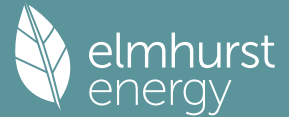


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Plot Reference	Plot 21				Issued on Date	22/12/2025	
Assessment Reference	Plot 21			Plot Type Ref			
Plot Address	Flat 6, 4 Cross Road Manchester, M21 9SX				SAP Version	10.2	
SAP Rating	88 B	DER	3.09	TER	10.84		
Environmental	98 A	% DER < TER				71.49	
CO ₂ Emissions (t/year)	0.19	DFEE	20.35	TFEE	23.18		
Compliance Check	See BREL	% DFEE < TFEE				12.23	
% DPER < TPER	43.42	DPER	32.43	TPER	57.31		
Assessor Details	Daniel Smith				Assessor ID	CJ06-0001	
Client	J Greenwood (Builders) Limited, Steve Brown						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	70.0000 (1b)	2.5000 (2b)	175.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	175.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.3900 (17)
Infiltration rate	0.1695 (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) = 0.1441 (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	0.1837	0.1801	0.1765	0.1585	0.1549	0.1369	0.1369	0.1333	0.1441	0.1549	0.1621	0.1693 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3237	0.3201	0.3165	0.2985	0.2949	0.2769	0.2769	0.2733	0.2841	0.2949	0.3021	0.3093 (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 N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.4700	11.2000	22.2700	0.1800	4.0086	110.0000	2449.7001 (29a)
Flat Roof	22.5500		22.5500	0.1500	3.3825	9.0000	202.9500 (30)
Total net area of external elements Aum(A, m ²)			56.0200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.2396		(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			25.2500	0.0000	0.0000	45.0000	1136.2500 (32)
Party Floor			70.0000			40.0000	2800.0000 (32d)
Party Ceiling			47.4500			30.0000	1423.5000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11405.2201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							162.9317 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5500	0.0370	0.6493
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.7200	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
E17 Corner (inverted - internal area greater than external area)	2.6800	-0.0850	-0.2278
E9 Balcony between dwellings, wall insulation continuous	5.0800	0.1500	0.7620
E15 Flat roof with parapet	7.4300	0.1320	0.9808
E24 Eaves (insulation at ceiling level - inverted)	4.2400	0.1500	0.6360
P4 Party wall - Roof (insulation at ceiling level)	8.3000	0.0400	0.3320
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0618 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	26.3014 (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	18.6934	18.4854	18.2774	17.2374	17.0294	15.9893	15.9893	15.7813	16.4053	17.0294	17.4454	17.8614	(38)
Heat transfer coeff	44.9948	44.7868	44.5788	43.5387	43.3307	42.2907	42.2907	42.0827	42.7067	43.3307	43.7468	44.1628	(39)
Average = Sum(39)m / 12 =												43.4867	
HLP	0.6428	0.6398	0.6368	0.6220	0.6190	0.6042	0.6042	0.6012	0.6101	0.6190	0.6250	0.6309	(40)
HLP (average)												0.6212	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2461 (42)
Hot water usage for mixer showers	61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427	(42a)
Hot water usage for baths	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432	(42b)
Hot water usage for other uses	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326	(42c)
Average daily hot water use (litres/day)												116.0487	(43)
Daily hot water use	126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184	(44)
Energy conte	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	134.2926	137.9892	158.0618	173.1684	197.1578	(45)
Energy content (annual)										Total = Sum(45)m =		1927.5450	
Distribution loss (46)m = 0.15 x (45)m	29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737	(46)
Water storage loss (or HIU loss):													
Store volume												201.0000	(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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092	(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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2244.8760	(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	66.4809	58.4981	61.4617	52.4707	49.7840	43.6910	42.2995	44.6523	45.8814	52.5556	57.5785	65.5550	(65)

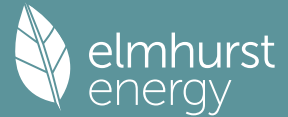
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.8207	114.9443	103.8207	107.2813	103.8207	107.2813	103.8207	103.8207	107.2813	103.8207	107.2813	103.8207	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	(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)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	(71)
Water heating gains (Table 5)	89.3561	87.0508	82.6098	72.8760	66.9139	60.6820	56.8542	60.0165	63.7242	70.6392	79.9701	88.1115	(72)
Total internal gains	447.1657	458.0313	437.3075	420.0511	396.7639	380.9620	364.9682	366.0832	378.4108	392.8484	419.5045	437.2159	(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
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North			3.6800		10.6334		0.4000		0.0000		0.7700		12.0523 (74)
South			7.5200		46.7521		0.4000		0.0000		0.7700		108.2853 (78)

Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	567.5033	658.4073	702.3495	738.2373	747.5094	727.6670	699.7825	676.1879	661.4507	611.5471	562.7275	540.8317 (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	70.4107	70.7377	71.0678	72.7655	73.1148	74.9128	74.9128	75.2831	74.1831	73.1148	72.4195	71.7373	
alpha	5.6940	5.7158	5.7379	5.8510	5.8743	5.9942	5.9942	6.0189	5.9455	5.8743	5.8280	5.7825	
util living area	0.9416	0.8869	0.8140	0.6821	0.5324	0.3713	0.2658	0.2862	0.4435	0.7001	0.8845	0.9507 (86)	
MIT	20.4743	20.6676	20.8189	20.9433	20.9878	20.9989	20.9999	20.9998	20.9967	20.9452	20.7313	20.4464 (87)	
Th 2	20.3916	20.3943	20.3970	20.4103	20.4129	20.4263	20.4263	20.4289	20.4209	20.4129	20.4076	20.4023 (88)	
util rest of house	0.9328	0.8725	0.7933	0.6545	0.5005	0.3383	0.2312	0.2507	0.4069	0.6680	0.8676	0.9431 (89)	
MIT 2	19.7867	20.0227	20.2030	20.3541	20.4022	20.4255	20.4262	20.4288	20.4185	20.3607	20.1142	19.7615 (90)	
Living area fraction									fLA = Living area / (4) =			0.4163 (91)	
MIT	20.0729	20.2912	20.4594	20.5994	20.6460	20.6642	20.6650	20.6665	20.6592	20.6040	20.3711	20.0466 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.0729	20.2912	20.4594	20.5994	20.6460	20.6642	20.6650	20.6665	20.6592	20.6040	20.3711	20.0466 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9277	0.8699	0.7956	0.6635	0.5132	0.3520	0.2456	0.2655	0.4220	0.6787	0.8665	0.9380 (94)	
Useful gains	526.4913	572.7496	558.7613	489.8308	383.6521	256.1382	171.8837	179.5020	279.1430	415.0322	487.6162	507.3115 (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	709.7003	689.3205	622.2919	509.3778	387.6372	256.4587	171.9124	179.5471	280.1218	433.4806	580.5674	699.8300 (97)	
Space heating kWh	136.3075	78.3357	47.2668	14.0738	2.9649	0.0000	0.0000	0.0000	0.0000	13.7256	66.9249	143.2337 (98a)	
Space heating requirement - total per year (kWh/year)												502.8328	
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	136.3075	78.3357	47.2668	14.0738	2.9649	0.0000	0.0000	0.0000	0.0000	13.7256	66.9249	143.2337 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												502.8328	
Space heating per m2										(98c) / (4) =		7.1833 (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	136.3075	78.3357	47.2668	14.0738	2.9649	0.0000	0.0000	0.0000	0.0000	13.7256	66.9249	143.2337 (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)	136.3075	78.3357	47.2668	14.0738	2.9649	0.0000	0.0000	0.0000	0.0000	13.7256	66.9249	143.2337 (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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092 (64)	
Efficiency of water heater (217)m	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912 (216)	
Fuel for water heating, kWh/month	65.8826	58.1540	61.4994	53.3953	51.3014	45.7281	44.7654	46.8200	47.6409	53.7218	57.8558	65.0740 (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	13.5997	12.2836	13.5997	13.1610	13.5997	13.1610	13.5997	13.5997	13.1610	13.5997	13.1610	13.5997 (231)	
Lighting	19.2063	15.4080	13.8732	10.1641	7.8510	6.4144	7.1620	9.3094	12.0920	15.8654	17.9199	19.7401 (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												502.8328 (211)	
Space heating fuel - main system 2												0.0000 (213)	

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Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	344.3912
Water heating fuel used	651.8389 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	160.1250 (230a)
Total electricity for the above, kWh/year	160.1250 (231)
Electricity for lighting (calculated in Appendix L)	155.0058 (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	1469.8025 (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	502.8328	0.1585	79.7070 (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)	651.8389	0.1412	92.0221 (264)
Space and water heating			171.7291 (265)
Pumps, fans and electric keep-hot	160.1250	0.1387	22.2113 (267)
Energy for lighting	155.0058	0.1443	22.3721 (268)
Total CO2, kg/year			216.3125 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0900 (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	502.8328	1.5867	797.8685 (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)	651.8389	1.5220	992.1119 (278)
Space and water heating			1789.9804 (279)
Pumps, fans and electric keep-hot	160.1250	1.5128	242.2371 (281)
Energy for lighting	155.0058	1.5338	237.7531 (282)
Total Primary energy kWh/year			2269.9706 (286)
Dwelling Primary energy Rate (DPER)			32.4300 (287)

