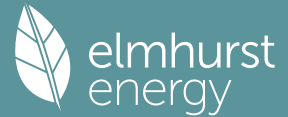


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Property Reference	4907-AU06-6316-034.R				Issued on Date	19/03/2025
Assessment Reference	Plot 034 _As Built		Prop Type Ref	GF Flat-TC		
Property	FLAT 1, 38 Spey Road, Tilehurst, Reading, RG30 4NF					
SAP Rating	80 C	DER	5.63	TER	13.13	
Environmental	96 A	% DER < TER				57.12
CO ₂ Emissions (t/year)	0.3	DFEE	30.13	TFEE	33.93	
Compliance Check	See BREL	% DFEE < TFEE				11.19
% DPER < TPER	16.02	DPER	58.25	TPER	69.36	
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	62.5100	2.4100	150.6491
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		
Dwelling volume			150.6491

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)

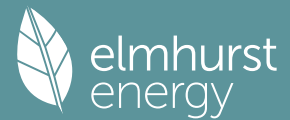
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.6500	(17)
Infiltration rate		0.1825	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1551	(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	0.1978	0.1939	0.1900	0.1706	0.1668	0.1474	0.1474	0.1435	0.1551	0.1668	0.1745	0.1823 (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			3.8200	1.2357	4.7205		(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			62.5100	0.1000	6.2510	75.0000	4688.2500 (28a)
EW Brick AAC018/019	23.3500	7.8600	15.4900	0.2600	4.0274	60.0000	929.4000 (29a)
E-WM-30 Corridor Wall	21.5200	2.0800	19.4400	0.2100	4.0824	52.3000	1016.7120 (29a)
Total net area of external elements Aum(A, m ²)			107.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.5174		(33)
Main dwelling							
Party Wall			36.8400	0.0000	0.0000	45.0000	1657.8000 (32)
Party Ceiling			62.5100			30.0000	1875.3000 (32b)
GF Timber			134.3400			9.0000	1209.0600 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 11534.4720 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							184.5220 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	1.8300	0.0370	0.0677
E2 Other lintels (including other steel lintels)	1.9200	0.0410	0.0787
E4 Jamb	12.4700	0.0140	0.1746
E5 Ground floor (normal)	8.3500	0.0380	0.3173
E7 Party floor between dwellings (in blocks of flats)	8.7600	0.0390	0.3416
E5 Ground floor (normal)	0.7100	0.0450	0.0319
E16 Corner (normal)	5.1600	0.0410	0.2116
E18 Party wall between dwellings	5.1600	0.0390	0.2012
P1 Party wall - Ground floor	14.2900	0.0470	0.6716
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.2900	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)	8.3400	0.0450	0.3753
E7 Party floor between dwellings (in blocks of flats)	8.3400	0.0330	0.2752
E25 Staggered party wall between dwellings	5.1600	0.0380	0.1961
P8 Party Wall - Exposed floor (inverted)	5.6700	0.2400	1.3608
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.6883 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	31.2057 (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	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	(38)
Heat transfer coeff	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	(39)
Average = Sum(39)m / 12 =													56.0628
HLP	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	(40)
HLP (average)													0.8969
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0516 (42)
Hot water usage for mixer showers													
58.6188	57.7379	56.4542	53.9981	52.1856	50.1643	49.0153	50.2893	51.6858	53.8561	56.3650	58.3942	58.3942	(42a)
Hot water usage for baths													
25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456	25.2456	(42b)
Hot water usage for other uses													
35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408	35.6408	(42c)
Average daily hot water use (litres/day)													109.9314 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.5909	117.0378	113.9283	109.1993	105.3593	101.2310	99.6440	102.7400	106.0054	110.3395	115.1413	119.2807	(44)
Energy conte	189.4028	166.6602	175.1035	149.4884	141.8339	124.4753	120.5107	127.2136	130.7152	149.7297	164.0399	186.7648	(45)
Energy content (annual)										Total = Sum(45)m =		1825.9381	
Distribution loss (46)m = 0.15 x (45)m													
28.4104	24.9990	26.2655	22.4233	21.2751	18.6713	18.0766	19.0820	19.6073	22.4595	24.6060	28.0147	28.0147	(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	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	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													
216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	213.7162	(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													
216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	213.7162	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2143.2691	(64)
Electric shower(s)												2143	(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	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													
62.9764	55.4145	58.2219	49.7049	47.1598	41.3880	40.0698	42.2985	43.4628	49.7851	54.5433	62.0993	62.0993	(65)

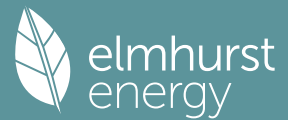
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
99.3076	109.9477	99.3076	102.6178	99.3076	102.6178	99.3076	99.3076	102.6178	99.3076	102.6178	99.3076	99.3076	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
179.2299	181.0898	176.4030	166.4255	153.8306	141.9932	134.0851	132.2253	136.9120	146.8896	159.4844	171.3218	171.3218	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	(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)													
-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	(71)
Water heating gains (Table 5)													
84.6457	82.4621	78.2553	69.0346	63.3868	57.4834	53.8573	56.8529	60.3650	66.9155	75.7545	83.4668	83.4668	(72)
Total internal gains													
416.9578	427.2741	407.7404	391.8525	370.2996	355.8690	341.0246	342.1603	353.6695	366.8872	391.6314	407.8708	407.8708	(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
Northeast	3.8200		11.2829		0.4600		0.0000		0.7700		15.2663 (75)
Northeast	4.0400		11.2829		0.6000		0.7000		0.7700		13.2674 (75)

Solar gains	28.5337	58.0812	104.6439	171.8553	231.0073	246.2782	230.3882	183.6682	127.5102	70.9799	35.9028	23.3021 (83)
Total gains	445.4916	485.3553	512.3844	563.7078	601.3069	602.1473	571.4128	525.8285	481.1797	437.8671	427.5342	431.1728 (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	57.1506	57.1506	57.1506	57.1506	57.1506	57.1506	57.1506	57.1506	57.1506	57.1506	57.1506	57.1506
alpha	4.8100	4.8100	4.8100	4.8100	4.8100	4.8100	4.8100	4.8100	4.8100	4.8100	4.8100	4.8100
util living area	0.9851	0.9760	0.9569	0.8947	0.7641	0.5749	0.4273	0.4822	0.7272	0.9225	0.9741	0.9872 (86)
MIT	19.8579	20.0151	20.2592	20.6005	20.8578	20.9710	20.9943	20.9900	20.9152	20.5887	20.1669	19.8147 (87)
Th 2	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702 (88)
util rest of house	0.9818	0.9707	0.9471	0.8715	0.7182	0.5078	0.3488	0.3990	0.6621	0.9001	0.9674	0.9843 (89)
MIT 2	18.8373	19.0359	19.3419	19.7560	20.0435	20.1509	20.1677	20.1655	20.1061	19.7506	19.2298	18.7827 (90)
Living area fraction	19.2398	19.4220	19.7037	20.0890	20.3646	20.4743	20.4937	20.4906	20.4252	20.0811	19.5993	0.3943 (91)
MIT	19.2398	19.4220	19.7037	20.0890	20.3646	20.4743	20.4937	20.4906	20.4252	20.0811	19.5993	19.1897 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2398	19.4220	19.7037	20.0890	20.3646	20.4743	20.4937	20.4906	20.4252	20.0811	19.5993	19.1897 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9769	0.9647	0.9405	0.8689	0.7296	0.5329	0.3797	0.4316	0.6832	0.8974	0.9616	0.9799 (94)
Useful gains	435.2207	468.2237	481.9145	489.8311	438.6943	320.8871	216.9665	226.9245	328.7272	392.9263	411.1263	422.5196 (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	837.5643	814.1452	740.2332	627.2859	485.7619	329.3293	218.2891	229.3329	354.6065	531.5381	700.7460	840.3615 (97)
Space heating kWh	299.3436	232.4593	192.1891	98.9674	35.0183	0.0000	0.0000	0.0000	0.0000	103.1272	208.5262	310.8743 (98a)
Space heating requirement - total per year (kWh/year)												1480.5054
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	299.3436	232.4593	192.1891	98.9674	35.0183	0.0000	0.0000	0.0000	0.0000	103.1272	208.5262	310.8743 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1480.5054
Space heating per m2										(98c) / (4) =		23.6843 (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	299.3436	232.4593	192.1891	98.9674	35.0183	0.0000	0.0000	0.0000	0.0000	103.1272	208.5262	310.8743 (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)	299.3436	232.4593	192.1891	98.9674	35.0183	0.0000	0.0000	0.0000	0.0000	103.1272	208.5262	310.8743 (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	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (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	66.6690	58.8572	62.2627	54.1016	52.0108	46.3938	45.4401	47.5056	48.3167	54.4438	58.5856	65.8561 (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	3.4966	3.1582	3.4966	3.3838	3.4966	3.3838	3.4966	3.4966	3.3838	3.4966	3.3838	3.4966 (231)
Lighting	19.4269	15.5850	14.0326	10.2809	7.9412	6.4881	7.2443	9.4164	12.2309	16.0476	18.1258	19.9669 (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)

