-22.7148	-26.3822 (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	209.6970	185.4828	197.3404	174.4246	169.6521	153.5093	152.0657	157.8122	159.1989	176.7320	186.9187	207.5487 (64)
12Total per year (kWh/year)												2130.3824 (64)
Electric shower(s)								Total per year (kWh/year) = Sum(64)m =				2130 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
100.4450	89.2526	95.6759	85.9304	84.5799	77.5881	77.4683	79.7038	79.6692	87.2133	90.7836	99.5651 (65)	

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.3878	105.6079	95.3878	98.5674	95.3878	98.5674	95.3878	95.3878	98.5674	95.3878	98.5674	95.3878	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	180.1971	182.0670	177.3549	167.3236	154.6607	142.7595	134.8087	132.9388	137.6509	147.6822	160.3451	172.2463	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	(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)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	(71)
Water heating gains (Table 5)	135.0067	132.8164	128.5967	119.3478	113.6827	107.7612	104.1241	107.1288	110.6517	117.2222	126.0883	133.8241	(72)
Total internal gains	467.5265	477.4262	458.2744	442.1737	420.6662	403.0231	388.2555	389.3904	400.8049	417.2272	441.9357	458.3932	(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
Southeast					1.9100	36.7938	0.6300	0.7000			0.7700			21.4773 (77)
Northwest					7.8600	11.2829	0.6300	0.7000			0.7700			27.1030 (81)
Solar gains	48.5803	91.7527	149.4523	225.2593	288.8929	302.8958	285.3271	235.3934	175.3161	107.8536	59.8274			40.5138 (83)
Total gains	516.1068	569.1789	607.7267	667.4330	709.5591	705.9188	673.5826	624.7838	576.1210	525.0809	501.7631			498.9070 (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	51.6964	51.8216	51.9450	52.5322	52.6435	53.1681	53.1681	53.2664	52.9648	52.6435	52.4187	52.1858		
alpha	4.4464	4.4548	4.4630	4.5021	4.5096	4.5445	4.5445	4.5511	4.5310	4.5096	4.4946	4.4791		
util living area	0.9842	0.9742	0.9536	0.8914	0.7660	0.5807	0.4316	0.4820	0.7210	0.9152	0.9718	0.9862	(86)	
MIT	19.7029	19.8852	20.1622	20.5436	20.8267	20.9622	20.9921	20.9871	20.9016	20.5481	20.0750	19.6759	(87)	
Th 2	20.0050	20.0072	20.0093	20.0193	20.0212	20.0299	20.0299	20.0315	20.0265	20.0212	20.0174	20.0134	(88)	
util rest of house	0.9802	0.9677	0.9417	0.8642	0.7131	0.5025	0.3393	0.3853	0.6454	0.8879	0.9636	0.9828	(89)	
MIT 2	18.5129	18.7440	19.0917	19.5593	19.8734	20.0067	20.0269	20.0262	19.9573	19.5762	18.9932	18.4847	(90)	
Living area fraction									fLA = Living area / (4) =			0.3930	(91)	
MIT	18.9806	19.1925	19.5124	19.9461	20.2480	20.3822	20.4062	20.4039	20.3284	19.9582	19.4184	18.9528	(92)	
Temperature adjustment												0.0000		
adjusted MIT	18.9806	19.1925	19.5124	19.9461	20.2480	20.3822	20.4062	20.4039	20.3284	19.9582	19.4184	18.9528	(93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9747	0.9610	0.9344	0.8619	0.7262	0.5317	0.3755	0.4231	0.6703	0.8858	0.9572	0.9778	(94)
Useful gains	503.0646	546.9659	567.8736	575.2417	515.2660	375.3565	252.9486	264.3549	386.1737	465.1166	480.2930	487.8162	(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	1011.0245	981.9179	891.8545	748.6233	578.0965	387.1885	254.8704	267.6115	418.6664	632.8844	836.6527	1006.4724	(97)
Space heating kWh	377.9222	292.2877	241.0418	124.8348	46.7459	0.0000	0.0000	0.0000	0.0000	124.8193	256.5790	385.8802	(98a)
Space heating requirement - total per year (kWh/year)												1850.1109	
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	377.9222	292.2877	241.0418	124.8348	46.7459	0.0000	0.0000	0.0000	0.0000	124.8193	256.5790	385.8802	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1850.1109	
Space heating per m ²										(98c) / (4) =		29.4135	(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	377.9222	292.2877	241.0418	124.8348	46.7459	0.0000	0.0000	0.0000	0.0000	124.8193	256.5790	385.8802	(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)	409.4498	316.6714	261.1504	135.2489	50.6456	0.0000	0.0000	0.0000	0.0000	135.2321	277.9838	418.0718	(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 requirement	209.6970	185.4828	197.3404	174.4246	169.6521	153.5093	152.0657	157.8122	159.1989	176.7320	186.9187	207.5487	(64)
Efficiency of water heater	85.3643	85.0750	84.5095	83.3227	81.5862	79.8000	79.8000	79.8000	79.8000	83.2943	84.7705	85.4302	(216)
(217)m													(217)

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Fuel for water heating, kWh/month	245.6495	218.0226	233.5126	209.3361	207.9421	192.3675	190.5585	197.7596	199.4974	212.1777	220.4996	242.9453 (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	19.8197	15.9001	14.3163	10.4887	8.1018	6.6192	7.3907	9.6067	12.4782	16.3721	18.4922	20.3706 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-21.4987	-31.3390	-46.5636	-54.1837	-60.0252	-56.6251	-55.9505	-52.0434	-45.3984	-36.6680	-24.0055	-18.4699 (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	-9.2006	-19.6319	-39.5337	-60.1272	-80.2280	-80.8603	-79.8902	-67.2943	-48.8800	-28.3009	-12.3582	-7.2537 (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												2004.4539 (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												2570.2686 (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)												159.9564 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1036.3301 (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												3784.3488 (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	2004.4539	0.2100	420.9353 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2570.2686	0.2100	539.7564 (264)
Space and water heating			960.6917 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	159.9564	0.1443	23.0866 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-502.7709	0.1339	-67.3096
PV Unit electricity exported	-533.5591	0.1255	-66.9800
Total			-134.2896 (269)
Total CO2, kg/year			861.4181 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.7000 (273)

13a. Primary energy - Individual heating systems including micro-CHP

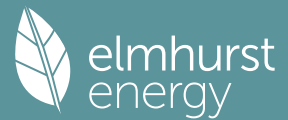
	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2004.4539	1.1300	2265.0329 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2570.2686	1.1300	2904.4036 (278)
Space and water heating			5169.4364 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	159.9564	1.5338	245.3464 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-502.7709	1.4947	-751.5157
PV Unit electricity exported	-533.5591	0.4608	-245.8537
Total			-997.3693 (283)
Total Primary energy kWh/year			4547.5143 (286)
Target Primary Energy Rate (TPER)			72.3000 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.9000 (1b)	x 2.4100 (2b)	= 151.5890 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	151.5890 (5)

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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) =	0.1319 (8)
Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												2.2900 (17)
Infiltration rate												0.2464 (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) = 0.2095 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	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)
Adj infilt rate	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)
	0.2671	0.2618	0.2566	0.2304	0.2252	0.1990	0.1990	0.1938	0.2095	0.2252	0.2357	0.2461 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5357	0.5343	0.5329	0.5265	0.5254	0.5198	0.5198	0.5188	0.5219	0.5254	0.5278	0.5303 (25)