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

1. Overall dwelling characteristics

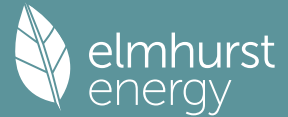
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	70.0000 (1b)	x 2.5000 (2b)	= 175.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 175.0000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1143 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3643 (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) = 0.3096 (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												

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Effective ac	0.3948	0.3871	0.3793	0.3406	0.3329	0.2942	0.2942	0.2864	0.3096	0.3329	0.3483	0.3638 (22b)
	0.5779	0.5749	0.5719	0.5580	0.5554	0.5433	0.5433	0.5410	0.5479	0.5554	0.5607	0.5662 (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 Opening Type			11.2000	1.1450	12.8244		(27)
EXT Wall	33.4700	11.2000	22.2700	0.1800	4.0086		(29a)
Flat Roof	22.5500		22.5500	0.1100	2.4805		(30)
Total net area of external elements Aum(A, m2)			56.0200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.3135		(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000		(32)
Corridor			25.2500	0.0000	0.0000		(32)

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

162.9317 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5500	0.0700	1.2285
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.7200	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885
E3 Sill	2.5000	0.0500	0.1250
E4 Jamb	10.4800	0.0500	0.5240
E16 Corner (normal)	5.3600	0.0900	0.4824
E18 Party wall between dwellings	2.6800	0.0600	0.1608
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824
E17 Corner (inverted - internal area greater than external area)	2.6800	-0.0900	-0.2412
E9 Balcony between dwellings, wall insulation continuous	5.0800	0.0200	0.1016
E15 Flat roof with parapet	7.4300	0.5600	4.1608
E24 Eaves (insulation at ceiling level - inverted)	4.2400	0.2400	1.0176
P4 Party wall - Roof (insulation at ceiling level)	8.3000	0.1200	0.9960

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

9.3264 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 28.6399 (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	33.3755	33.2008	33.0295	32.2249	32.0743	31.3736	31.3736	31.2438	31.6435	32.0743	32.3789	32.6973 (38)
Heat transfer coeff	62.0155	61.8407	61.6694	60.8648	60.7143	60.0135	60.0135	59.8837	60.2834	60.7143	61.0188	61.3372 (39)
Average = Sum(39)m / 12 =												60.8641

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8859	0.8834	0.8810	0.8695	0.8673	0.8573	0.8573	0.8555	0.8612	0.8673	0.8717	0.8762 (40)
HLP (average)												0.8695
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

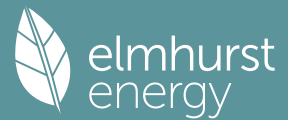
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2461 (42)
Hot water usage for mixer showers	61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427 (42a)	
Hot water usage for baths	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432 (42b)	
Hot water usage for other uses	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326 (42c)	
Average daily hot water use (litres/day)												116.0487 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184 (44)	
Energy conte	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	134.2926	137.9892	158.0618	173.1684	197.1578 (45)	
Energy content (annual)										Total = Sum(45)m =		1927.5450	
Distribution loss (46)m = 0.15 x (45)m	29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737 (46)	
Water storage loss (or HIU loss):													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month													
	246.5375	218.0199	231.4421	202.8986	196.3211	176.4934	173.8115	180.8875	183.0811	204.6567	218.2602	243.7527 (62)	
WWHRS	-28.2888	-25.0189	-26.1983	-21.6933	-20.2173	-17.3001	-16.2161	-17.2442	-17.8994	-21.1014	-23.9053	-27.7650 (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	218.2487	193.0011	205.2437	181.2053	176.1038	159.1933	157.5954	163.6433	165.1817	183.5553	194.3549	215.9878 (64)	
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				2213.3143 (64)	
Electric shower(s)												2213 (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	103.7568	92.1667	98.7376	88.5442	87.0599	79.7645	79.5754	81.9282	81.9549	89.8315	93.6520	102.8309 (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	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.8207	114.9443	103.8207	107.2813	103.8207	107.2813	103.8207	103.8207	107.2813	103.8207	107.2813	103.8207 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												

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Cooking gains	197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918 (68)
Pumps, fans	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306 (69)
Losses e.g. evaporation	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
(negative values) (Table 5)												
Water heating gains (Table 5)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450 (71)
Total internal gains	139.4581	137.1528	132.7118	122.9781	117.0160	110.7840	106.9562	110.1186	113.8262	120.7412	130.0722	138.2136 (72)
	500.2677	511.1334	490.4096	473.1532	449.8659	431.0640	415.0703	416.1853	428.5128	445.9504	472.6065	490.3179 (73)