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Annual totals kWh/year	
Space heating fuel - main system 1	1480.5054 (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	660.4428 (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)	41.1694 (230a)
Total electricity for the above, kWh/year	41.1694 (231)
Electricity for lighting (calculated in Appendix L)	156.7865 (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	2338.9041 (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	1480.5054	0.1556	230.3514 (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)	660.4428	0.1412	93.2240 (264)
Space and water heating			323.5755 (265)
Pumps, fans and electric keep-hot	41.1694	0.1387	5.7107 (267)
Energy for lighting	156.7865	0.1443	22.6291 (268)
Total CO2, kg/year			351.9153 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.6300 (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	1480.5054	1.5760	2333.3304 (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)	660.4428	1.5219	1005.1598 (278)
Space and water heating			3338.4902 (279)
Pumps, fans and electric keep-hot	41.1694	1.5128	62.2810 (281)
Energy for lighting	156.7865	1.5338	240.4844 (282)
Total Primary energy kWh/year			3641.2557 (286)
Dwelling Primary energy Rate (DPER)			58.2500 (287)

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

1. Overall dwelling characteristics

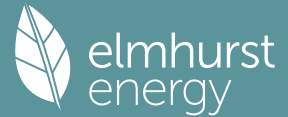
	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	62.5100 (1b)	2.4100 (2b)	150.6491 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		150.6491 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	150.6491 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1328 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3828 (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) = 0.3253 (21)

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

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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												
	0.4148	0.4067	0.3985	0.3579	0.3497	0.3091	0.3091	0.3009	0.3253	0.3497	0.3660	0.3823 (22b)
Effective ac	0.5860	0.5827	0.5794	0.5640	0.5612	0.5478	0.5478	0.5453	0.5529	0.5612	0.5670	0.5731 (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			7.8600	1.1450	9.0000		(27)
GF B&B J150 P/A=0.22			62.5100	0.1300	8.1263		(28a)
EW Brick AAC018/019	23.3500	7.8600	15.4900	0.1800	2.7882		(29a)
E-WM-30 Corridor Wall	21.5200	2.0800	19.4400	0.1800	3.4992		(29a)
Total net area of external elements Aum(A, m2)			107.3800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	25.4937	(33)
Main dwelling							
Party Wall			36.8400	0.0000	0.0000		(32)

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

194.5220 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	1.8300	0.0500	0.0915
E2 Other lintels (including other steel lintels)	1.9200	0.0500	0.0960
E4 Jamb	12.4700	0.0500	0.6235
E5 Ground floor (normal)	8.3500	0.1600	1.3360
E7 Party floor between dwellings (in blocks of flats)	8.7600	0.0700	0.6132
E5 Ground floor (normal)	0.7100	0.1600	0.1136
E16 Corner (normal)	5.1600	0.0900	0.4644
E18 Party wall between dwellings	5.1600	0.0600	0.3096
P1 Party wall - Ground floor	14.2900	0.0800	1.1432
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.2900	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)	8.3400	0.1600	1.3344
E7 Party floor between dwellings (in blocks of flats)	8.3400	0.0700	0.5838
E25 Staggered party wall between dwellings	5.1600	0.0600	0.3096
P8 Party Wall - Exposed floor (inverted)	5.6700	0.2400	1.3608

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

8.6406 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 34.1343 (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	29.1343	28.9682	28.8054	28.0407	27.8977	27.2317	27.2317	27.1083	27.4882	27.8977	28.1871	28.4897 (38)
Heat transfer coeff	63.2686	63.1025	62.9397	62.1750	62.0320	61.3660	61.3660	61.2426	61.6225	62.0320	62.3214	62.6240 (39)
Average = Sum(39)m / 12 =												62.1744

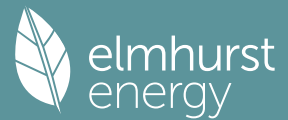
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0121	1.0095	1.0069	0.9946	0.9924	0.9817	0.9817	0.9797	0.9858	0.9924	0.9970	1.0018 (40)
HLP (average)												0.9946
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0516 (42)
Hot water usage for mixer showers												
58.6188	57.7379	56.4542	53.9981	52.1856	50.1643	49.0153	50.2893	51.6858	53.8561	56.3650	58.3942 (42a)	
Hot water usage for baths												
25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456 (42b)	
Hot water usage for other uses												
35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408 (42c)	
Average daily hot water use (litres/day)												109.9314 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	119.5909	117.0378	113.9283	109.1993	105.3593	101.2310	99.6440	102.7400	106.0054	110.3395	115.1413	119.2807 (44)
Energy content	189.4028	166.6602	175.1035	149.4884	141.8339	124.4753	120.5107	127.2136	130.7152	149.7297	164.0399	186.7648 (45)
Energy content (annual)										Total = Sum(45)m =		1825.9381
Distribution loss (46)m = 0.15 x (45)m												
28.4104	24.9990	26.2655	22.4233	21.2751	18.6713	18.0766	19.0820	19.6073	22.4595	24.6060	28.0147 (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												
235.9977	208.7459	221.6984	194.5803	188.4288	169.5671	167.1056	173.8085	175.8070	196.3246	209.1318	233.3597 (62)	
WWHRS	-26.7981	-23.7004	-24.8177	-20.5501	-19.1519	-16.3884	-15.3616	-16.3355	-16.9561	-19.9894	-22.6456	-26.3018 (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												
209.1996	185.0455	196.8807	174.0302	169.2769	153.1787	151.7441	157.4730	158.8509	176.3352	186.4862	207.0578 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2125.5589 (64)
Electric shower(s)												2126 (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												
100.2524	89.0831	95.4978	85.7784	84.4357	77.4615	77.3457	79.5744	79.5363	87.0610	90.6167	99.3752 (65)	

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

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Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	99.3076	109.9477	99.3076	102.6178	99.3076	102.6178	99.3076	99.3076	102.6178	99.3076	102.6178	99.3076 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	179.2299	181.0898	176.4030	166.4255	153.8306	141.9932	134.0851	132.2253	136.9120	146.8896	159.4844	171.3218 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656 (71)
Water heating gains (Table 5)												
	134.7478	132.5641	128.3573	119.1366	113.4889	107.5854	103.9593	106.9549	110.4671	117.0175	125.8566	133.5688 (72)
Total internal gains												
	470.0599	480.3762	460.8425	444.9545	423.4016	405.9711	391.1266	392.2624	403.7715	419.9893	444.7334	460.9728 (73)

6. Solar gains

[Jan]		Area m ²		Solar flux Table 6a W/m ²		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast		7.8600		11.2829		0.6300		0.7000		0.7700		27.1030 (75)
Solar gains	27.1030	55.1689	99.3967	163.2380	219.4239	233.9291	218.8359	174.4585	121.1165	67.4207	34.1025	22.1336 (83)
Total gains	497.1628	535.5450	560.2392	608.1925	642.8255	639.9002	609.9625	566.7209	524.8880	487.4100	478.8360	483.1064 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
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	53.3860	53.5265	53.6650	54.3250	54.4503	55.0412	55.0412	55.1521	54.8121	54.4503	54.1974	53.9356
alpha	4.5591	4.5684	4.5777	4.6217	4.6300	4.6694	4.6694	4.6768	4.6541	4.6300	4.6132	4.5957
util living area	0.9827	0.9739	0.9557	0.8972	0.7752	0.5879	0.4371	0.4874	0.7271	0.9159	0.9699	0.9847 (86)
MIT	19.7816	19.9389	20.1899	20.5550	20.8307	20.9642	20.9927	20.9881	20.9061	20.5718	20.1350	19.7607 (87)
Th 2	20.0732	20.0754	20.0776	20.0878	20.0897	20.0986	20.0986	20.1003	20.0952	20.0897	20.0858	20.0818 (88)
util rest of house	0.9786	0.9677	0.9449	0.8725	0.7262	0.5144	0.3502	0.3966	0.6567	0.8903	0.9617	0.9810 (89)
MIT 2	18.6656	18.8654	19.1815	19.6320	19.9416	20.0757	20.0957	20.0950	20.0267	19.6619	19.1225	18.6454 (90)
Living area fraction									fLA = Living area / (4) =			0.3943 (91)
MIT	19.1056	19.2887	19.5791	19.9960	20.2922	20.4261	20.4494	20.4472	20.3735	20.0207	19.5218	19.0852 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1056	19.2887	19.5791	19.9960	20.2922	20.4261	20.4494	20.4472	20.3735	20.0207	19.5218	19.0852 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9731	0.9612	0.9379	0.8697	0.7378	0.5418	0.3844	0.4322	0.6797	0.8881	0.9554	0.9759 (94)
Useful gains	483.7765	514.7511	525.4313	528.9567	474.3072	346.7128	234.4886	244.9201	356.7552	432.8569	457.4810	471.4621 (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	936.7323	907.9651	823.1971	689.8914	532.9895	357.5241	236.2219	247.8626	386.5862	584.3865	774.1416	932.1715 (97)
Space heating kWh	336.9992	264.2398	221.5378	115.8730	43.6597	0.0000	0.0000	0.0000	0.0000	112.7381	227.9956	342.7678 (98a)
Space heating requirement - total per year (kWh/year)												1665.8109
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	336.9992	264.2398	221.5378	115.8730	43.6597	0.0000	0.0000	0.0000	0.0000	112.7381	227.9956	342.7678 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1665.8109
Space heating per m ²										(98c) / (4) =		26.6487 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												
Fraction of space heat from main system(s)												
Efficiency of main space heating system 1 (in %)												
Efficiency of main space heating system 2 (in %)												
Efficiency of secondary/supplementary heating system, %												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	336.9992	264.2398	221.5378	115.8730	43.6597	0.0000	0.0000	0.0000	0.0000	112.7381	227.9956	342.7678 (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)	365.1128	286.2836	240.0192	125.5395	47.3019	0.0000	0.0000	0.0000	0.0000	122.1431	247.0159	371.3627 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	209.1996	185.0455	196.8807	174.0302	169.2769	153.1787	151.7441	157.4730	158.8509	176.3352	186.4862	207.0578 (64)
Efficiency of water heater	85.1230	84.8582	84.3250	83.1692	81.4935	79.8000	79.8000	79.8000	79.8000	83.0841	84.5116	79.8000 (216)
Fuel for water heating, kWh/month	245.7616	218.0643	233.4783	209.2485	207.7183	191.9532	190.1555	197.3346	199.0613	212.2371	220.6635	243.0766 (219)