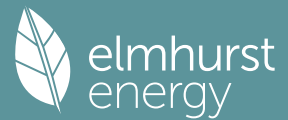
3. Heat losses and heat loss parameter

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								
Window			5.7300	1.2357	7.0808			(27)
French Door			4.0400	1.3258	5.3561			(27)
Corridor Door			2.0800	1.0000	2.0800			(26)
GF B&B J150 P/A=0.22			62.9000	0.1000	6.2900	75.0000	4717.5000	(28a)
EW Brick AAC018/019	59.3700	9.7700	49.6000	0.2600	12.8960	60.0000	2975.9999	(29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600	(29a)
Total net area of external elements Aum (A, m2)			126.5500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		34.1649			(33)
Main dwelling								
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500	(32)
Party Ceiling			62.9000			40.0000	2516.0000	(32b)
GF Timber			167.9200			9.0000	1511.2800	(32c)
Masonry Walls			4.0500			39.0000	157.9500	(32c)
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		12816.8400	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							203.7653	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				3.6500	0.0370		0.1351	
E2 Other lintels (including other steel lintels)				1.9200	0.0410		0.0787	
E3 Sill				3.6400	0.0090		0.0328	
E4 Jamb				16.6700	0.0140		0.2334	
E5 Ground floor (normal)				8.0100	0.0380		0.3044	
E7 Party floor between dwellings (in blocks of flats)				23.0100	0.0390		0.8974	
E5 Ground floor (normal)				15.0000	0.0450		0.6750	
E16 Corner (normal)				7.7400	0.0410		0.3173	
E18 Party wall between dwellings				2.5800	0.0390		0.1006	
P1 Party wall - Ground floor				7.0900	0.0470		0.3332	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				7.0900	0.0000		0.0000	
E2 Other lintels (including other steel lintels)				1.0200	0.0270		0.0275	
E4 Jamb				4.2000	0.0850		0.3570	
E5 Ground floor (normal)				1.6600	0.0450		0.0747	
E7 Party floor between dwellings (in blocks of flats)				1.6600	0.0330		0.0548	
E25 Staggered party wall between dwellings				2.5800	0.0380		0.0980	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.7199	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	37.8848	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0623 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224 (42b)
Hot water usage for other uses	35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503 (42c)
Average daily hot water use (litres/day)												56.0578 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	61.1586	59.4813	57.6499	55.3701	53.3364	51.2229	50.7835	52.6112	54.4857	56.6562	58.9562	61.0727 (44)

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Energy content (annual)	96.8603	84.7006	88.6057	75.7989	71.8011	62.9846	61.4182	65.1436	67.1864	76.8820	83.9939	95.6252 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	931.0004
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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	82.3313	71.9955	75.3149	64.4291	61.0309	53.5369	52.2055	55.3721	57.1084	65.3497	71.3948	81.2814 (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	82.3313	71.9955	75.3149	64.4291	61.0309	53.5369	52.2055	55.3721	57.1084	65.3497	71.3948	81.2814 (64)
12Total per year (kWh/year)												791.3503 (64)
Electric shower(s)	47.0875	41.9553	45.8136	43.7194	44.5397	42.4866	43.9028	44.5397	43.7194	45.8136	44.9521	47.0875 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												535.6171 (64a)
Heat gains from water heating, kWh/month	32.3547	28.4877	30.2821	27.0371	26.3927	24.0059	24.0271	24.9780	25.2069	27.7908	29.0867	32.0922 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.3878	105.6079	95.3878	98.5674	95.3878	98.5674	95.3878	95.3878	98.5674	95.3878	98.5674	95.3878 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	180.1971	182.0670	177.3549	167.3236	154.6607	142.7595	134.8087	132.9388	137.6509	147.6822	160.3451	172.2463 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116 (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)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932 (71)
Water heating gains (Table 5)	43.4875	42.3924	40.7018	37.5515	35.4740	33.3415	32.2945	33.5725	35.0096	37.3532	40.3982	43.1347 (72)
Total internal gains	373.0073	384.0023	367.3795	357.3774	339.4575	328.6033	316.4259	315.8341	325.1629	334.3583	353.2457	364.7038 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF Access factor Table 6d	Gains W
Southeast	1.9100	36.7938	0.4600	0.0000	0.7700	24.8918 (77)
Northwest	3.8200	11.2829	0.4600	0.0000	0.7700	15.2663 (81)
Northwest	4.0400	11.2829	0.6000	0.7000	0.7700	13.2674 (81)

Solar gains	53.4256	100.4812	162.6574	243.7369	311.5207	326.2094	307.4504	254.2906	190.3266	117.8409	65.7175	44.6043 (83)
Total gains	426.4329	484.4835	530.0369	601.1144	650.9782	654.8127	623.8763	570.1247	515.4895	452.1992	418.9632	409.3081 (84)

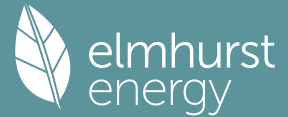
7. Mean internal temperature (heating season)

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	55.0429	55.1019	55.1599	55.4338	55.4854	55.7266	55.7266	55.7716	55.6335	55.4854	55.3812	55.2727
alpha	4.6695	4.6735	4.6773	4.6956	4.6990	4.7151	4.7151	4.7181	4.7089	4.6990	4.6921	4.6848
util living area	0.9921	0.9848	0.9684	0.9117	0.7869	0.5971	0.4447	0.5039	0.7556	0.9419	0.9846	0.9934 (86)
MIT	19.6534	19.8457	20.1336	20.5298	20.8265	20.9633	20.9925	20.9869	20.8930	20.5044	20.0128	19.6144 (87)
Th 2	20.0598	20.0607	20.0616	20.0658	20.0666	20.0703	20.0703	20.0710	20.0689	20.0666	20.0650	20.0633 (88)
util rest of house	0.9900	0.9808	0.9599	0.8886	0.7370	0.5205	0.3536	0.4074	0.6839	0.9215	0.9799	0.9917 (89)
MIT 2	18.8360	19.0269	19.3101	19.6902	19.9494	20.0524	20.0680	20.0666	20.0084	19.6751	19.1971	18.8001 (90)
Living area fraction	19.1572	19.3487	19.6337	20.0202	20.2941	20.4104	20.4314	20.4283	20.3561	20.0010	19.5177	19.1201 (92)
MIT	19.1572	19.3487	19.6337	20.0202	20.2941	20.4104	20.4314	20.4283	20.3561	20.0010	19.5177	19.1201 (93)
Temperature adjustment												0.0000
adjusted MIT	19.1572	19.3487	19.6337	20.0202	20.2941	20.4104	20.4314	20.4283	20.3561	20.0010	19.5177	19.1201 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	421.0406	473.3455	506.2987	533.3660	488.2298	359.6967	242.9620	253.8182	364.7466	415.9540	409.0424	404.9648 (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	960.9811	933.5548	847.7031	714.1943	551.4447	371.2111	244.7759	257.1517	400.3538	603.2191	798.2826	961.0365 (97)
Space heating kWh	401.7157	309.2606	254.0049	130.1964	47.0319	0.0000	0.0000	0.0000	0.0000	139.3253	280.2530	413.7174 (98a)
Space heating requirement - total per year (kWh/year)												1975.5051
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	401.7157	309.2606	254.0049	130.1964	47.0319	0.0000	0.0000	0.0000	0.0000	139.3253	280.2530	413.7174 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1975.5051
Space heating per m2												31.4071 (99)

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8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
Heat loss rate W												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	600.5420	472.7671	485.1537	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8936	0.9409	0.9142	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	536.6253	444.8174	443.5460	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	726.7280	692.5602	631.6166	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	136.8739	184.3206	139.9246	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	34.2185	46.0802	34.9811	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												115.2798 (107)
Energy for space heating												31.4071 (99)
Energy for space cooling												1.8327 (108)
Total												33.2398 (109)
Fabric Energy Efficiency (DFEE)												33.2 (109)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.9000 (1b)	x 2.4100 (2b)	= 151.5890 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	151.5890 (5)