6. Solar gains

[Jan]												Gains
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c	Access factor Table 6d		W
North					3.6800	10.6334	0.6300		0.7000	0.7700		11.9589 (74)
South					7.5200	46.7521	0.6300		0.7000	0.7700		107.4461 (78)
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)
Total gains	619.6727	709.9564	753.3974	788.8734	797.8932	775.0820	747.2898	723.8867	709.3592	662.9543	614.7196	593.1307 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	51.0859	51.2303	51.3726	52.0517	52.1808	52.7901	52.7901	52.9045	52.5537	52.1808	51.9203	51.6508
alpha	4.4057	4.4154	4.4248	4.4701	4.4787	4.5193	4.5193	4.5270	4.5036	4.4787	4.4614	4.4434
util living area	0.9554	0.9232	0.8781	0.7880	0.6559	0.4849	0.3513	0.3776	0.5632	0.7970	0.9209	0.9616 (86)
MIT	19.9959	20.2295	20.4727	20.7390	20.9061	20.9811	20.9965	20.9951	20.9626	20.7656	20.3591	19.9559 (87)
Th 2	20.1795	20.1816	20.1837	20.1935	20.1953	20.2039	20.2039	20.2055	20.2006	20.1953	20.1916	20.1877 (88)
util rest of house	0.9475	0.9107	0.8587	0.7569	0.6108	0.4282	0.2887	0.3137	0.5051	0.7611	0.9059	0.9548 (89)
MIT 2	19.0247	19.3141	19.6110	19.9301	20.1123	20.1910	20.2023	20.2031	20.1730	19.9676	19.4861	18.9812 (90)
Living area fraction									FLA = Living area / (4) =			0.4163 (91)
MIT	19.4290	19.6952	19.9697	20.2668	20.4427	20.5199	20.5329	20.5328	20.5017	20.2998	19.8495	19.3869 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4290	19.6952	19.9697	20.2668	20.4427	20.5199	20.5329	20.5328	20.5017	20.2998	19.8495	19.3869 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9389	0.9021	0.8531	0.7599	0.6251	0.4510	0.3147	0.3401	0.5275	0.7660	0.8986	0.9465	(94)
Useful gains	581.8175	640.4632	642.7538	599.4488	498.7366	349.5315	235.1405	246.2178	374.1588	507.8445	552.3907	561.4219	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	938.2314	914.9428	830.6714	691.8402	530.8088	355.2738	236.0252	247.4851	385.9161	588.9155	777.9616	931.5234	(97)
Space heating kWh	265.1720	184.4503	139.8107	66.5218	23.8617	0.0000	0.0000	0.0000	0.0000	60.3168	162.4111	275.3556	(98a)
Space heating requirement - total per year (kWh/year)												1177.9001	
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	265.1720	184.4503	139.8107	66.5218	23.8617	0.0000	0.0000	0.0000	0.0000	60.3168	162.4111	275.3556	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1177.9001	
Space heating per m2											(98c) / (4) =	16.8271	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	265.1720	184.4503	139.8107	66.5218	23.8617	0.0000	0.0000	0.0000	0.0000	60.3168	162.4111	275.3556 (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)	287.2936	199.8379	151.4742	72.0713	25.8524	0.0000	0.0000	0.0000	0.0000	65.3487	175.9600	298.3267 (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	218.2487	193.0011	205.2437	181.2053	176.1038	159.1933	157.5954	163.6433	165.1817	183.5553	194.3549	215.9878 (64)
Efficiency of water heater (217)m	84.4976	83.9583	83.2174	82.0326	80.7769	79.8000	79.8000	79.8000	79.8000	81.8518	83.6599	79.8000 (216)
Fuel for water heating, kWh/month	258.2898	229.8774	246.6356	220.8943	218.0124	199.4903	197.4880	205.0668	206.9946	224.2533	232.3154	255.2881 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	21.5719	17.3058	15.5819	11.4160	8.8180	7.2044	8.0441	10.4560	13.5814	17.8195	20.1271	22.1714 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-18.7693	-27.8136	-41.9981	-49.6842	-55.7412	-52.8253	-52.1866	-48.1950	-41.5274	-32.8852	-21.1116	-16.0736 (233a)

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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	-6.8542	-14.7297	-29.8637	-45.7264	-61.3223	-61.9280	-61.1940	-51.4112	-37.1629	-21.3417	-9.2396	-5.3968	(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												1276.1648	(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												2694.6061	(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)												174.0974	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-864.9813	(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												3365.8870	(238)

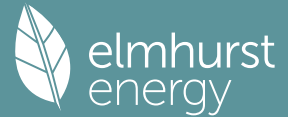
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1276.1648	0.2100	267.9946 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2694.6061	0.2100	565.8673 (264)
Space and water heating			833.8619 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	174.0974	0.1443	25.1276 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-458.8109	0.1335	-61.2741
PV Unit electricity exported	-406.1704	0.1253	-50.9081
Total			-112.1822 (269)
Total CO2, kg/year			758.7366 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.8400 (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	1276.1648	1.1300	1442.0662 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2694.6061	1.1300	3044.9049 (278)
Space and water heating			4486.9711 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	174.0974	1.5338	267.0365 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-458.8109	1.4935	-685.2426
PV Unit electricity exported	-406.1704	0.4600	-186.8569
Total			-872.0996 (283)
Total Primary energy kWh/year			4012.0089 (286)
Target Primary Energy Rate (TPER)			57.3100 (287)