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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	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.6342	16.5535	14.9046	10.9197	8.4347	6.8912	7.6944	10.0015	12.9910	17.0449	19.2521	21.2076	21.2076	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-21.3850	-31.1805	-46.3347	-53.9216	-59.7358	-56.3524	-55.6871	-51.8058	-45.1936	-36.4947	-23.8836	-18.3719	-18.3719	(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	-9.1240	-19.4744	-39.2288	-59.6805	-79.6478	-80.2806	-79.3113	-66.7919	-48.5003	-28.0714	-12.2546	-7.1922	-7.1922	(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													1804.7788	(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													2568.7529	(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)													166.5294	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-1029.9044	(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													3596.1568	(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	1804.7788	0.2100	379.0036	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2568.7529	0.2100	539.4381	(264)
Space and water heating			918.4417	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	166.5294	0.1443	24.0353	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-500.3467	0.1339	-66.9835	
PV Unit electricity exported	-529.5577	0.1255	-66.4740	
Total			-133.4575	(269)
Total CO2, kg/year			820.9488	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.1300	(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	1804.7788	1.1300	2039.4001	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2568.7529	1.1300	2902.6908	(278)
Space and water heating			4942.0909	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	166.5294	1.5338	255.4284	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-500.3467	1.4947	-747.8862	
PV Unit electricity exported	-529.5577	0.4608	-243.9962	
Total			-991.8824	(283)
Total Primary energy kWh/year			4335.7377	(286)
Target Primary Energy Rate (TPER)			69.3600	(287)

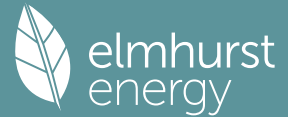
SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	62.5100	x	150.6491	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100			(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	150.6491	

2. Ventilation rate

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			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) =	0.1328 (8)	
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	3.6500 (17)		
Infiltration rate	0.3153 (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) =	0.2680 (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
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
	0.3417	0.3350	0.3283	0.2948	0.2881	0.2546	0.2546	0.2479	0.2680	0.2881	0.3015	0.3149
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (22)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23b)
Effective ac	0.5584	0.5561	0.5539	0.5434	0.5415	0.5324	0.5324	0.5307	0.5359	0.5415	0.5454	0.5496
												0.0000 (23c)
												0.5496 (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			3.8200	1.2357	4.7205		(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			62.5100	0.1000	6.2510	75.0000	4688.2500 (28a)
EW Brick AAC018/019	23.3500	7.8600	15.4900	0.2600	4.0274	60.0000	929.4000 (29a)
E-WM-30 Corridor Wall	21.5200	2.0800	19.4400	0.2100	4.0824	52.3000	1016.7120 (29a)
Total net area of external elements Aum(A, m2)			107.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.5174		(33)
Main dwelling							
Party Wall			36.8400	0.0000	0.0000	45.0000	1657.8000 (32)
Party Ceiling			62.5100			40.0000	2500.4000 (32b)
GF Timber			134.3400			9.0000	1209.0600 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12159.5720 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		194.5220 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	1.8300	0.0370	0.0677
E2 Other lintels (including other steel lintels)	1.9200	0.0410	0.0787
E2 Other lintels (including other steel lintels)	12.4700	0.0140	0.1746
E4 Jamb	8.3500	0.0380	0.3173
E5 Ground floor (normal)	8.7600	0.0390	0.3416
E7 Party floor between dwellings (in blocks of flats)	0.7100	0.0450	0.0319
E5 Ground floor (normal)	5.1600	0.0410	0.2116
E16 Corner (normal)	5.1600	0.0390	0.2012
E18 Party wall between dwellings	14.2900	0.0470	0.6716
P1 Party wall - Ground floor	14.2900	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	1.0200	0.0270	0.0275
E2 Other lintels (including other steel lintels)	4.2000	0.0850	0.3570
E4 Jamb	8.3400	0.0450	0.3753
E5 Ground floor (normal)	8.3400	0.0330	0.2752
E7 Party floor between dwellings (in blocks of flats)	5.1600	0.0380	0.1961
E25 Staggered party wall between dwellings	5.6700	0.2400	1.3608
P8 Party Wall - Exposed floor (inverted)			

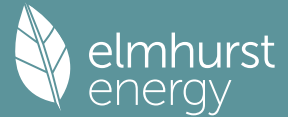
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		4.6883 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	31.2057 (37)

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	27.7587	27.6461	27.5356	27.0169	26.9198	26.4680	26.4680	26.3843	26.6420	26.9198	27.1162	27.3214
Average = Sum(39)m / 12 =	58.9644	58.8517	58.7413	58.2225	58.1255	57.6737	57.6737	57.5900	57.8477	58.1255	58.3218	58.5271
												58.2221 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9433	0.9415	0.9397	0.9314	0.9299	0.9226	0.9226	0.9213	0.9254	0.9299	0.9330	0.9363
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

												2.0516 (42)	
Assumed occupancy													
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													
	25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456 (42b)	
Hot water usage for other uses													
	35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408 (42c)	
Average daily hot water use (litres/day)													
												55.8868 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	60.9721	59.2999	57.4740	55.2012	53.1738	51.0667	50.6286	52.4507	54.3195	56.4834	58.7764	60.8865 (44)	
Energy content (annual)													
	96.5649	84.4422	88.3355	75.5677	71.5821	62.7925	61.2309	64.9449	66.9814	76.6474	83.7377	95.3335 (45)	
										Total = Sum(45)m =			928.1607

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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	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	82.0802	71.7759	75.0852	64.2325	60.8448	53.3736	52.0463	55.2032	56.9342	65.1503	71.1770	81.0334 (62)
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 (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	82.0802	71.7759	75.0852	64.2325	60.8448	53.3736	52.0463	55.2032	56.9342	65.1503	71.1770	81.0334 (64)
12Total per year (kWh/year)												
Electric shower(s)	46.9439	41.8274	45.6739	43.5861	44.4040	42.3571	43.7690	44.4040	43.5861	45.6739	44.8151	46.9439 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												533.9844 (64a)
Heat gains from water heating, kWh/month	32.2560	28.4008	30.1898	26.9547	26.3122	23.9327	23.9538	24.9018	25.1301	27.7061	28.9980	31.9943 (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	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.3076	109.9477	99.3076	102.6178	99.3076	102.6178	99.3076	99.3076	102.6178	99.3076	102.6178	99.3076 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.2299	181.0898	176.4030	166.4255	153.8306	141.9932	134.0851	132.2253	136.9120	146.8896	159.4844	171.3218 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582 (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)	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656 (71)
Water heating gains (Table 5)	43.3549	42.2631	40.5777	37.4370	35.3658	33.2398	32.1960	33.4701	34.9029	37.2393	40.2750	43.0031 (72)
Total internal gains	375.6669	387.0752	370.0628	360.2549	342.2786	331.6255	319.3633	318.7776	328.2073	337.2111	356.1519	367.4071 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W
Northeast					3.8200	11.2829	0.4600	0.0000			0.7700	15.2663 (75)
Northeast					4.0400	11.2829	0.6000	0.7000			0.7700	13.2674 (75)
Solar gains	28.5337	58.0812	104.6439	171.8553	231.0073	246.2782	230.3882	183.6682	127.5102	70.9799	35.9028	23.3021 (83)
Total gains	404.2007	445.1564	474.7067	532.1103	573.2859	577.9037	549.7515	502.4458	455.7176	408.1910	392.0547	390.7092 (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	57.2830	57.3927	57.5006	58.0129	58.1098	58.5650	58.5650	58.6501	58.3888	58.1098	57.9141	57.7110
alpha	4.8189	4.8262	4.8334	4.8675	4.8740	4.9043	4.9043	4.9100	4.8926	4.8740	4.8609	4.8474
util living area	0.9919	0.9860	0.9729	0.9227	0.8045	0.6112	0.4559	0.5162	0.7710	0.9468	0.9847	0.9931 (86)
MIT	19.7278	19.8912	20.1496	20.5334	20.8265	20.9651	20.9932	20.9879	20.8954	20.5234	20.0724	19.7007 (87)
Th 2	20.1309	20.1324	20.1339	20.1409	20.1422	20.1483	20.1483	20.1494	20.1460	20.1422	20.1395	20.1368 (88)
util rest of house	0.9899	0.9825	0.9659	0.9029	0.7595	0.5397	0.3704	0.4259	0.7056	0.9290	0.9802	0.9914 (89)
MIT 2	18.9686	19.1315	19.3872	19.7606	20.0213	20.1305	20.1461	20.1451	20.0842	19.7587	19.3178	18.9463 (90)
Living area fraction									FLA = Living area / (4) =			0.3943 (91)
MIT	19.2680	19.4311	19.6878	20.0653	20.3388	20.4597	20.4801	20.4775	20.4041	20.0602	19.6154	19.2438 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2680	19.4311	19.6878	20.0653	20.3388	20.4597	20.4801	20.4775	20.4041	20.0602	19.6154	19.2438 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	399.0613	435.8107	456.4233	479.3956	441.7345	327.4021	222.1571	231.8013	331.1843	378.3995	382.9717	386.4392 (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 (96)
Heat loss rate W	882.5771	855.1807	774.6688	650.0741	502.1361	337.9475	223.7812	234.8214	364.6782	549.8815	729.9198	880.4701 (97)
Space heating kWh	359.7357	281.8166	236.7747	122.8885	44.9388	0.0000	0.0000	0.0000	0.0000	127.5826	249.8026	367.5590 (98a)
Space heating requirement - total per year (kWh/year)												1791.0986
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	359.7357	281.8166	236.7747	122.8885	44.9388	0.0000	0.0000	0.0000	0.0000	127.5826	249.8026	367.5590 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1791.0986
Space heating per m ²												28.6530 (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	542.1325	426.7852	437.6840	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8876	0.9378	0.9092	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	481.1708	400.2329	397.9542	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh						632.1110	601.3911	548.0966	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	108.6770	149.6617	111.7060	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						27.1692	37.4154	27.9265	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												92.5112 (107)
Energy for space heating												28.6530 (99)
Energy for space cooling												1.4799 (108)
Total												30.1329 (109)
Fabric Energy Efficiency (DFEE)												30.1 (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 (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	62.5100 (1b)	2.4100 (2b)	150.6491 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		150.6491 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 150.6491 (5)