2. Ventilation rate

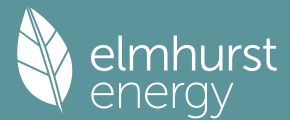
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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	20.0000 / (5) = 0.1319 (8)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Yes
Pressure test	Blower Door
Pressure Test Method	5.0000 (17)
Measured/design AP50	0.3819 (18)
Infiltration rate	2 (19)
Number of sides sheltered	
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3246 (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	0.4139	0.4058	0.3977	0.3571	0.3490	0.3084	0.3084	0.3003	0.3246	0.3490	0.3652	0.3815 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5857	0.5823	0.5791	0.5638	0.5609	0.5476	0.5476	0.5451	0.5527	0.5609	0.5667	0.5728 (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			2.0800	1.0000	2.0800		(26)
TER Opening Type			9.7700	1.1450	11.1870		(27)
GF B&B J150 P/A=0.22			62.9000	0.1300	8.1770		(28a)
EW Brick AAC018/019	59.3700		49.6000	0.1800	8.9280		(29a)
E-WM-30 Corridor Wall	4.2800	9.7700	2.2000	0.1800	0.3960		(29a)
Total net area of external elements Aum(A, m2)			126.5500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.7680		(33)
Main dwelling							
Party Wall			18.2900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							203.7653 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				3.6500	0.0500		0.1825
E2 Other lintels (including other steel lintels)				1.9200	0.0500		0.0960

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E3 Sill								3.6400	0.0500	0.1820		
E4 Jamb								16.6700	0.0500	0.8335		
E5 Ground floor (normal)								8.0100	0.1600	1.2816		
E7 Party floor between dwellings (in blocks of flats)								23.0100	0.0700	1.6107		
E5 Ground floor (normal)								15.0000	0.1600	2.4000		
E16 Corner (normal)								7.7400	0.0900	0.6966		
E18 Party wall between dwellings								2.5800	0.0600	0.1548		
P1 Party wall - Ground floor								7.0900	0.0800	0.5672		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)								7.0900	0.0000	0.0000		
E2 Other lintels (including other steel lintels)								1.0200	0.0500	0.0510		
E4 Jamb								4.2000	0.0500	0.2100		
E5 Ground floor (normal)								1.6600	0.1600	0.2656		
E7 Party floor between dwellings (in blocks of flats)								1.6600	0.0700	0.1162		
E25 Staggered party wall between dwellings								2.5800	0.0600	0.1548		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											8.8025	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	39.5705 (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
Heat transfer coeff	29.2976	29.1312	28.9681	28.2019	28.0586	27.3913	27.3913	27.2677	27.6483	28.0586	28.3486	28.6517 (38)
Average = Sum(39)m / 12 =	68.8681	68.7017	68.5386	67.7724	67.6291	66.9618	66.9618	66.8383	67.2189	67.6291	67.9191	68.2222 (39)
												67.7718
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0949	1.0922	1.0896	1.0775	1.0752	1.0646	1.0646	1.0626	1.0687	1.0752	1.0798	1.0846 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.0775
												31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.0623 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224 (42b)
Hot water usage for other uses												
	35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503 (42c)
Average daily hot water use (litres/day)												56.0578 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	61.1586	59.4813	57.6499	55.3701	53.3364	51.2229	50.7835	52.6112	54.4857	56.6562	58.9562	61.0727 (44)
Energy content (annual)	96.8603	84.7006	88.6057	75.7989	71.8011	62.9846	61.4182	65.1436	67.1864	76.8820	83.9939	95.6252 (45)
Distribution loss (46)m = 0.15 x (45)m												931.0004
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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												
WWHRS	82.3313	71.9955	75.3149	64.4291	61.0309	53.5369	52.2055	55.3721	57.1084	65.3497	71.3948	81.2814 (62)
FV 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 (63a)
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 (63b)
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 (63c)
Output from w/h	82.3313	71.9955	75.3149	64.4291	61.0309	53.5369	52.2055	55.3721	57.1084	65.3497	71.3948	81.2814 (64)
12Total per year (kWh/year)												791.3503 (64)
Electric shower(s)	47.0875	41.9553	45.8136	43.7194	44.5397	42.4866	43.9028	44.5397	43.7194	45.8136	44.9521	47.0875 (64a)
												535.6171 (64a)
Heat gains from water heating, kWh/month	32.3547	28.4877	30.2821	27.0371	26.3927	24.0059	24.0271	24.9780	25.2069	27.7908	29.0867	32.0922 (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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	95.3878	105.6079	95.3878	98.5674	95.3878	98.5674	95.3878	95.3878	98.5674	95.3878	98.5674	95.3878 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	180.1971	182.0670	177.3549	167.3236	154.6607	142.7595	134.8087	132.9388	137.6509	147.6822	160.3451	172.2463 (68)
Pumps, fans	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932 (71)
Total internal gains	43.4875	42.3924	40.7018	37.5515	35.4740	33.3415	32.2945	33.5725	35.0096	37.3532	40.3982	43.1347 (72)
	373.0073	384.0023	367.3795	357.3774	339.4575	328.6033	316.4259	315.8341	325.1629	334.3583	353.2457	364.7038 (73)

6. Solar gains												

[Jan]												
			Area		Solar flux		g		FF		Access	Gains
			m2		Table 6a		W/m2		Specific data		factor	W
					or Table 6b				or Table 6c		Table 6d	
Southeast			1.9100		36.7938		0.6300		0.7000		0.7700	21.4773 (77)
Northwest			7.8600		11.2829		0.6300		0.7000		0.7700	27.1030 (81)

Solar gains	48.5803	91.7527	149.4523	225.2593	288.8929	302.8958	285.3271	235.3934	175.3161	107.8536	59.8274	40.5138 (83)

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Total gains 421.5876 475.7550 516.8318 582.6367 628.3504 631.4991 601.7530 551.2275 500.4790 442.2119 413.0731 405.2175 (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	51.6964	51.8216	51.9450	52.5322	52.6435	53.1681	53.1681	53.2664	52.9648	52.6435	52.4187	52.1858
alpha	4.4464	4.4548	4.4630	4.5021	4.5096	4.5445	4.5445	4.5511	4.5310	4.5096	4.4946	4.4791
util living area	0.9927	0.9866	0.9733	0.9267	0.8189	0.6362	0.4797	0.5398	0.7867	0.9504	0.9862	0.9938 (86)
MIT	19.5223	19.7132	20.0076	20.4321	20.7679	20.9456	20.9879	20.9798	20.8577	20.4258	19.9124	19.4951 (87)
Th 2	20.0050	20.0072	20.0093	20.0193	20.0212	20.0299	20.0299	20.0315	20.0265	20.0212	20.0174	20.0134 (88)
util rest of house	0.9907	0.9830	0.9658	0.9059	0.7707	0.5549	0.3787	0.4344	0.7154	0.9320	0.9818	0.9922 (89)
MIT 2	18.6640	18.8548	19.1464	19.5616	19.8619	20.0031	20.0262	20.0248	19.9446	19.5647	19.0613	18.6434 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.0013	19.1921	19.4849	19.9037	20.2180	20.3735	20.4042	20.4001	20.3034	19.9031	19.3958	18.9781 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.0013	19.1921	19.4849	19.9037	20.2180	20.3735	20.4042	20.4001	20.3034	19.9031	19.3958	18.9781 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9880	0.9792	0.9609	0.9031	0.7812	0.5849	0.4184	0.4756	0.7375	0.9293	0.9782	0.9898 (94)
Useful gains	416.5423	465.8426	496.6311	526.1699	490.8967	369.3463	251.7537	262.1533	369.1174	410.9354	404.0632	401.1029 (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	1012.4529	981.8932	889.9641	745.7461	576.0652	386.6037	254.7329	267.3614	416.9882	629.1613	835.1194	1008.1974 (97)
Space heating kWh	443.3574	346.7860	292.6397	158.0948	63.3654	0.0000	0.0000	0.0000	0.0000	162.3601	310.3605	451.6783 (98a)
Space heating requirement - total per year (kWh/year)	2228.6423											
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	443.3574	346.7860	292.6397	158.0948	63.3654	0.0000	0.0000	0.0000	0.0000	162.3601	310.3605	451.6783 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2228.6423											
Space heating per m2	(98c) / (4) = 35.4315 (99)											

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan 4.3000	Feb 4.9000	Mar 6.5000	Apr 8.9000	May 11.7000	Jun 14.6000	Jul 16.6000	Aug 16.4000	Sep 14.1000	Oct 10.6000	Nov 7.1000	Dec 4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	629.4412	495.5176	507.9708	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8600	0.9174	0.8858	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	541.3356	454.5889	449.9517	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	699.4783	666.7018	609.5289	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	113.8627	157.8120	118.7254	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	28.4657	39.4530	29.6814	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	97.6000 (107)											
Energy for space heating	35.4315 (99)											
Energy for space cooling	1.5517 (108)											
Total	36.9832 (109)											
Fabric Energy Efficiency (TFEE)	37.0 (109)											