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Plot Reference	Plot 21				Issued on Date	22/12/2025	
Assessment Reference	Plot 21			Plot Type Ref			
Plot Address	Flat 6, 4 Cross Road Manchester, M21 9SX				SAP Version	10.2	
SAP Rating	88 B	DER	3.09	TER	10.84		
Environmental	98 A	% DER < TER				71.49	
CO ₂ Emissions (t/year)	0.19	DFEE	20.35	TFEE	23.18		
Compliance Check	See BREL	% DFEE < TFEE				12.23	
% DPER < TPER	43.42	DPER	32.43	TPER	57.31		
Assessor Details	Daniel Smith				Assessor ID	CJ06-0001	
Client	J Greenwood (Builders) Limited, Steve Brown						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		
Dwelling volume			

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) =	0.1143 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.3900	(17)
Infiltration rate	0.2838	(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) =	0.2412 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.3076	0.3015	0.2955	0.2653	0.2593	0.2292	0.2292	0.2231	0.2412	0.2593	0.2714	0.2834 (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	0.5473	0.5455	0.5437	0.5352	0.5336	0.5263	0.5263	0.5249	0.5291	0.5336	0.5368	0.5402 (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 N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.4700	11.2000	22.2700	0.1800	4.0086	110.0000	2449.7001 (29a)
Flat Roof	22.5500		22.5500	0.1500	3.3825	9.0000	202.9500 (30)
Total net area of external elements Aum(A, m ²)			56.0200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.2396		(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			25.2500	0.0000	0.0000	45.0000	1136.2500 (32)
Party Floor			70.0000			40.0000	2800.0000 (32d)
Party Ceiling			47.4500			30.0000	1423.5000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11405.2201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							162.9317 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)				17.5500	0.0370	0.6493	

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 31.6062	Feb 31.5002	Mar 31.3962	Apr 30.9079	May 30.8166	Jun 30.3913	Jul 30.3913	Aug 30.3126	Sep 30.5551	Oct 30.8166	Nov 31.0014	Dec 31.1946 (38)
Heat transfer coeff	57.9076	57.8016	57.6976	57.2093	57.1180	56.6927	56.6927	56.6139	56.8565	57.1180	57.3028	57.4960 (39)
Average = Sum(39)m / 12 =												57.2089
HLP	Jan 0.8273	Feb 0.8257	Mar 0.8243	Apr 0.8173	May 0.8160	Jun 0.8099	Jul 0.8099	Aug 0.8088	Sep 0.8122	Oct 0.8160	Nov 0.8186	Dec 0.8214 (40)
HLP (average)												0.8173
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												2.2461 (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	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432 (42b)
Hot water usage for other uses	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326 (42c)
Average daily hot water use (litres/day)												58.9976 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	64.3661	62.6006	60.6731	58.2737	56.1334	53.9090	53.4466	55.3703	57.3432	59.6276	62.0482	64.2757 (44)
Energy content (annual)	101.9402	89.1425	93.2523	79.7738	75.5663	66.2874	64.6391	68.5600	70.7100	80.9141	88.3990	100.6403 (45)
Distribution loss (46)m = 0.15 x (45)m										Total =	Sum(45)m =	979.8247
Water storage loss (or HIU 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	86.6492	75.7711	79.2644	67.8078	64.2313	56.3443	54.9432	58.2760	60.1035	68.7770	75.1391	85.5442 (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	86.6492	75.7711	79.2644	67.8078	64.2313	56.3443	54.9432	58.2760	60.1035	68.7770	75.1391	85.5442 (64)
12Total per year (kWh/year)										Total per year (kWh/year) =	Sum(64)m =	832.8510 (64)
Electric shower(s)	49.5554	44.1543	48.2148	46.0108	46.8741	44.7134	46.2038	46.8741	46.0108	48.2148	47.3081	49.5554 (64a)
												563.6896 (64a)
Heat gains from water heating, kWh/month	34.0511	29.9813	31.8698	28.4546	27.7764	25.2644	25.2868	26.2875	26.5286	29.2479	30.6118	33.7749 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.8207	114.9443	103.8207	107.2813	103.8207	107.2813	103.8207	103.8207	107.2813	103.8207	107.2813	103.8207 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306 (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)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450 (71)
Water heating gains (Table 5)	45.7677	44.6151	42.8357	39.5203	37.3338	35.0895	33.9876	35.3327	36.8452	39.3117	42.5164	45.3964 (72)
Total internal gains	403.5773	415.5956	397.5335	386.6954	367.1838	355.3694	342.1016	341.3994	351.5318	361.5209	382.0508	394.5007 (73)