2. Ventilation rate

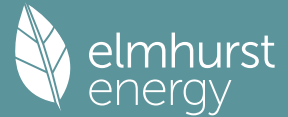
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1328 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3828 (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) = 0.3253 (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 infiltr rate	0.4148	0.4067	0.3985	0.3579	0.3497	0.3091	0.3091	0.3009	0.3253	0.3497	0.3660	0.3823 (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	0.5860	0.5827	0.5794	0.5640	0.5612	0.5478	0.5478	0.5453	0.5529	0.5612	0.5670	0.5731 (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							
TER Opaque door			2.0800	1.0000	2.0800		(26)
TER Opening Type			7.8600	1.1450	9.0000		(27)
GF B&B J150 P/A=0.22			62.5100	0.1300	8.1263		(28a)
EW Brick AAC018/019	23.3500	7.8600	15.4900	0.1800	2.7882		(29a)
E-WM-30 Corridor Wall	21.5200	2.0800	19.4400	0.1800	3.4992		(29a)
Total net area of external elements Aum(A, m ²)			107.3800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 25.4937		(33)
Main dwelling							
Party Wall			36.8400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							194.5220 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				1.8300	0.0500		0.0915
E2 Other lintels (including other steel lintels)				1.9200	0.0500		0.0960
E4 Jamb				12.4700	0.0500		0.6235
E5 Ground floor (normal)				8.3500	0.1600		1.3360
E7 Party floor between dwellings (in blocks of flats)				8.7600	0.0700		0.6132

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E5 Ground floor (normal)	0.7100	0.1600	0.1136
E16 Corner (normal)	5.1600	0.0900	0.4644
E18 Party wall between dwellings	5.1600	0.0600	0.3096
P1 Party wall - Ground floor	14.2900	0.0800	1.1432
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.2900	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)	8.3400	0.1600	1.3344
E7 Party floor between dwellings (in blocks of flats)	8.3400	0.0700	0.5838
E25 Staggered party wall between dwellings	5.1600	0.0600	0.3096
P8 Party Wall - Exposed floor (inverted)	5.6700	0.2400	1.3608
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.6406 (36)
Point Thermal Bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	34.1343 (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	29.1343	28.9682	28.8054	28.0407	27.8977	27.2317	27.2317	27.1083	27.4882	27.8977	28.1871	28.4897 (38)
Average = Sum(39)m / 12 =	63.2686	63.1025	62.9397	62.1750	62.0320	61.3660	61.3660	61.2426	61.6225	62.0320	62.3214	62.6240 (39)
												62.1744
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0121	1.0095	1.0069	0.9946	0.9924	0.9817	0.9817	0.9797	0.9858	0.9924	0.9970	1.0018 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31
												0.9946
												31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0516 (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	25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456 (42b)
Hot water usage for other uses	35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408 (42c)
Average daily hot water use (litres/day)												55.8868 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	60.9721	59.2999	57.4740	55.2012	53.1738	51.0667	50.6286	52.4507	54.3195	56.4834	58.7764	60.8865 (44)
Distribution loss (46)m = 0.15 x (45)m	96.5649	84.4422	88.3355	75.5677	71.5821	62.7925	61.2309	64.9449	66.9814	76.6474	83.7377	95.3335 (45)
Water 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 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	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	82.0802	71.7759	75.0852	64.2325	60.8448	53.3736	52.0463	55.2032	56.9342	65.1503	71.1770	81.0334 (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	82.0802	71.7759	75.0852	64.2325	60.8448	53.3736	52.0463	55.2032	56.9342	65.1503	71.1770	81.0334 (64)
12Total per year (kWh/year)												788.9366 (64)
Electric shower(s)	46.9439	41.8274	45.6739	43.5861	44.4040	42.3571	43.7690	44.4040	43.5861	45.6739	44.8151	46.9439 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												533.9844 (64a)
Heat gains from water heating, kWh/month	32.2560	28.4008	30.1898	26.9547	26.3122	23.9327	23.9538	24.9018	25.1301	27.7061	28.9980	31.9943 (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	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	99.3076	109.9477	99.3076	102.6178	99.3076	102.6178	99.3076	99.3076	102.6178	99.3076	102.6178	99.3076 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	179.2299	181.0898	176.4030	166.4255	153.8306	141.9932	134.0851	132.2253	136.9120	146.8896	159.4844	171.3218 (68)
Pumps, fans	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582 (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)	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656 (71)
Total internal gains	43.3549	42.2631	40.5777	37.4370	35.3658	33.2398	32.1960	33.4701	34.9029	37.2393	40.2750	43.0031 (72)
	375.6669	387.0752	370.0628	360.2549	342.2786	331.6255	319.3633	318.7776	328.2073	337.2111	356.1519	367.4071 (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							
Northeast	7.8600	11.2829	0.6300	0.7000	0.7700	27.1030 (75)						
Solar gains	27.1030	55.1689	99.3967	163.2380	219.4239	233.9291	218.8359	174.4585	121.1165	67.4207	34.1025	22.1336 (83)
Total gains	402.7699	442.2440	469.4596	523.4929	561.7025	565.5546	538.1992	493.2361	449.3238	404.6318	390.2544	389.5408 (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	53.3860	53.5265	53.6650	54.3250	54.4503	55.0412	55.0412	55.1521	54.8121	54.4503	54.1974	53.9356	
alpha	4.5591	4.5684	4.5777	4.6217	4.6300	4.6694	4.6694	4.6768	4.6541	4.6300	4.6132	4.5957	
util living area	0.9923	0.9872	0.9763	0.9346	0.8332	0.6502	0.4915	0.5525	0.7997	0.9536	0.9860	0.9934 (86)	
MIT	19.5909	19.7565	20.0243	20.4334	20.7653	20.9459	20.9882	20.9802	20.8578	20.4414	19.9636	19.5700 (87)	
Th 2	20.0732	20.0754	20.0776	20.0878	20.0897	20.0986	20.0986	20.1003	20.0952	20.0897	20.0858	20.0818 (88)	
util rest of house	0.9904	0.9840	0.9699	0.9166	0.7896	0.5738	0.3956	0.4528	0.7344	0.9373	0.9818	0.9918 (89)	
MIT 2	18.7883	18.9541	19.2202	19.6231	19.9240	20.0708	20.0948	20.0932	20.0100	19.6385	19.1686	18.7740 (90)	
Living area fraction									fLA = Living area / (4) =				0.3943 (91)
MIT	19.1048	19.2705	19.5373	19.9427	20.2558	20.4159	20.4471	20.4430	20.3444	19.9551	19.4821	19.0879 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.1048	19.2705	19.5373	19.9427	20.2558	20.4159	20.4471	20.4430	20.3444	19.9551	19.4821	19.0879 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9877	0.9804	0.9653	0.9133	0.7983	0.6018	0.4333	0.4918	0.7540	0.9344	0.9782	0.9894 (94)
Useful gains	397.8281	433.5637	453.1480	478.1057	448.4020	340.3348	233.2265	242.5902	338.7895	378.0743	381.7627	385.4003 (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	936.6774	906.8162	820.5627	686.5780	530.7324	356.8966	236.0792	247.6019	384.7931	580.3148	771.6688	932.3388 (97)
Space heating kWh	400.9039	318.0257	273.3565	150.1001	61.2538	0.0000	0.0000	0.0000	0.0000	150.4669	280.7324	406.9222 (98a)
Space heating requirement - total per year (kWh/year)												2041.7616
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	400.9039	318.0257	273.3565	150.1001	61.2538	0.0000	0.0000	0.0000	0.0000	150.4669	280.7324	406.9222 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2041.7616
Space heating per m2											(98c) / (4) =	32.6630 (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	576.8402	454.1082	465.4441	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8506	0.9113	0.8774	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	490.6358	413.8442	408.3863	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	617.6769	587.8883	537.3320	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	91.4696	129.4888	95.9356	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
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 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	22.8674	32.3722	23.9839	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												79.2235 (107)
Energy for space heating												32.6630 (99)
Energy for space cooling												1.2674 (108)
Total												33.9303 (109)
Fabric Energy Efficiency (TFEE)												33.9 (109)