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)

CALCULATION OF ENERGY RATING

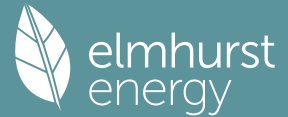
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	62.9000 (1b)	x 2.4100 (2b)	= 151.5890 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 151.5890 (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	0 * 10 = 0.0000 (7a)

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Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
0.0000 / (5) = 0.0000 (8)
Yes
Blower Door
2.2900 (17)
0.1145 (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) = 0.0973 (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	0.1241	0.1217	0.1192	0.1071	0.1046	0.0925	0.0925	0.0900	0.0973	0.1046	0.1095	0.1144	(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 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								
Window			5.7300	1.2357	7.0808			(27)
French Door			4.0400	1.3258	5.3561			(27)
Corridor Door			2.0800	1.0000	2.0800			(26)
GF B&B J150 P/A=0.22			62.9000	0.1000	6.2900	75.0000	4717.5000	(28a)
EW Brick AAC018/019	59.3700	9.7700	49.6000	0.2600	12.8960	60.0000	2975.9999	(29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600	(29a)
Total net area of external elements Aum(A, m2)			126.5500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 34.1649			(33)
Main dwelling								
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500	(32)
Party Ceiling			62.9000			40.0000	2516.0000	(32b)
GF Timber			167.9200			9.0000	1511.2800	(32c)
Masonry Walls			4.0500			39.0000	157.9500	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
(28)...(30) + (32) + (32a)...(32e) = 12816.8400 (34)
203.7653 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.6500	0.0370	0.1351
E2 Other lintels (including other steel lintels)	1.9200	0.0410	0.0787
E3 Sill	3.6400	0.0090	0.0328
E4 Jamb	16.6700	0.0140	0.2334
E5 Ground floor (normal)	8.0100	0.0380	0.3044
E7 Party floor between dwellings (in blocks of flats)	23.0100	0.0390	0.8974
E5 Ground floor (normal)	15.0000	0.0450	0.6750
E16 Corner (normal)	7.7400	0.0410	0.3173
E18 Party wall between dwellings	2.5800	0.0390	0.1006
P1 Party wall - Ground floor	7.0900	0.0470	0.3332
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	1.0200	0.0270	0.0275
E4 Jamb	4.2000	0.0850	0.3570
E5 Ground floor (normal)	1.6600	0.0450	0.0747
E7 Party floor between dwellings (in blocks of flats)	1.6600	0.0330	0.0548
E25 Staggered party wall between dwellings	2.5800	0.0380	0.0980

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 37.8848 (37)

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

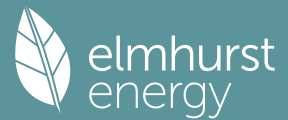
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	(38)
Heat transfer coeff	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	(39)
Average = Sum(39)m / 12 =												62.8970	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(40)
HLP (average)												1.0000	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0623 (42)
Hot water usage for mixer showers	58.7981	57.9145	56.6268	54.1632	52.3452	50.3177	49.1652	50.4431	51.8439	54.0208	56.5373	58.5728	(42a)
Hot water usage for baths	25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224	(42b)
Hot water usage for other uses	35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503	(42c)
Average daily hot water use (litres/day)													110.2677 (43)
Daily hot water use	119.9567	117.3957	114.2767	109.5333	105.6816	101.5406	99.9487	103.0543	106.3296	110.6770	115.4935	119.6455	(44)
Energy conte	189.9821	167.1700	175.6391	149.9457	142.2677	124.8560	120.8793	127.6027	131.1150	150.1877	164.5417	187.3360	(45)
Energy content (annual)										Total = Sum(45)m =		1831.5229	
Distribution loss (46)m = 0.15 x (45)m	28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004	(46)
Water storage loss:													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													

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If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
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 (59)
Total heat required for water heating calculated for each month	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (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	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (64)
	Total per year (kWh/year) = Sum(64)m =											2148.8539 (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	63.1691	55.5840	58.4000	49.8569	47.3040	41.5146	40.1924	42.4279	43.5957	49.9374	54.7101	62.2892 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.3187	18.9351	15.3991	11.6581	8.7145	7.3572	7.9497	10.3333	13.8694	17.6103	20.5539	21.9112	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	268.9509	271.7418	264.7089	249.7366	230.8369	213.0738	201.2070	198.4162	205.4491	220.4213	239.3210	257.0841	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	(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)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	(71)
Water heating gains (Table 5)	84.9046	82.7143	78.4946	69.2457	63.5807	57.6592	54.0220	57.0268	60.5496	67.1202	75.9863	83.7221	(72)
Total internal gains	465.8571	464.0741	449.2854	421.3234	393.8150	368.7731	353.8616	356.4591	370.5510	395.8347	426.5440	453.4003	(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				
Southeast					1.9100	36.7938		0.4600	0.0000	0.7700		24.8918 (77)				
Northwest					3.8200	11.2829		0.4600	0.0000	0.7700		15.2663 (81)				
Northwest					4.0400	11.2829		0.6000	0.7000	0.7700		13.2674 (81)				
Solar gains					53.4256	100.4812	162.6574	243.7369	311.5207	326.2094	307.4504	254.2906	190.3266	117.8409	65.7175	44.6043 (83)
Total gains					519.2827	564.5553	611.9429	665.0603	705.3357	694.9825	661.3120	610.7498	560.8776	513.6756	492.2615	498.0046 (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	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042
alpha	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736
util living area	0.9822	0.9718	0.9456	0.8775	0.7416	0.5604	0.4147	0.4666	0.7072	0.9100	0.9708	0.9852 (86)
MIT	19.8858	20.0432	20.3126	20.6340	20.8725	20.9731	20.9948	20.9910	20.9230	20.6150	20.1826	19.8328 (87)
Th 2	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834 (88)
util rest of house	0.9778	0.9651	0.9325	0.8491	0.6897	0.4873	0.3302	0.3770	0.6345	0.8823	0.9625	0.9816 (89)
MIT 2	18.8002	18.9981	19.3326	19.7164	19.9754	20.0669	20.0814	20.0796	20.0292	19.7043	19.1763	18.7334 (90)
Living area fraction	19.2268	19.4088	19.7177	20.0770	20.3280	20.4230	20.4404	20.4378	20.3804	20.0622	19.5718	19.1655 (91)
MIT	19.2268	19.4088	19.7177	20.0770	20.3280	20.4230	20.4404	20.4378	20.3804	20.0622	19.5718	19.1655 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2268	19.4088	19.7177	20.0770	20.3280	20.4230	20.4404	20.4378	20.3804	20.0622	19.5718	19.1655 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	505.0815	541.3549	566.8504	564.5751	496.7653	357.9030	240.2908	251.7020	369.7716	452.8568	470.9899	486.4836	(94)
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	(95)
Heat loss rate W	938.8518	912.5619	831.3563	703.0022	542.6723	366.2501	241.5465	253.9661	395.0212	595.1466	784.4382	941.2845	(97)
Space heating kWh	322.7251	249.4511	196.7924	99.6675	34.1549	0.0000	0.0000	0.0000	0.0000	105.8636	225.6828	338.3718	(98a)
Space heating requirement - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
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)	322.7251	249.4511	196.7924	99.6675	34.1549	0.0000	0.0000	0.0000	0.0000	105.8636	225.6828	338.3718	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98c)
Space heating per m2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
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Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(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	322.7251	249.4511	196.7924	99.6675	34.1549	0.0000	0.0000	0.0000	0.0000	105.8636	225.6828	338.3718	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	322.7251	249.4511	196.7924	99.6675	34.1549	0.0000	0.0000	0.0000	0.0000	105.8636	225.6828	338.3718	(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)
Space heating fuel used, main system 2												0.0000	(213)