[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		
North					3.6800	10.6334	0.4000	0.0000	0.7700	12.0523 (74)		
South					7.5200	46.7521	0.4000	0.0000	0.7700	108.2853 (78)		
Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	523.9148	615.9716	662.5754	704.8816	717.9293	702.0744	676.9159	651.5041	634.5717	580.2197	525.2738	498.1165 (84)

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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	54.7098	54.8102	54.9090	55.3776	55.4662	55.8823	55.8823	55.9600	55.7213	55.4662	55.2873	55.1015
alpha	4.6473	4.6540	4.6606	4.6918	4.6977	4.7255	4.7255	4.7307	4.7148	4.6977	4.6858	4.6734
util living area	0.9726	0.9451	0.9043	0.8168	0.6829	0.5055	0.3664	0.3966	0.5921	0.8340	0.9466	0.9775 (86)
MIT	19.9479	20.1984	20.4535	20.7313	20.9056	20.9817	20.9967	20.9953	20.9617	20.7460	20.3101	19.8966 (87)
Th 2	20.2298	20.2311	20.2324	20.2384	20.2395	20.2448	20.2448	20.2457	20.2427	20.2395	20.2372	20.2348 (88)
util rest of house	0.9675	0.9357	0.8882	0.7884	0.6396	0.4497	0.3045	0.3329	0.5351	0.8022	0.9357	0.9733 (89)
MIT 2	19.2741	19.5183	19.7633	20.0241	20.1735	20.2348	20.2435	20.2439	20.2203	20.0431	19.6349	19.2280 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.5546	19.8014	20.0506	20.3185	20.4783	20.5457	20.5571	20.5567	20.5289	20.3357	19.9160	19.5063 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5546	19.8014	20.0506	20.3185	20.4783	20.5457	20.5571	20.5567	20.5289	20.3357	19.9160	19.5063 (93)

8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9621	0.9296	0.8840	0.7916	0.6536	0.4722	0.3302	0.3593	0.5571	0.8065	0.9304	0.9684 (94)
Useful gains	504.0659	572.5976	585.7339	557.9584	469.2321	331.5281	223.5245	234.1051	353.5106	467.9658	488.7300	482.3698 (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	883.3553	861.3235	781.8364	653.2445	501.3982	337.0797	224.3380	235.3246	365.5268	556.0852	734.3905	880.0526 (97)
Space heating kWh	282.1913	194.0238	145.9003	68.6060	23.9316	0.0000	0.0000	0.0000	0.0000	65.5608	176.8755	295.8760 (98a)
Space heating requirement - total per year (kWh/year)	1252.9654											
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	282.1913	194.0238	145.9003	68.6060	23.9316	0.0000	0.0000	0.0000	0.0000	65.5608	176.8755	295.8760 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1252.9654											
Space heating per m2	(98c) / (4) = 17.8995 (99)											

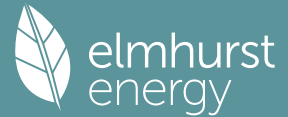
8c. Space cooling requirement												
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	532.9113	419.5259	430.2659	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9406	0.9708	0.9635	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	501.2379	407.2753	414.5406	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	778.3520	751.0906	723.4417	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	199.5222	255.7985	229.8224	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	49.8805	63.9496	57.4556	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	171.2858 (107)											
Energy for space heating	17.8995 (99)											
Energy for space cooling	2.4469 (108)											
Total	20.3464 (109)											
Fabric Energy Efficiency (DFEE)	20.3 (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			Storey height			Volume				
		(m2)			(m)			(m3)				
Main dwelling		70.0000	(1b)	x	2.5000	(2b)	=	175.0000	(1b)	-	(3b)	
Ground floor												
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)		70.0000										
Dwelling volume				(3a) + (3b) + (3c) + (3d) + (3e) ... (3n)		=	175.0000	(5)				

2. Ventilation rate												
m3 per hour												
Number of open chimneys	0 * 80 = 0.0000 (6a)											
Number of open flues	0 * 20 = 0.0000 (6b)											
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)											
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)											
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)											
Number of blocked chimneys	0 * 20 = 0.0000 (6f)											
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)											
Number of passive vents	0 * 10 = 0.0000 (7b)											
Number of flueless gas fires	0 * 40 = 0.0000 (7c)											