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

CALCULATION OF ENERGY RATING

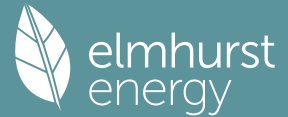
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.5100 (1b)	x 2.4100 (2b)	= 150.6491 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	150.6491 (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)
Air changes per hour	

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.6500 (17)
Infiltration rate 0.1825 (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) = 0.1551 (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	0.1978	0.1939	0.1900	0.1706	0.1668	0.1474	0.1474	0.1435	0.1551	0.1668	0.1745	0.1823	(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			3.8200	1.2357	4.7205			(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			62.5100	0.1000	6.2510	75.0000	4688.2500	(28a)
EW Brick AAC018/019	23.3500	7.8600	15.4900	0.2600	4.0274	60.0000	929.4000	(29a)
E-WM-30 Corridor Wall	21.5200	2.0800	19.4400	0.2100	4.0824	52.3000	1016.7120	(29a)
Total net area of external elements Aum(A, m2)			107.3800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.5174			(33)
Main dwelling								
Party Wall			36.8400	0.0000	0.0000	45.0000	1657.8000	(32)
Party Ceiling			62.5100			40.0000	2500.4000	(32b)
GF Timber			134.3400			9.0000	1209.0600	(32c)
Masonry Walls			4.0500			39.0000	157.9500	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 12159.5720 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 194.5220 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	1.8300	0.0370	0.0677
E2 Other lintels (including other steel lintels)	1.9200	0.0410	0.0787
E4 Jamb	12.4700	0.0140	0.1746
E5 Ground floor (normal)	8.3500	0.0380	0.3173
E7 Party floor between dwellings (in blocks of flats)	8.7600	0.0390	0.3416
E5 Ground floor (normal)	0.7100	0.0450	0.0319
E16 Corner (normal)	5.1600	0.0410	0.2116
E18 Party wall between dwellings	5.1600	0.0390	0.2012
P1 Party wall - Ground floor	14.2900	0.0470	0.6716
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.2900	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)	8.3400	0.0450	0.3753
E7 Party floor between dwellings (in blocks of flats)	8.3400	0.0330	0.2752
E25 Staggered party wall between dwellings	5.1600	0.0380	0.1961
P8 Party Wall - Exposed floor (inverted)	5.6700	0.2400	1.3608

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

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 31.2057 (37)

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

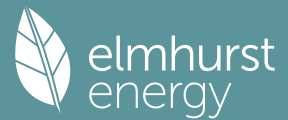
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	(38)
Heat transfer coeff	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	(39)
Average = Sum(39)m / 12 =													56.0628

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	(40)
HLP (average)													0.8969
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Assumed occupancy													2.0516 (42)
Hot water usage for mixer showers	58.6188	57.7379	56.4542	53.9981	52.1856	50.1643	49.0153	50.2893	51.6858	53.8561	56.3650	58.3942	(42a)
Hot water usage for baths	25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456	(42b)
Hot water usage for other uses	35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408	(42c)
Average daily hot water use (litres/day)													109.9314 (43)
Daily hot water use	119.5909	117.0378	113.9283	109.1993	105.3593	101.2310	99.6440	102.7400	106.0054	110.3395	115.1413	119.2807	(44)
Energy conte	189.4028	166.6602	175.1035	149.4884	141.8339	124.4753	120.5107	127.2136	130.7152	149.7297	164.0399	186.7648	(45)
Energy content (annual)										Total = Sum(45)m =			1825.9381
Distribution loss (46)m = 0.15 x (45)m	28.4104	24.9990	26.2655	22.4233	21.2751	18.6713	18.0766	19.0820	19.6073	22.4595	24.6060	28.0147	(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)

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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												
	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (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												
	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (64)
Total per year (kWh/year) = Sum(64)m =											2143.2691 (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												
	62.9764	55.4145	58.2219	49.7049	47.1598	41.3880	40.0698	42.2985	43.4628	49.7851	54.5433	62.0993 (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	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	22.1948	19.7132	16.0318	12.1371	9.0727	7.6595	8.2764	10.7579	14.4393	18.3340	21.3985	22.8116 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	267.5073	270.2832	263.2881	248.3962	229.5979	211.9302	200.1271	197.3512	204.3463	219.2382	238.0365	255.7042 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615 (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)												
	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656 (71)
Water heating gains (Table 5)												
	84.6457	82.4621	78.2553	69.0346	63.3868	57.4834	53.8573	56.8529	60.3650	66.9155	75.7545	83.4668 (72)
Total internal gains												
	464.7421	462.8528	447.9695	419.9622	392.4517	367.4674	352.6550	355.3563	369.5449	394.8819	425.5838	452.3769 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W
Northeast					3.8200	11.2829	0.4600	0.0000			0.7700	15.2663 (75)
Northeast					4.0400	11.2829	0.6000	0.7000			0.7700	13.2674 (75)
Solar gains	28.5337	58.0812	104.6439	171.8553	231.0073	246.2782	230.3882	183.6682	127.5102	70.9799	35.9028	23.3021 (83)
Total gains	493.2758	520.9340	552.6134	591.8176	623.4590	613.7456	583.0432	539.0244	497.0551	465.8618	461.4866	475.6790 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478
alpha	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165
util living area												
	0.9806	0.9721	0.9488	0.8851	0.7515	0.5675	0.4198	0.4722	0.7152	0.9120	0.9692	0.9837 (86)
MIT	20.0031	20.1272	20.3642	20.6596	20.8836	20.9769	20.9958	20.9926	20.9310	20.6515	20.2687	19.9559 (87)
Th 2	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702 (88)
util rest of house												
	0.9762	0.9659	0.9371	0.8598	0.7042	0.5002	0.3422	0.3899	0.6487	0.8867	0.9612	0.9799 (89)
MIT 2	19.0163	19.1725	19.4677	19.8226	20.0688	20.1553	20.1684	20.1668	20.1196	19.8212	19.3528	18.9569 (90)
Living area fraction												
									FLA = Living area / (4) =			0.3943 (91)
MIT	19.4054	19.5490	19.8212	20.1526	20.3901	20.4793	20.4947	20.4925	20.4396	20.1486	19.7139	19.3509 (92)
Temperature adjustment												
												0.0000
adjusted MIT	19.4054	19.5490	19.8212	20.1526	20.3901	20.4793	20.4947	20.4925	20.4396	20.1486	19.7139	19.3509 (93)

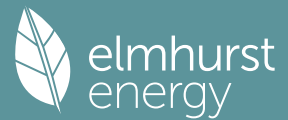
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9711	0.9602	0.9314	0.8592	0.7173	0.5258	0.3728	0.4223	0.6714	0.8860	0.9558	0.9752 (94)
Useful gains	479.0380	500.1775	514.7017	508.5136	447.2290	322.6967	217.3543	227.6085	333.7029	412.7383	441.0799	463.9009 (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												
	846.8527	821.2644	746.8251	630.8538	487.1930	329.6080	218.3468	229.4345	355.4154	535.3227	707.1722	849.3995 (97)
Space heating kWh												
	273.6541	215.7704	172.6998	88.0849	29.7332	0.0000	0.0000	0.0000	0.0000	91.2028	191.5865	286.8110 (98a)
Space heating requirement - total per year (kWh/year)												
												1349.5428
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												
	273.6541	215.7704	172.6998	88.0849	29.7332	0.0000	0.0000	0.0000	0.0000	91.2028	191.5865	286.8110 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												
												1349.5428
Space heating per m2												
										(98c) / (4) =		21.5892 (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)

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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	273.6541	215.7704	172.6998	88.0849	29.7332	0.0000	0.0000	0.0000	0.0000	91.2028	191.5865	286.8110 (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)	273.6541	215.7704	172.6998	88.0849	29.7332	0.0000	0.0000	0.0000	0.0000	91.2028	191.5865	286.8110 (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 requirement	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (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	66.6690	58.8572	62.2627	54.1016	52.0108	46.3938	45.4401	47.5056	48.3167	54.4438	58.5856	65.8561 (217)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (219)
(221)m	3.4966	3.1582	3.4966	3.3838	3.4966	3.3838	3.4966	3.4966	3.3838	3.4966	3.3838	3.4966 (221)
Pumps and Fa	19.4269	15.5850	14.0326	10.2809	7.9412	6.4881	7.2443	9.4164	12.2309	16.0476	18.1258	19.9669 (231)
Lighting												
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)
(233a)m												
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)
(234a)m												
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)
(235a)m												
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)
(235c)m												
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)
(233b)m												
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)
(234b)m												
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)
(235b)m												
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)
(235d)m												
Annual totals kWh/year												
Space heating fuel - main system 1												1349.5428 (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												660.4428 (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)												41.1694 (230a)
Total electricity for the above, kWh/year												41.1694 (231)
Electricity for lighting (calculated in Appendix L)												156.7865 (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												2207.9415 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1349.5428	16.4900	222.5396
Space heating - main system 2	0.0000	16.4900	0.0000
Total CO2 associated with community systems			0.0000
Water heating (other fuel)	660.4428	16.4900	108.9070
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000
Pumps, fans and electric keep-hot	41.1694	16.4900	6.7888
Energy for lighting	156.7865	16.4900	25.8541
Additional standing charges			0.0000
Total energy cost			364.0896