Water heating													
Water heating requirement	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874	(64)
Efficiency of water heater	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(216)
Fuel for water heating, kWh/month	66.8475	59.0143	62.4277	54.2425	52.1444	46.5111	45.5537	47.6255	48.4399	54.5849	58.7402	66.0321	(217)
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	3.5184	3.1779	3.5184	3.4049	3.5184	3.4049	3.5184	3.4049	3.5184	3.4049	3.5184	3.4049	(231)
Lighting	18.6601	14.9699	13.4787	9.8751	7.6278	6.2320	6.9583	9.0447	11.7482	15.4142	17.4103	19.1788	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	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)	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)	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)	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)	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)	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)	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)	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												1572.7092	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												324.5200	
Water heating fuel used												662.1638	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:		
(MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.2240)		
mechanical ventilation fans (SFP = 0.2240)		
Total electricity for the above, kWh/year	41.4262	(230a)
Electricity for lighting (calculated in Appendix L)	41.4262	(231)
	150.5981	(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	2426.8973	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1572.7092	16.4900	259.3397
Space heating - main system 2	0.0000	16.4900	0.0000
Total CO2 associated with community systems			0.0000
Water heating (other fuel)	662.1638	16.4900	109.1908
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000
Pumps, fans and electric keep-hot	41.4262	16.4900	6.8312
Energy for lighting	150.5981	16.4900	24.8336
Additional standing charges			0.0000
Total energy cost			400.1954

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600	(256)
Energy cost factor (ECF)	1.3352	(257)
SAP value	78.3561	
SAP rating (Section 12)	78	(258)
SAP band	C	

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	1572.7092	0.1558	245.0167
Space heating - main system 2	0.0000	0.0000	0.0000

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Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	662.1638	0.1412	93.4677 (264)
Space and water heating			338.4843 (265)
Pumps, fans and electric keep-hot	41.4262	0.1387	5.7463 (267)
Energy for lighting	150.5981	0.1443	21.7360 (268)
Total CO2, kg/year			365.9666 (272)
CO2 emissions per m2			5.8200 (273)
EI value			95.4551
EI rating			95 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	62.9000 (1b)	x 2.4100 (2b)	= 151.5890 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 151.5890 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		2.2900	(17)
Infiltration rate		0.1145	(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) =	0.0973	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000 (22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000 (22a)
Adj infilt rate	0.1071	0.0998	0.0998	0.0949	0.0949	0.0827	0.0827	0.0803	0.0827	0.0925	0.0900	0.0973 (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

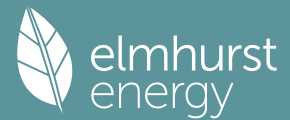
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window			5.7300	1.2357	7.0808		(27)
French Door			4.0400	1.3258	5.3561		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
GF B&B J150 P/A=0.22			62.9000	0.1000	6.2900	75.0000	4717.5000 (28a)
EW Brick AAC018/019	59.3700	9.7700	49.6000	0.2600	12.8960	60.0000	2975.9999 (29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600 (29a)
Total net area of external elements Aum(A, m2)			126.5500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.1649		(33)
Main dwelling							
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500 (32)
Party Ceiling			62.9000			40.0000	2516.0000 (32b)
GF Timber			167.9200			9.0000	1511.2800 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12816.8400	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		203.7653	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.6500	0.0370	0.1351
E2 Other lintels (including other steel lintels)	1.9200	0.0410	0.0787
E3 Sill	3.6400	0.0090	0.0328
E4 Jamb	16.6700	0.0140	0.2334
E5 Ground floor (normal)	8.0100	0.0380	0.3044
E7 Party floor between dwellings (in blocks of flats)	23.0100	0.0390	0.8974
E5 Ground floor (normal)	15.0000	0.0450	0.6750
E16 Corner (normal)	7.7400	0.0410	0.3173
E18 Party wall between dwellings	2.5800	0.0390	0.1006
P1 Party wall - Ground floor	7.0900	0.0470	0.3332
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	0.0000	0.0000

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E2 Other lintels (including other steel lintels)	1.0200	0.0270	0.0275
E4 Jamb	4.2000	0.0850	0.3570
E5 Ground floor (normal)	1.6600	0.0450	0.0747
E7 Party floor between dwellings (in blocks of flats)	1.6600	0.0330	0.0548
E25 Staggered party wall between dwellings	2.5800	0.0380	0.0980
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.7199 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	37.8848 (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
Heat transfer coeff	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122 (38)
Average = Sum(39)m / 12 =	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970 (39)
HLP	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000 (40)
HLP (average)												1.0000
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0623 (42)
Hot water usage for mixer showers												
Hot water usage for baths	58.7981	57.9145	56.6268	54.1632	52.3452	50.3177	49.1652	50.4431	51.8439	54.0208	56.5373	58.5728 (42a)
Hot water usage for other uses	25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224 (42b)
Average daily hot water use (litres/day)	35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503 (42c)
Daily hot water use	119.9567	117.3957	114.2767	109.5333	105.6816	101.5406	99.9487	103.0543	106.3296	110.6770	115.4935	119.6455 (44)
Energy content (annual)	189.9821	167.1700	175.6391	149.9457	142.2677	124.8560	120.8793	127.6027	131.1150	150.1877	164.5417	187.3360 (45)
Distribution loss (46)m = 0.15 x (45)m	28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004 (46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	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	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (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	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (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	63.1691	55.5840	58.4000	49.8569	47.3040	41.5146	40.1924	42.4279	43.5957	49.9374	54.7101	62.2892 (65)

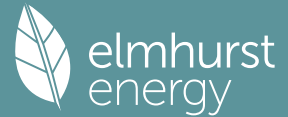
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	21.3187	18.9351	15.3991	11.6581	8.7145	7.3572	7.9497	10.3333	13.8694	17.6103	20.5539	21.9112 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	268.9509	271.7418	264.7089	249.7366	230.8369	213.0738	201.2070	198.4162	205.4491	220.4213	239.3210	257.0841 (68)
Pumps, fans	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932 (71)
Total internal gains	84.9046	82.7143	78.4946	69.2457	63.5807	57.6592	54.0220	57.0268	60.5496	67.1202	75.9863	83.7221 (72)
	465.8571	464.0741	449.2854	421.3234	393.8150	368.7731	353.8616	356.4591	370.5510	395.8347	426.5440	453.4003 (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			
Southeast				1.9100	42.9509	0.4600	0.0000	0.7700	29.0572 (77)			
Northwest				3.8200	13.7758	0.4600	0.0000	0.7700	18.6392 (81)			
Northwest				4.0400	13.7758	0.6000	0.7000	0.7700	16.1987 (81)			
Solar gains	63.8951	105.5669	170.8171	261.0114	325.2225	360.0564	336.0983	283.4451	213.5451	133.2431	77.5422	53.5760 (83)
Total gains	529.7523	569.6410	620.1025	682.3347	719.0376	728.8295	689.9599	639.9043	584.0960	529.0777	504.0862	506.9762 (84)