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Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											Air changes per hour	
Pressure Test												20.0000 / (5) =	0.1143 (8)
Pressure Test Method												Yes	
Measured/design AP50												Blower Door	
Infiltration rate												5.0000 (17)	
Number of sides sheltered												0.3643 (18)	
												2 (19)	
Shelter factor												(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.3096 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.3948	0.3871	0.3793	0.3406	0.3329	0.2942	0.2942	0.2864	0.3096	0.3329	0.3483	0.3638	(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	0.5779	0.5749	0.5719	0.5580	0.5554	0.5433	0.5433	0.5410	0.5479	0.5554	0.5607	0.5662	(25)

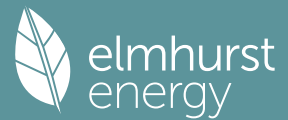
3. Heat losses and heat loss parameter

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 Opening Type			11.2000	1.1450	12.8244			(27)
EXT Wall	33.4700	11.2000	22.2700	0.1800	4.0086			(29a)
Flat Roof	22.5500		22.5500	0.1100	2.4805			(30)
Total net area of external elements Aum(A, m2)			56.0200					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.3135			(33)
Main dwelling								
Party Wall			53.8400	0.0000	0.0000			(32)
Corridor			25.2500	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								162.9317 (35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E7 Party floor between dwellings (in blocks of flats)				17.5500	0.0700	1.2285		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				50.7200	0.0000	0.0000		
E2 Other lintels (including other steel lintels)				5.7700	0.0500	0.2885		
E3 Sill				2.5000	0.0500	0.1250		
E4 Jamb				10.4800	0.0500	0.5240		
E16 Corner (normal)				5.3600	0.0900	0.4824		
E18 Party wall between dwellings				2.6800	0.0600	0.1608		
E25 Staggered party wall between dwellings				8.0400	0.0600	0.4824		
E17 Corner (inverted - internal area greater than external area)				2.6800	-0.0900	-0.2412		
E9 Balcony between dwellings, wall insulation continuous				5.0800	0.0200	0.1016		
E15 Flat roof with parapet				7.4300	0.5600	4.1608		
E24 Eaves (insulation at ceiling level - inverted)				4.2400	0.2400	1.0176		
P4 Party wall - Roof (insulation at ceiling level)				8.3000	0.1200	0.9960		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								9.3264 (36)
Point Thermal bridges						(36a) =		0.0000
Total fabric heat loss						(33) + (36) + (36a) =		28.6399 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2461 (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												
26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432	(42b)
Hot water usage for other uses												
37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326	(42c)
Average daily hot water use (litres/day)												58.9976 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
64.3661	62.6006	60.6731	58.2737	56.1334	53.9090	53.4466	55.3703	57.3432	59.6276	62.0482	64.2757	(44)
Energy conte	101.9402	89.1425	93.2523	79.7738	75.5663	66.2874	64.6391	68.5600	70.7100	80.9141	88.3990	100.6403 (45)
Energy content (annual)												Total = Sum(45)m =
Distribution loss (46)m = 0.15 x (45)m												979.8247
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 (or HIU 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	(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	(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												
86.6492	75.7711	79.2644	67.8078	64.2313	56.3443	54.9432	58.2760	60.1035	68.7770	75.1391	85.5442	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	86.6492	75.7711	79.2644	67.8078	64.2313	56.3443	54.9432	58.2760	60.1035	68.7770	75.1391	85.5442 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m =
Electric shower(s)												832.8510 (64)
49.5554	44.1543	48.2148	46.0108	46.8741	44.7134	46.2038	46.8741	46.0108	48.2148	47.3081	49.5554	(64a)

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Heat gains from water heating, kWh/month
34.0511 29.9813 31.8698 28.4546 27.7764 25.2644 25.2868 26.2875 26.5286 29.2479 30.6118 33.7749 (65)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 563.6896 (64a)