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600	(256)
Energy cost factor (ECF)	1.2192	(257)
SAP value	80.2374	
SAP rating (Section 12)	80	(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	1349.5428	0.1557	210.1562
Space heating - main system 2	0.0000	0.0000	0.0000
Total CO2 associated with community systems			0.0000
Water heating (other fuel)	660.4428	0.1412	93.2240
Space and water heating			303.3802
Pumps, fans and electric keep-hot	41.1694	0.1387	5.7107
Energy for lighting	156.7865	0.1443	22.6291

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Total CO2, kg/year 331.7201 (272)
CO2 emissions per m2 5.3100 (273)
EI value 95.8655
EI rating 96 (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

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.5100 (1b)	x 2.4100 (2b)	= 150.6491 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 150.6491 (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	0 * 10 =	0.0000 (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) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.6500 (17)
Infiltration rate 0.1825 (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) = 0.1551 (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	0.1706	0.1590	0.1590	0.1512	0.1512	0.1319	0.1319	0.1280	0.1319	0.1474	0.1435	0.1551 (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)

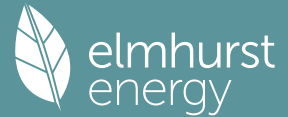
3. Heat losses and heat loss parameter

Element	Gross 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			3.8200	1.2357	4.7205		(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			62.5100	0.1000	6.2510	75.0000	4688.2500 (28a)
EW Brick AAC018/019	23.3500	7.8600	15.4900	0.2600	4.0274	60.0000	929.4000 (29a)
E-WM-30 Corridor Wall	21.5200	2.0800	19.4400	0.2100	4.0824	52.3000	1016.7120 (29a)
Total net area of external elements Aum(A, m2)			107.3800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.5174		(33)
Main dwelling							
Party Wall			36.8400	0.0000	0.0000	45.0000	1657.8000 (32)
Party Ceiling			62.5100			40.0000	2500.4000 (32b)
GF Timber			134.3400			9.0000	1209.0600 (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) = 12159.5720 (34)
List of Thermal Bridges 194.5220 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	1.8300	0.0370	0.0677
E2 Other lintels (including other steel lintels)	1.9200	0.0410	0.0787
E4 Jamb	12.4700	0.0140	0.1746
E5 Ground floor (normal)	8.3500	0.0380	0.3173
E7 Party floor between dwellings (in blocks of flats)	8.7600	0.0390	0.3416
E5 Ground floor (normal)	0.7100	0.0450	0.0319
E16 Corner (normal)	5.1600	0.0410	0.2116
E18 Party wall between dwellings	5.1600	0.0390	0.2012
P1 Party wall - Ground floor	14.2900	0.0470	0.6716
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.2900	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)	8.3400	0.0450	0.3753
E7 Party floor between dwellings (in blocks of flats)	8.3400	0.0330	0.2752
E25 Staggered party wall between dwellings	5.1600	0.0380	0.1961
P8 Party Wall - Exposed floor (inverted)	5.6700	0.2400	1.3608

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

Point Thermal bridges
Total fabric heat loss

(33) + (36) + (36a) =
4.6883 (36)
0.0000
31.2057 (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	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	(38)
Heat transfer coeff	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	(39)
Average = Sum(39)m / 12 =												56.0628	(39)
HLP	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	(40)
HLP (average)												0.8969	(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												2.0516	(42)
Hot water usage for mixer showers	58.6188	57.7379	56.4542	53.9981	52.1856	50.1643	49.0153	50.2893	51.6858	53.8561	56.3650	58.3942	(42a)
Hot water usage for baths	25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456	(42b)
Hot water usage for other uses	35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408	(42c)
Average daily hot water use (litres/day)												109.9314	(43)
Daily hot water use	119.5909	117.0378	113.9283	109.1993	105.3593	101.2310	99.6440	102.7400	106.0054	110.3395	115.1413	119.2807	(44)
Energy conte	189.4028	166.6602	175.1035	149.4884	141.8339	124.4753	120.5107	127.2136	130.7152	149.7297	164.0399	186.7648	(45)
Energy content (annual)										Total = Sum(45)m =		1825.9381	
Distribution loss (46)m = 0.15 x (45)m	28.4104	24.9990	26.2655	22.4233	21.2751	18.6713	18.0766	19.0820	19.6073	22.4595	24.6060	28.0147	(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	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	(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	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	(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	62.9764	55.4145	58.2219	49.7049	47.1598	41.3880	40.0698	42.2985	43.4628	49.7851	54.5433	62.0993	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.1948	19.7132	16.0318	12.1371	9.0727	7.6595	8.2764	10.7579	14.4393	18.3340	21.3985	22.8116	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.5073	270.2832	263.2881	248.3962	229.5979	211.9302	200.1271	197.3512	204.3463	219.2382	238.0365	255.7042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	(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)	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	(71)
Water heating gains (Table 5)	84.6457	82.4621	78.2553	69.0346	63.3868	57.4834	53.8573	56.8529	60.3650	66.9155	75.7545	83.4668	(72)
Total internal gains	464.7421	462.8528	447.9695	419.9622	392.4517	367.4674	352.6550	355.3563	369.5449	394.8819	425.5838	452.3769	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W		

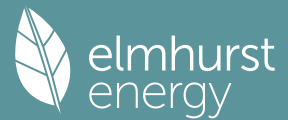
Northeast					3.8200	13.7758	0.4600	0.0000			0.7700			18.6392 (75)		
Northeast					4.0400	13.7758	0.6000	0.7000			0.7700			16.1987 (75)		

Solar gains					34.8379	62.3281	111.9599	186.5190	243.4027	273.8675	253.9334	207.1012	145.4710	81.9319	43.2632	28.5584 (83)
Total gains					499.5800	525.1809	559.9294	606.4812	635.8544	641.3349	606.5884	562.4575	515.0159	476.8139	468.8470	480.9353 (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	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478

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alpha	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165
util living area	0.9764	0.9668	0.9347	0.8514	0.6834	0.4662	0.3136	0.3575	0.6412	0.8799	0.9603	0.9797 (86)
MIT	20.0861	20.2042	20.4610	20.7420	20.9322	20.9918	20.9991	20.9983	20.9618	20.7387	20.3616	20.0496 (87)
Th 2	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702 (88)
util rest of house	0.9709	0.9592	0.9198	0.8199	0.6285	0.3971	0.2374	0.2758	0.5675	0.8463	0.9498	0.9749 (89)
MIT 2	19.1214	19.2692	19.5864	19.9165	20.1160	20.1658	20.1699	20.1697	20.1453	19.9210	19.4686	19.0756 (90)
Living area fraction									FLA = Living area / (4) =			0.3943 (91)
MIT	19.5018	19.6379	19.9313	20.2420	20.4379	20.4915	20.4969	20.4964	20.4672	20.2434	19.8207	19.4597 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5018	19.6379	19.9313	20.2420	20.4379	20.4915	20.4969	20.4964	20.4672	20.2434	19.8207	19.4597 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9655	0.9533	0.9148	0.8228	0.6469	0.4241	0.2675	0.3081	0.5948	0.8496	0.9444	0.9698 (94)
Useful gains	482.3500	500.6407	512.2392	499.0354	411.3068	272.0052	162.2493	173.2651	306.3077	405.1126	442.7985	466.4269 (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	818.6180	792.6114	708.1447	591.0136	433.8079	274.2311	162.4094	173.5950	317.7214	495.7877	673.9158	816.2565 (97)
Space heating kWh	250.1834	196.2043	145.7537	66.2243	16.7408	0.0000	0.0000	0.0000	0.0000	67.4623	166.4044	260.2733 (98a)
Space heating requirement - total per year (kWh/year)												1169.2464
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	250.1834	196.2043	145.7537	66.2243	16.7408	0.0000	0.0000	0.0000	0.0000	67.4623	166.4044	260.2733 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1169.2464
Space heating per m2										(98c) / (4) =		18.7050 (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	250.1834	196.2043	145.7537	66.2243	16.7408	0.0000	0.0000	0.0000	0.0000	67.4623	166.4044	260.2733 (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)	250.1834	196.2043	145.7537	66.2243	16.7408	0.0000	0.0000	0.0000	0.0000	67.4623	166.4044	260.2733 (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	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (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	66.6690	58.8572	62.2627	54.1016	52.0108	46.3938	45.4401	47.5056	48.3167	54.4438	58.5856	65.8561 (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	3.4966	3.1582	3.4966	3.3838	3.4966	3.3838	3.4966	3.4966	3.3838	3.4966	3.3838	3.4966 (231)
Lighting	19.4269	15.5850	14.0326	10.2809	7.9412	6.4881	7.2443	9.4164	12.2309	16.0476	18.1258	19.9669 (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												1169.2464 (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												660.4428 (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)												41.1694 (230a)
Total electricity for the above, kWh/year												41.1694 (231)
Electricity for lighting (calculated in Appendix L)												156.7865 (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)

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Appendix Q - special features
Energy saved or generated
Energy used
Total delivered energy for all uses