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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	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042
alpha	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736
util living area	0.9778	0.9665	0.9314	0.8432	0.6748	0.4594	0.3091	0.3522	0.6319	0.8766	0.9616	0.9813 (86)
MIT	19.9800	20.1250	20.4142	20.7208	20.9241	20.9901	20.9989	20.9979	20.9570	20.7112	20.2875	19.9377 (87)
Th 2	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834 (88)
util rest of house	0.9724	0.9583	0.9148	0.8082	0.6150	0.3843	0.2262	0.2634	0.5517	0.8397	0.9505	0.9766 (89)
MIT 2	18.9194	19.1008	19.4568	19.8145	20.0247	20.0784	20.0831	20.0828	20.0567	19.8137	19.3069	18.8665 (90)
Living area fraction									fLA = Living area / (4) =			0.3930 (91)
MIT	19.3363	19.5033	19.8331	20.1707	20.3781	20.4367	20.4430	20.4424	20.4105	20.1664	19.6923	19.2875 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3363	19.5033	19.8331	20.1707	20.3781	20.4367	20.4430	20.4424	20.4105	20.1664	19.6923	19.2875 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9667	0.9520	0.9095	0.8118	0.6350	0.4136	0.2589	0.2984	0.5813	0.8434	0.9448	0.9713 (94)
Useful gains	512.1132	542.3006	563.9856	553.9379	456.5676	301.4611	178.6060	190.9378	339.5550	446.2320	476.2500	492.4343 (95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000 (96)
Heat loss rate W	907.9967	880.7659	788.2929	658.5743	482.9322	304.2155	178.8164	191.3598	352.8834	551.3828	747.9891	904.9290 (97)
Space heating kWh	294.5373	227.4487	166.8846	75.3382	19.6153	0.0000	0.0000	0.0000	0.0000	78.2322	195.6521	306.8961 (98a)
Space heating requirement - total per year (kWh/year)												1364.6045
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	294.5373	227.4487	166.8846	75.3382	19.6153	0.0000	0.0000	0.0000	0.0000	78.2322	195.6521	306.8961 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1364.6045
Space heating per m2										(98c) / (4) =		21.6948 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (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	294.5373	227.4487	166.8846	75.3382	19.6153	0.0000	0.0000	0.0000	0.0000	78.2322	195.6521	306.8961 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	294.5373	227.4487	166.8846	75.3382	19.6153	0.0000	0.0000	0.0000	0.0000	78.2322	195.6521	306.8961 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (64)
Efficiency of water heater												324.5200 (216)
(217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200 (217)
Fuel for water heating, kWh/month	66.8475	59.0143	62.4277	54.2425	52.1444	46.5111	45.5537	47.6255	48.4399	54.5849	58.7402	66.0321 (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	3.5184	3.1779	3.5184	3.4049	3.5184	3.4049	3.5184	3.5184	3.4049	3.5184	3.4049	3.5184 (231)
Lighting	18.6601	14.9699	13.4787	9.8751	7.6278	6.2320	6.9583	9.0447	11.7482	15.4142	17.4103	19.1788 (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												1364.6045 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												324.5200
Water heating fuel used												662.1638 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2240)												
mechanical ventilation fans (SFP = 0.2240)												41.4262 (230a)
Total electricity for the above, kWh/year												41.4262 (231)
Electricity for lighting (calculated in Appendix L)												150.5981 (232)

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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	2218.7925 (238)

10a. Fuel costs - using BEDF prices (567)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1364.6045	26.0600	355.6159 (240)
Space heating - main system 2	0.0000	26.0600	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	662.1638	26.0600	172.5599 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	41.4262	26.0600	10.7957 (249)
Energy for lighting	150.5981	26.0600	39.2459 (250)
Additional standing charges			0.0000 (251)
Total energy cost			578.2173 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1364.6045	0.1565	213.5044 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	662.1638	0.1412	93.4677 (264)
Space and water heating			306.9721 (265)
Pumps, fans and electric keep-hot	41.4262	0.1387	5.7463 (267)
Energy for lighting	150.5981	0.1443	21.7360 (268)
Total CO2, kg/year			334.4544 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1364.6045	1.5792	2155.0335 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	662.1638	1.5220	1007.7817 (278)
Space and water heating			3162.8152 (279)
Pumps, fans and electric keep-hot	41.4262	1.5128	62.6696 (281)
Energy for lighting	150.5981	1.5338	230.9923 (282)
Total Primary energy kWh/year			3456.4771 (286)

SAP 10 EPC IMPROVEMENTS

Plot 032

Current energy efficiency rating: C 78
Current environmental impact rating: A 95

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
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Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings £0		0.00 kg/m²

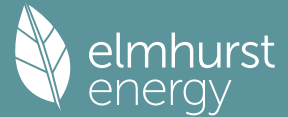
Potential energy efficiency rating: C 78
Potential environmental impact rating: A 95

Fuel prices for cost data on this page from database revision number 567 TEST (07 Mar 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current £578	Potential £578	Saving £0
Electricity			
Space heating	£366	£366	£0
Water heating	£173	£173	£0
Lighting	£39	£39	£0
Total cost of fuels	£578	£578	£0
Total cost of uses	£578	£578	£0
Delivered energy	35 kWh/m²	35 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	5 kg/m²	5 kg/m²	0 kg/m²
Primary energy	55 kWh/m²	55 kWh/m²	0 kWh/m²

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SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling		Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor		62.9000 (1b)	x 2.4100 (2b)	= 151.5890 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 151.5890 (5)

2. Ventilation rate

		m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)	
Number of open flues	0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)	
Number of blocked chimneys	0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)	
Number of passive vents	0 * 10 =	0.0000 (7b)	
Number of flueless gas fires	0 * 40 =	0.0000 (7c)	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)	
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		2.2900 (17)	
Infiltration rate		0.1145 (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) =	0.0973 (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	0.1241	0.1217	0.1192	0.1071	0.1046	0.0925	0.0925	0.0900	0.0973	0.1046	0.1095	0.1144 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
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
Main dwelling							
Window			5.7300	1.2357	7.0808		(27)
French Door			4.0400	1.3258	5.3561		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
GF B&B J150 P/A=0.22			62.9000	0.1000	6.2900	75.0000	4717.5000 (28a)
EW Brick AAC018/019	59.3700	9.7700	49.6000	0.2600	12.8960	60.0000	2975.9999 (29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600 (29a)
Total net area of external elements Aum(A, m ²)			126.5500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.1649		(33)
Main dwelling							
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500 (32)
Party Ceiling			62.9000			40.0000	2516.0000 (32b)
GF Timber			167.9200			9.0000	1511.2800 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
(28)...(30) + (32) + (32a)...(32e) = 12816.8400 (34)
203.7653 (35)

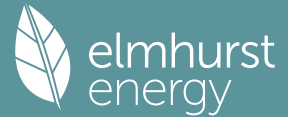
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.6500	0.0370	0.1351
E2 Other lintels (including other steel lintels)	1.9200	0.0410	0.0787
E3 Sill	3.6400	0.0090	0.0328
E4 Jamb	16.6700	0.0140	0.2334
E5 Ground floor (normal)	8.0100	0.0380	0.3044
E7 Party floor between dwellings (in blocks of flats)	23.0100	0.0390	0.8974
E5 Ground floor (normal)	15.0000	0.0450	0.6750
E16 Corner (normal)	7.7400	0.0410	0.3173
E18 Party wall between dwellings	2.5800	0.0390	0.1006
P1 Party wall - Ground floor	7.0900	0.0470	0.3332
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	0.0000	0.0000
E2 Other lintels (including other steel lintels)	1.0200	0.0270	0.0275
E4 Jamb	4.2000	0.0850	0.3570
E5 Ground floor (normal)	1.6600	0.0450	0.0747
E7 Party floor between dwellings (in blocks of flats)	1.6600	0.0330	0.0548
E25 Staggered party wall between dwellings	2.5800	0.0380	0.0980

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
Total fabric heat loss
(33) + (36) + (36a) = 37.8848 (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
	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122 (38)

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Heat transfer coeff	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970 (39)
Average = Sum(39)m / 12 =												62.8970
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0623 (42)
Hot water usage for mixer showers												
58.7981	57.9145	56.6268	54.1632	52.3452	50.3177	49.1652	50.4431	51.8439	54.0208	56.5373	58.5728	(42a)
Hot water usage for baths												
25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224	(42b)
Hot water usage for other uses												
35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503	(42c)
Average daily hot water use (litres/day)												110.2677 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	119.9567	117.3957	114.2767	109.5333	105.6816	101.5406	99.9487	103.0543	106.3296	110.6770	115.4935	119.6455 (44)
Energy conte	189.9821	167.1700	175.6391	149.9457	142.2677	124.8560	120.8793	127.6027	131.1150	150.1877	164.5417	187.3360 (45)
Energy content (annual)										Total = Sum(45)m =		1831.5229
Distribution loss (46)m = 0.15 x (45)m												
28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004	(46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	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												
216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874	(62)
WWHRS	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	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h												
216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874	(64)
							Total per year (kWh/year) = Sum(64)m =					2148.8539 (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												
63.1691	55.5840	58.4000	49.8569	47.3040	41.5146	40.1924	42.4279	43.5957	49.9374	54.7101	62.2892	(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
123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
21.3187	18.9351	15.3991	11.6581	8.7145	7.3572	7.9497	10.3333	13.8694	17.6103	20.5539	21.9112	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
268.9509	271.7418	264.7089	249.7366	230.8369	213.0738	201.2070	198.4162	205.4491	220.4213	239.3210	257.0841	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	(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)												
-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	(71)
Water heating gains (Table 5)												
84.9046	82.7143	78.4946	69.2457	63.5807	57.6592	54.0220	57.0268	60.5496	67.1202	75.9863	83.7221	(72)
Total internal gains												
465.8571	464.0741	449.2854	421.3234	393.8150	368.7731	353.8616	356.4591	370.5510	395.8347	426.5440	453.4003	(73)

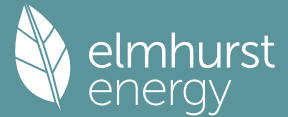
6. Solar gains

[Jan]												
				Area	Solar flux	g		FF		Access	Gains	
				m2	Table 6a	Specific data	Specific data			factor	W	
					W/m2	or Table 6b	or Table 6c			Table 6d		
Southeast				1.9100	36.7938	0.4600	0.0000			0.7700	24.8918 (77)	
Northwest				3.8200	11.2829	0.4600	0.0000			0.7700	15.2663 (81)	
Northwest				4.0400	11.2829	0.6000	0.7000			0.7700	13.2674 (81)	
Solar gains	53.4256	100.4812	162.6574	243.7369	311.5207	326.2094	307.4504	254.2906	190.3266	117.8409	65.7175	44.6043 (83)
Total gains	519.2827	564.5553	611.9429	665.0603	705.3357	694.9825	661.3120	610.7498	560.8776	513.6756	492.2615	498.0046 (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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736
util living area												
0.9822	0.9718	0.9456	0.8775	0.7416	0.5604	0.4147	0.4666	0.7072	0.9100	0.9708	0.9852	(86)
MIT	19.8858	20.0432	20.3126	20.6340	20.8725	20.9731	20.9948	20.9910	20.9230	20.6150	20.1826	19.8328 (87)
Th 2	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834 (88)

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util rest of house	0.9778	0.9651	0.9325	0.8491	0.6897	0.4873	0.3302	0.3770	0.6345	0.8823	0.9625	0.9816 (89)
MIT 2	18.8002	18.9981	19.3326	19.7164	19.9754	20.0669	20.0814	20.0796	20.0292	19.7043	19.1763	18.7334 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	19.2268	19.4088	19.7177	20.0770	20.3280	20.4230	20.4404	20.4378	20.3804	20.0622	19.5718	19.1655 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2268	19.4088	19.7177	20.0770	20.3280	20.4230	20.4404	20.4378	20.3804	20.0622	19.5718	19.1655 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9727	0.9589	0.9263	0.8489	0.7043	0.5150	0.3634	0.4121	0.6593	0.8816	0.9568	0.9769	(94)
Useful gains	505.0815	541.3549	566.8504	564.5751	496.7653	357.9030	240.2908	251.7020	369.7716	452.8568	470.9899	486.4836	(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	938.8518	912.5619	831.3563	703.0022	542.6723	366.2501	241.5465	253.9661	395.0212	595.1466	784.4382	941.2845	(97)
Space heating kWh	322.7251	249.4511	196.7924	99.6675	34.1549	0.0000	0.0000	0.0000	0.0000	105.8636	225.6828	338.3718	(98a)
Space heating requirement - total per year (kWh/year)												1572.7092	
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	322.7251	249.4511	196.7924	99.6675	34.1549	0.0000	0.0000	0.0000	0.0000	105.8636	225.6828	338.3718	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1572.7092	
Space heating per m2											(98c) / (4) =	25.0033	(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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	322.7251	249.4511	196.7924	99.6675	34.1549	0.0000	0.0000	0.0000	0.0000	105.8636	225.6828	338.3718 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	322.7251	249.4511	196.7924	99.6675	34.1549	0.0000	0.0000	0.0000	0.0000	105.8636	225.6828	338.3718 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (64)
Efficiency of water heater (217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200 (216)
Fuel for water heating, kWh/month	66.8475	59.0143	62.4277	54.2425	52.1444	46.5111	45.5537	47.6255	48.4399	54.5849	58.7402	66.0321 (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	3.5184	3.1779	3.5184	3.4049	3.5184	3.4049	3.5184	3.5184	3.4049	3.5184	3.4049	3.5184 (231)
Lighting	18.6601	14.9699	13.4787	9.8751	7.6278	6.2320	6.9583	9.0447	11.7482	15.4142	17.4103	19.1788 (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												1572.7092 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												324.5200
Water heating fuel used												662.1638 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans: (MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.2240)												
mechanical ventilation fans (SFP = 0.2240)												41.4262 (230a)
Total electricity for the above, kWh/year												41.4262 (231)
Electricity for lighting (calculated in Appendix L)												150.5981 (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												2426.8973 (238)

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10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1572.7092	16.4900	259.3397 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	662.1638	16.4900	109.1908 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.4262	16.4900	6.8312 (249)
Energy for lighting	150.5981	16.4900	24.8336 (250)
Additional standing charges			0.0000 (251)
Total energy cost			400.1954 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.3352 (257)
SAP value	78.3561
SAP rating (Section 12)	78 (258)
SAP band	C

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	1572.7092	0.1558	245.0167 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	662.1638	0.1412	93.4677 (264)
Space and water heating			338.4843 (265)
Pumps, fans and electric keep-hot	41.4262	0.1387	5.7463 (267)
Energy for lighting	150.5981	0.1443	21.7360 (268)
Total CO2, kg/year			365.9666 (272)
CO2 emissions per m2			5.8200 (273)
EI value			95.4551
EI rating			95 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.9000 (1b)	x 2.4100 (2b)	= 151.5890 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	151.5890 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			2.2900 (17)
Infiltration rate			0.1145 (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) =		0.0973 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000 (22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000 (22a)
Adj infilt rate	0.1071	0.0998	0.0998	0.0949	0.0949	0.0827	0.0827	0.0803	0.0827	0.0925	0.0900	0.0973 (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)

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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								
Window			5.7300	1.2357	7.0808			(27)
French Door			4.0400	1.3258	5.3561			(27)
Corridor Door			2.0800	1.0000	2.0800			(26)
GF B&B J150 P/A=0.22			62.9000	0.1000	6.2900	75.0000	4717.5000	(28a)
EW Brick AAC018/019	59.3700	9.7700	49.6000	0.2600	12.8960	60.0000	2975.9999	(29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600	(29a)
Total net area of external elements Aum (A, m2)			126.5500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.1649			(33)
Main dwelling								
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500	(32)
Party Ceiling			62.9000			40.0000	2516.0000	(32b)
GF Timber			167.9200			9.0000	1511.2800	(32c)
Masonry Walls			4.0500			39.0000	157.9500	(32c)

Heat capacity Cm = Sum(A x k)

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

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	3.6500	0.0370	0.1351	
E2 Other lintels (including other steel lintels)	1.9200	0.0410	0.0787	
E3 Sill	3.6400	0.0090	0.0328	
E4 Jamb	16.6700	0.0140	0.2334	
E5 Ground floor (normal)	8.0100	0.0380	0.3044	
E7 Party floor between dwellings (in blocks of flats)	23.0100	0.0390	0.8974	
E5 Ground floor (normal)	15.0000	0.0450	0.6750	
E16 Corner (normal)	7.7400	0.0410	0.3173	
E18 Party wall between dwellings	2.5800	0.0390	0.1006	
P1 Party wall - Ground floor	7.0900	0.0470	0.3332	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	1.0200	0.0270	0.0275	
E4 Jamb	4.2000	0.0850	0.3570	
E5 Ground floor (normal)	1.6600	0.0450	0.0747	
E7 Party floor between dwellings (in blocks of flats)	1.6600	0.0330	0.0548	
E25 Staggered party wall between dwellings	2.5800	0.0380	0.0980	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				3.7199 (36)
Point Thermal bridges				0.0000 (36a)
Total fabric heat loss			(33) + (36) + (36a) =	37.8848 (37)