-0.0000 (236)
0.0000 (237)
2027.6452 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1169.2464	26.0600	304.7056 (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)	660.4428	26.0600	172.1114 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	41.1694	26.0600	10.7287 (249)
Energy for lighting	156.7865	26.0600	40.8586 (250)
Additional standing charges			0.0000 (251)
Total energy cost			528.4043 (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	1169.2464	0.1564	182.8792 (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)	660.4428	0.1412	93.2240 (264)
Space and water heating			276.1033 (265)
Pumps, fans and electric keep-hot	41.1694	0.1387	5.7107 (267)
Energy for lighting	156.7865	0.1443	22.6291 (268)
Total CO2, kg/year			304.4431 (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	1169.2464	1.5791	1846.3054 (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)	660.4428	1.5219	1005.1598 (278)
Space and water heating			2851.4652 (279)
Pumps, fans and electric keep-hot	41.1694	1.5128	62.2810 (281)
Energy for lighting	156.7865	1.5338	240.4844 (282)
Total Primary energy kWh/year			3154.2307 (286)

SAP 10 EPC IMPROVEMENTS

Plot 034_ As Built

Current energy efficiency rating: C 80
Current environmental impact rating: A 96

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

Recommended measures (none) Typical annual savings Energy efficiency Environmental impact

Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: C 80
Potential environmental impact rating: A 96

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	Potential	Saving
Electricity	£528	£528	£0
Space heating	£315	£315	£0
Water heating	£172	£172	£0
Lighting	£41	£41	£0
Total cost of fuels	£528	£528	£0
Total cost of uses	£528	£528	£0
Delivered energy	32 kWh/m²	32 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	50 kWh/m²	50 kWh/m²	0 kWh/m²

Full SAP Calculation Printout



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	62.5100 (1b)	x 2.4100 (2b)	= 150.6491 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 150.6491 (5)

2. Ventilation rate

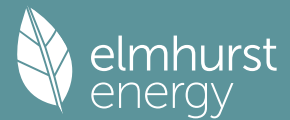
												m3 per hour	
Number of open chimneys												0 * 80 =	0.0000 (6a)
Number of open flues												0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire												0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler												0 * 20 =	0.0000 (6d)
Number of flues attached 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)
												Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =												0.0000 / (5) =	0.0000 (8)
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50													3.6500 (17)
Infiltration rate													0.1825 (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) =	0.1551 (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	0.1978	0.1939	0.1900	0.1706	0.1668	0.1474	0.1474	0.1435	0.1551	0.1668	0.1745	0.1823 (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			3.8200	1.2357	4.7205			(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			62.5100	0.1000	6.2510	75.0000	4688.2500	(28a)				
EW Brick AAC018/019	23.3500	7.8600	15.4900	0.2600	4.0274	60.0000	929.4000	(29a)				
E-WM-30 Corridor Wall	21.5200	2.0800	19.4400	0.2100	4.0824	52.3000	1016.7120	(29a)				
Total net area of external elements Aum (A, m2)			107.3800					(31)				
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		26.5174			(33)				
Main dwelling												
Party Wall			36.8400	0.0000	0.0000	45.0000	1657.8000	(32)				
Party Ceiling			62.5100			40.0000	2500.4000	(32b)				
GF Timber			134.3400			9.0000	1209.0600	(32c)				
Masonry Walls			4.0500			39.0000	157.9500	(32c)				
Heat capacity Cm = Sum(A x k)					(28)... (30) + (32) + (32a)... (32e) =		12159.5720	(34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							194.5220	(35)				
List of Thermal Bridges												
K1 Element				Length	Psi-value		Total					
E2 Other lintels (including other steel lintels)				1.8300	0.0370		0.0677					
E2 Other lintels (including other steel lintels)				1.9200	0.0410		0.0787					
E4 Jamb				12.4700	0.0140		0.1746					
E5 Ground floor (normal)				8.3500	0.0380		0.3173					
E7 Party floor between dwellings (in blocks of flats)				8.7600	0.0390		0.3416					
E5 Ground floor (normal)				0.7100	0.0450		0.0319					
E16 Corner (normal)				5.1600	0.0410		0.2116					
E18 Party wall between dwellings				5.1600	0.0390		0.2012					
P1 Party wall - Ground floor				14.2900	0.0470		0.6716					
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.2900	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)				8.3400	0.0450		0.3753					
E7 Party floor between dwellings (in blocks of flats)				8.3400	0.0330		0.2752					
E25 Staggered party wall between dwellings				5.1600	0.0380		0.1961					
P8 Party Wall - Exposed floor (inverted)				5.6700	0.2400		1.3608					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.6883	(36)				
Point Thermal bridges							0.0000					
Total fabric heat loss					(33) + (36) + (36a) =		31.2057	(37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 24.8571	Feb 24.8571	Mar 24.8571	Apr 24.8571	May 24.8571	Jun 24.8571	Jul 24.8571	Aug 24.8571	Sep 24.8571	Oct 24.8571	Nov 24.8571	Dec 24.8571 (38)
Heat transfer coeff	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628 (39)
Average = Sum(39)m / 12 =												56.0628
HLP	Jan 0.8969	Feb 0.8969	Mar 0.8969	Apr 0.8969	May 0.8969	Jun 0.8969	Jul 0.8969	Aug 0.8969	Sep 0.8969	Oct 0.8969	Nov 0.8969	Dec 0.8969 (40)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nill,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478
alpha	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165
util living area	0.9806	0.9721	0.9488	0.8851	0.7515	0.5675	0.4198	0.4722	0.7152	0.9120	0.9692	0.9837 (86)
MIT	20.0031	20.1272	20.3642	20.6596	20.8836	20.9769	20.9958	20.9926	20.9310	20.6515	20.2687	19.9559 (87)
Th 2	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702 (88)
util rest of house	0.9762	0.9659	0.9371	0.8598	0.7042	0.5002	0.3422	0.3899	0.6487	0.8867	0.9612	0.9799 (89)
MIT 2	19.0163	19.1725	19.4677	19.8226	20.0688	20.1553	20.1684	20.1668	20.1196	19.8212	19.3528	18.9569 (90)
Living area fraction									fLA = Living area / (4) =			0.3943 (91)
MIT	19.4054	19.5490	19.8212	20.1526	20.3901	20.4793	20.4947	20.4925	20.4396	20.1486	19.7139	19.3509 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4054	19.5490	19.8212	20.1526	20.3901	20.4793	20.4947	20.4925	20.4396	20.1486	19.7139	19.3509 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9711	0.9602	0.9314	0.8592	0.7173	0.5258	0.3728	0.4223	0.6714	0.8860	0.9558	0.9752	(94)
Useful gains	479.0380	500.1775	514.7017	508.5136	447.2290	322.6967	217.3543	227.6085	333.7029	412.7383	441.0799	463.9009	(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	846.8527	821.2644	746.8251	630.8538	487.1930	329.6080	218.3468	229.4345	355.4154	535.3227	707.1722	849.3995	(97)
Space heating kWh	273.6541	215.7704	172.6998	88.0849	29.7332	0.0000	0.0000	0.0000	0.0000	91.2028	191.5865	286.8110	(98a)
Space heating requirement - total per year (kWh/year)												1349.5428	
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	273.6541	215.7704	172.6998	88.0849	29.7332	0.0000	0.0000	0.0000	0.0000	91.2028	191.5865	286.8110	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1349.5428	
Space heating per m2											(98c) / (4) =	21.5892	(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	273.6541	215.7704	172.6998	88.0849	29.7332	0.0000	0.0000	0.0000	0.0000	91.2028	191.5865	286.8110	(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)	273.6541	215.7704	172.6998	88.0849	29.7332	0.0000	0.0000	0.0000	0.0000	91.2028	191.5865	286.8110	(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 requirement	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	(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	66.6690	58.8572	62.2627	54.1016	52.0108	46.3938	45.4401	47.5056	48.3167	54.4438	58.5856	65.8561	(219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	3.4966	3.1582	3.4966	3.3838	3.4966	3.3838	3.4966	3.4966	3.3838	3.4966	3.3838	3.4966	(231)	
Lighting	19.4269	15.5850	14.0326	10.2809	7.9412	6.4881	7.2443	9.4164	12.2309	16.0476	18.1258	19.9669	(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												1349.5428	(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												660.4428	(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)												41.1694	(230a)	
Total electricity for the above, kWh/year												41.1694	(231)	
Electricity for lighting (calculated in Appendix L)												156.7865	(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												2207.9415	(238)	

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1349.5428	16.4900	222.5396	(240)

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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)	660.4428	16.4900	108.9070 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.1694	16.4900	6.7888 (249)
Energy for lighting	156.7865	16.4900	25.8541 (250)
Additional standing charges			0.0000 (251)
Total energy cost			364.0896 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2192 (257)
SAP value		80.2374
SAP rating (Section 12)		80 (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	1349.5428	0.1557	210.1562 (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)	660.4428	0.1412	93.2240 (264)
Space and water heating			303.3802 (265)
Pumps, fans and electric keep-hot	41.1694	0.1387	5.7107 (267)
Energy for lighting	156.7865	0.1443	22.6291 (268)
Total CO2, kg/year			331.7201 (272)
CO2 emissions per m2			5.3100 (273)
EI value			95.8655
EI rating			96 (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	62.5100 (1b)	x 2.4100 (2b)	= 150.6491 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	150.6491 (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		3.6500 (17)
Infiltration rate		0.1825 (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) =	0.1551 (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	0.1706	0.1590	0.1590	0.1512	0.1512	0.1319	0.1319	0.1280	0.1319	0.1474	0.1435	0.1551 (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	Openings	NetArea	U-value	A x U	K-value	A x K
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Main dwelling		m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
Window				3.8200	1.2357	4.7205			(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				62.5100	0.1000	6.2510	75.0000	4688.2500	(28a)				
EW Brick AAC018/019	23.3500	7.8600		15.4900	0.2600	4.0274	60.0000	929.4000	(29a)				
E-WM-30 Corridor Wall	21.5200	2.0800		19.4400	0.2100	4.0824	52.3000	1016.7120	(29a)				
Total net area of external elements Aum(A, m2)				107.3800					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.5174				(33)				
Main dwelling													
Party Wall				36.8400	0.0000	0.0000	45.0000	1657.8000	(32)				
Party Ceiling				62.5100			40.0000	2500.4000	(32b)				
GF Timber				134.3400			9.0000	1209.0600	(32c)				
Masonry Walls				4.0500			39.0000	157.9500	(32c)				
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =			12159.5720	(34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								194.5220	(35)				
List of Thermal Bridges													
K1 Element					Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)					1.8300	0.0370	0.0677						
E2 Other lintels (including other steel lintels)					1.9200	0.0410	0.0787						
E4 Jamb					12.4700	0.0140	0.1746						
E5 Ground floor (normal)					8.3500	0.0380	0.3173						
E7 Party floor between dwellings (in blocks of flats)					8.7600	0.0390	0.3416						
E5 Ground floor (normal)					0.7100	0.0450	0.0319						
E16 Corner (normal)					5.1600	0.0410	0.2116						
E18 Party wall between dwellings					5.1600	0.0390	0.2012						
P1 Party wall - Ground floor					14.2900	0.0470	0.6716						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					14.2900	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)					8.3400	0.0450	0.3753						
E7 Party floor between dwellings (in blocks of flats)					8.3400	0.0330	0.2752						
E25 Staggered party wall between dwellings					5.1600	0.0380	0.1961						
P8 Party Wall - Exposed floor (inverted)					5.6700	0.2400	1.3608						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								4.6883	(36)				
Point Thermal bridges								0.0000					
Total fabric heat loss							(33) + (36) + (36a) =	31.2057	(37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	
Average = Sum(39)m / 12 =	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	56.0628	(39)
HLP	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	0.8969	(40)
HLP (average)												0.8969	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

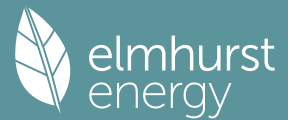
4. Water heating energy requirements (kWh/year)													

Assumed occupancy													2.0516 (42)
Hot water usage for mixer showers													
58.6188	57.7379	56.4542	53.9981	52.1856	50.1643	49.0153	50.2893	51.6858	53.8561	56.3650	58.3942	58.3942	(42a)
Hot water usage for baths													
25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456	25.2456	(42b)
Hot water usage for other uses													
35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408	35.6408	(42c)
Average daily hot water use (litres/day)													109.9314 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
119.5909	117.0378	113.9283	109.1993	105.3593	101.2310	99.6440	102.7400	106.0054	110.3395	115.1413	119.2807	119.2807	(44)
Energy conte	189.4028	166.6602	175.1035	149.4884	141.8339	124.4753	120.5107	127.2136	130.7152	149.7297	164.0399	186.7648	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													1825.9381
28.4104	24.9990	26.2655	22.4233	21.2751	18.6713	18.0766	19.0820	19.6073	22.4595	24.6060	28.0147	28.0147	(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	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	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													
216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	213.7162	(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													
216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	213.7162	(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	0.0000	(64a)
Heat gains from water heating, kWh/month													
62.9764	55.4145	58.2219	49.7049	47.1598	41.3880	40.0698	42.2985	43.4628	49.7851	54.5433	62.0993	62.0993	(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	
123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
22.1948	19.7132	16.0318	12.1371	9.0727	7.6595	8.2764	10.7579	14.4393	18.3340	21.3985	22.8116	22.8116	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
267.5073	270.2832	263.2881	248.3962	229.5979	211.9302	200.1271	197.3512	204.3463	219.2382	238.0365	255.7042	255.7042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

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Pumps, fans	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615 (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)
	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656 (71)
Water heating gains (Table 5)	84.6457	82.4621	78.2553	69.0346	63.3868	57.4834	53.8573	56.8529	60.3650	66.9155	75.7545	83.4668 (72)
Total internal gains	464.7421	462.8528	447.9695	419.9622	392.4517	367.4674	352.6550	355.3563	369.5449	394.8819	425.5838	452.3769 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
Northeast					3.8200	13.7758	0.4600	0.0000			0.7700			18.6392 (75)
Northeast					4.0400	13.7758	0.6000	0.7000			0.7700			16.1987 (75)
Solar gains	34.8379	62.3281	111.9599	186.5190	243.4027	273.8675	253.9334	207.1012	145.4710	81.9319	43.2632			28.5584 (83)
Total gains	499.5800	525.1809	559.9294	606.4812	635.8544	641.3349	606.5884	562.4575	515.0159	476.8139	468.8470			480.9353 (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	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478	60.2478
alpha	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165	5.0165
util living area	0.9764	0.9668	0.9347	0.8514	0.6834	0.4662	0.3136	0.3575	0.6412	0.8799	0.9603	0.9797 (86)
MIT	20.0861	20.2042	20.4610	20.7420	20.9322	20.9918	20.9991	20.9983	20.9618	20.7387	20.3616	20.0496 (87)
Th 2	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702	20.1702 (88)
util rest of house	0.9709	0.9592	0.9198	0.8199	0.6285	0.3971	0.2374	0.2758	0.5675	0.8463	0.9498	0.9749 (89)
MIT 2	19.1214	19.2692	19.5864	19.9165	20.1160	20.1658	20.1699	20.1697	20.1453	19.9210	19.4686	19.0756 (90)
Living area fraction									FLA = Living area / (4) =			0.3943 (91)
MIT	19.5018	19.6379	19.9313	20.2420	20.4379	20.4915	20.4969	20.4964	20.4672	20.2434	19.8207	19.4597 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5018	19.6379	19.9313	20.2420	20.4379	20.4915	20.4969	20.4964	20.4672	20.2434	19.8207	19.4597 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9655	0.9533	0.9148	0.8228	0.6469	0.4241	0.2675	0.3081	0.5948	0.8496	0.9444	0.9698 (94)
Useful gains	482.3500	500.6407	512.2392	499.0354	411.3068	272.0052	162.2493	173.2651	306.3077	405.1126	442.7985	466.4269 (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	818.6180	792.6114	708.1447	591.0136	433.8079	274.2311	162.4094	173.5950	317.7214	495.7877	673.9158	816.2565 (97)
Space heating kWh	250.1834	196.2043	145.7537	66.2243	16.7408	0.0000	0.0000	0.0000	0.0000	67.4623	166.4044	260.2733 (98a)
Space heating requirement - total per year (kWh/year)												1169.2464
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	250.1834	196.2043	145.7537	66.2243	16.7408	0.0000	0.0000	0.0000	0.0000	67.4623	166.4044	260.2733 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1169.2464
Space heating per m ²										(98c) / (4) =		18.7050 (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	250.1834	196.2043	145.7537	66.2243	16.7408	0.0000	0.0000	0.0000	0.0000	67.4623	166.4044	260.2733 (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)	250.1834	196.2043	145.7537	66.2243	16.7408	0.0000	0.0000	0.0000	0.0000	67.4623	166.4044	260.2733 (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	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (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	66.6690	58.8572	62.2627	54.1016	52.0108	46.3938	45.4401	47.5056	48.3167	54.4438	58.5856	65.8561 (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	3.4966	3.1582	3.4966	3.3838	3.4966	3.3838	3.4966	3.4966	3.3838	3.4966	3.3838	3.4966 (231)
Lighting	19.4269	15.5850	14.0326	10.2809	7.9412	6.4881	7.2443	9.4164	12.2309	16.0476	18.1258	19.9669 (232)

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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												1169.2464	(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												660.4428	(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)												41.1694	(230a)
Total electricity for the above, kWh/year												41.1694	(231)
Electricity for lighting (calculated in Appendix L)												156.7865	(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												2027.6452	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1169.2464	26.0600	304.7056	(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)	660.4428	26.0600	172.1114	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	41.1694	26.0600	10.7287	(249)
Energy for lighting	156.7865	26.0600	40.8586	(250)
Additional standing charges			0.0000	(251)
Total energy cost			528.4043	(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	1169.2464	0.1564	182.8792	(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)	660.4428	0.1412	93.2240	(264)
Space and water heating			276.1033	(265)
Pumps, fans and electric keep-hot	41.1694	0.1387	5.7107	(267)
Energy for lighting	156.7865	0.1443	22.6291	(268)
Total CO2, kg/year			304.4431	(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	1169.2464	1.5791	1846.3054	(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)	660.4428	1.5219	1005.1598	(278)
Space and water heating			2851.4652	(279)
Pumps, fans and electric keep-hot	41.1694	1.5128	62.2810	(281)
Energy for lighting	156.7865	1.5338	240.4844	(282)
Total Primary energy kWh/year			3154.2307	(286)