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

(38)m	Jan 25.0122	Feb 25.0122	Mar 25.0122	Apr 25.0122	May 25.0122	Jun 25.0122	Jul 25.0122	Aug 25.0122	Sep 25.0122	Oct 25.0122	Nov 25.0122	Dec 25.0122	(38)
Heat transfer coeff	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	62.8970	(39)
Average = Sum(39)m / 12 =													62.8970
HLP	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(40)
HLP (average)													1.0000
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

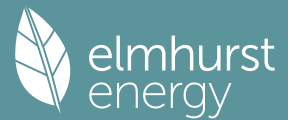
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0623 (42)
Hot water usage for mixer showers													
58.7981	57.9145	56.6268	54.1632	52.3452	50.3177	49.1652	50.4431	51.8439	54.0208	56.5373	58.5728		(42a)
Hot water usage for baths													
25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224		(42b)
Hot water usage for other uses													
35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503		(42c)
Average daily hot water use (litres/day)													110.2677 (43)
Daily hot water use													
119.9567	117.3957	114.2767	109.5333	105.6816	101.5406	99.9487	103.0543	106.3296	110.6770	115.4935	119.6455		(44)
Energy conte	189.9821	167.1700	175.6391	149.9457	142.2677	124.8560	120.8793	127.6027	131.1150	150.1877	164.5417	187.3360	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004		(46)
Water storage loss:													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514		(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514		(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(59)
Combi loss	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													
216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874		(62)
WVHRS	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		(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)
Output from w/h													
216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874		(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													
63.1691	55.5840	58.4000	49.8569	47.3040	41.5146	40.1924	42.4279	43.5957	49.9374	54.7101	62.2892		(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	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.3187	18.9351	15.3991	11.6581	8.7145	7.3572	7.9497	10.3333	13.8694	17.6103	20.5539	21.9112	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	268.9509	271.7418	264.7089	249.7366	230.8369	213.0738	201.2070	198.4162	205.4491	220.4213	239.3210	257.0841	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	(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)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	(71)
Water heating gains (Table 5)	84.9046	82.7143	78.4946	69.2457	63.5807	57.6592	54.0220	57.0268	60.5496	67.1202	75.9863	83.7221	(72)
Total internal gains	465.8571	464.0741	449.2854	421.3234	393.8150	368.7731	353.8616	356.4591	370.5510	395.8347	426.5440	453.4003	(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		
Southeast				1.9100	42.9509	0.4600	0.0000		0.7700		29.0572	(77)	
Northwest				3.8200	13.7758	0.4600	0.0000		0.7700		18.6392	(81)	
Northwest				4.0400	13.7758	0.6000	0.7000		0.7700		16.1987	(81)	
Solar gains	63.8951	105.5669	170.8171	261.0114	325.2225	360.0564	336.0983	283.4451	213.5451	133.2431	77.5422	53.5760	(83)
Total gains	529.7523	569.6410	620.1025	682.3347	719.0376	728.8295	689.9599	639.9043	584.0960	529.0777	504.0862	506.9762	(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	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	56.6042	
alpha	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	4.7736	
util living area	0.9778	0.9665	0.9314	0.8432	0.6748	0.4594	0.3091	0.3522	0.6319	0.8766	0.9616	0.9813	(86)
MIT	19.9800	20.1250	20.4142	20.7208	20.9241	20.9901	20.9989	20.9979	20.9570	20.7112	20.2875	19.9377	(87)
Th 2	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	20.0834	(88)
util rest of house	0.9724	0.9583	0.9148	0.8082	0.6150	0.3843	0.2262	0.2634	0.5517	0.8397	0.9505	0.9766	(89)
MIT 2	18.9194	19.1008	19.4568	19.8145	20.0247	20.0784	20.0831	20.0828	20.0567	19.8137	19.3069	18.8665	(90)
Living area fraction									fLA = Living area / (4) =			0.3930	(91)
MIT	19.3363	19.5033	19.8331	20.1707	20.3781	20.4367	20.4430	20.4424	20.4105	20.1664	19.6923	19.2875	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3363	19.5033	19.8331	20.1707	20.3781	20.4367	20.4430	20.4424	20.4105	20.1664	19.6923	19.2875	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9667	0.9520	0.9095	0.8118	0.6350	0.4136	0.2589	0.2984	0.5813	0.8434	0.9448	0.9713	(94)
Ext temp.	512.1132	542.3006	563.9856	553.9379	456.5676	301.4611	178.6060	190.9378	339.5550	446.2320	476.2500	492.4343	(95)
Heat loss rate W	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Space heating kWh	907.9967	880.7659	788.2929	658.5743	482.9322	304.2155	178.8164	191.3598	352.8834	551.3828	747.9891	904.9290	(97)
Space heating requirement - total per year (kWh/year)	294.5373	227.4487	166.8846	75.3382	19.6153	0.0000	0.0000	0.0000	0.0000	78.2322	195.6521	306.8961	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98c)
Space heating kWh	294.5373	227.4487	166.8846	75.3382	19.6153	0.0000	0.0000	0.0000	0.0000	78.2322	195.6521	306.8961	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1364.6045	
Space heating per m ²										(98c) / (4) =		21.6948	(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)	
Fraction of main heating from main system 2												0.0000 (203)	
Fraction of total heating from main system 1												1.0000 (204)	
Fraction of total heating from main system 2												0.0000 (205)	
Efficiency of main space heating system 1 (in %)												100.0000 (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	294.5373	227.4487	166.8846	75.3382	19.6153	0.0000	0.0000	0.0000	0.0000	78.2322	195.6521	306.8961	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	294.5373	227.4487	166.8846	75.3382	19.6153	0.0000	0.0000	0.0000	0.0000	78.2322	195.6521	306.8961	(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)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874	(64)

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Efficiency of water heater (217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(216)
Fuel for water heating, kWh/month	66.8475	59.0143	62.4277	54.2425	52.1444	46.5111	45.5537	47.6255	48.4399	54.5849	58.7402	66.0321	66.0321	(217)
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	0.0000	(221)
Pumps and Fa (233a)m	3.5184	3.1779	3.5184	3.4049	3.5184	3.4049	3.5184	3.5184	3.4049	3.5184	3.4049	3.5184	3.5184	(231)
Lighting (235c)m	18.6601	14.9699	13.4787	9.8751	7.6278	6.2320	6.9583	9.0447	11.7482	15.4142	17.4103	19.1788	19.1788	(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	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	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	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	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	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	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	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	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													1364.6045	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													324.5200	
Water heating fuel used													662.1638	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2240)														
mechanical ventilation fans (SFP = 0.2240)													41.4262	(230a)
Total electricity for the above, kWh/year													41.4262	(231)
Electricity for lighting (calculated in Appendix L)													150.5981	(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													2218.7925	(238)

10a. Fuel costs - using BEDF prices (567)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1364.6045	26.0600	355.6159	(240)
Space heating - main system 2	0.0000	26.0600	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	662.1638	26.0600	172.5599	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	41.4262	26.0600	10.7957	(249)
Energy for lighting	150.5981	26.0600	39.2459	(250)
Additional standing charges			0.0000	(251)
Total energy cost			578.2173	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1364.6045	0.1565	213.5044	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	662.1638	0.1412	93.4677	(264)
Space and water heating			306.9721	(265)
Pumps, fans and electric keep-hot	41.4262	0.1387	5.7463	(267)
Energy for lighting	150.5981	0.1443	21.7360	(268)
Total CO2, kg/year			334.4544	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1364.6045	1.5792	2155.0335	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	662.1638	1.5220	1007.7817	(278)
Space and water heating			3162.8152	(279)
Pumps, fans and electric keep-hot	41.4262	1.5128	62.6696	(281)
Energy for lighting	150.5981	1.5338	230.9923	(282)
Total Primary energy kWh/year			3456.4771	(286)