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	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.8207	103.8207	103.8207	103.8207	103.8207	103.8207	103.8207	103.8207	103.8207	103.8207	103.8207	103.8207	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	(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)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	(71)
Water heating gains (Table 5)	45.7677	44.6151	42.8357	39.5203	37.3338	35.0895	33.9876	35.3327	36.8452	39.3117	42.5164	45.3964	(72)
Total internal gains	403.5773	415.5956	397.5335	386.6954	367.1838	355.3694	342.1016	341.3994	351.5318	361.5209	382.0508	394.5007	(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	
North					3.6800	10.6334	0.6300	0.7000			0.7700	11.9589 (74)	
South					7.5200	46.7521	0.6300	0.7000			0.7700	107.4461 (78)	
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)	
Total gains	522.9822	614.4187	660.5214	702.4157	715.2111	699.3875	674.3211	649.1008	632.3782	578.5248	524.1638	497.3135 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
tau	51.0859	51.2303	51.3726	52.0517	52.1808	52.7901	52.7901	52.9045	52.5537	52.1808	51.9203	51.6508	
alpha	4.4057	4.4154	4.4248	4.4701	4.4787	4.5193	4.5193	4.5270	4.5036	4.4787	4.4614	4.4434	
util living area	0.9750	0.9510	0.9152	0.8360	0.7101	0.5321	0.3881	0.4193	0.6199	0.8513	0.9519	0.9793	(86)
MIT	19.8100	20.0683	20.3434	20.6607	20.8708	20.9727	20.9947	20.9925	20.9454	20.6840	20.2066	19.7667	(87)
Th 2	20.1795	20.1816	20.1837	20.1935	20.1953	20.2039	20.2039	20.2055	20.2006	20.1953	20.1916	20.1877	(88)
util rest of house	0.9702	0.9421	0.9000	0.8082	0.6653	0.4716	0.3195	0.3491	0.5592	0.8203	0.9417	0.9753	(89)
MIT 2	19.0989	19.3522	19.6185	19.9215	20.1045	20.1891	20.2019	20.2025	20.1685	19.9497	19.4981	19.0630	(90)
Living area fraction									fLA = Living area / (4) =			0.4163	(91)
MIT	19.3949	19.6503	19.9203	20.2292	20.4235	20.5153	20.5319	20.5314	20.4919	20.2554	19.7930	19.3559	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3949	19.6503	19.9203	20.2292	20.4235	20.5153	20.5319	20.5314	20.4919	20.2554	19.7930	19.3559	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9645	0.9354	0.8945	0.8096	0.6785	0.4956	0.3480	0.3781	0.5820	0.8228	0.9358	0.9701	(94)
Useful gains	504.4314	574.7100	590.8634	568.6437	485.2954	346.6403	234.6325	245.4491	368.0226	476.0295	490.4877	482.4672	(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	936.1194	912.1706	827.6203	689.5486	529.6420	354.9975	235.9700	247.4021	385.3244	586.2181	774.5121	929.6225	(97)
Space heating kWh	321.1758	226.7735	176.1471	87.0515	32.9938	0.0000	0.0000	0.0000	0.0000	81.9803	204.4975	332.6835	(98a)
Space heating requirement - total per year (kWh/year)												1463.3031	
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	321.1758	226.7735	176.1471	87.0515	32.9938	0.0000	0.0000	0.0000	0.0000	81.9803	204.4975	332.6835	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1463.3031	
Space heating per m ²										(98c) / (4) =		20.9043	(99)

8c. Space cooling requirement

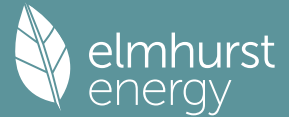
Calculated for June, July and August. See Table 10b

	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	0.0000	0.0000	0.0000	0.0000	0.0000	564.1269	444.0999	455.1163	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9217	0.9592	0.9501	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	519.9645	425.9832	432.3846	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	775.2114	748.0577	720.6326	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	183.7778	239.6234	214.4565	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	45.9444	59.9058	53.6141	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												159.4644	(107)
Energy for space heating												20.9043	(99)
Energy for space cooling												2.2781	(108)

Total
Fabric Energy Efficiency (TFEE)

23.1824 (109)
23.2 (109)

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Plot Reference	Plot 21			Issued on Date	22/12/2025	
Assessment Reference	Plot 21	Plot Type Ref				
Plot Address	Flat 6, 4 Cross Road Manchester, M21 9SX			SAP Version	10.2	
SAP Rating	88 B	DER	3.09	TER	10.84	
Environmental	98 A	% DER < TER				71.49
CO ₂ Emissions (t/year)	0.19	DFEE	20.35	TFEE	23.18	
Compliance Check	See BREL	% DFEE < TFEE				12.23
% DPER < TPER	43.42	DPER	32.43	TPER	57.31	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client	J Greenwood (Builders) Limited, Steve Brown					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	70.0000 (1b)	2.5000 (2b)	175.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	175.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.3900 (17)
Infiltration rate	0.1695 (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) = 0.1441 (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	0.1837	0.1801	0.1765	0.1585	0.1549	0.1369	0.1369	0.1333	0.1441	0.1549	0.1621	0.1693 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3237	0.3201	0.3165	0.2985	0.2949	0.2769	0.2769	0.2733	0.2841	0.2949	0.3021	0.3093 (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 N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.4700	11.2000	22.2700	0.1800	4.0086	110.0000	2449.7001 (29a)
Flat Roof	22.5500		22.5500	0.1500	3.3825	9.0000	202.9500 (30)
Total net area of external elements Aum(A, m ²)			56.0200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.2396		(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			25.2500	0.0000	0.0000	45.0000	1136.2500 (32)
Party Floor			70.0000			40.0000	2800.0000 (32d)
Party Ceiling			47.4500			30.0000	1423.5000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		11405.2201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							162.9317 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5500	0.0370	0.6493
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.7200	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
E17 Corner (inverted - internal area greater than external area)	2.6800	-0.0850	-0.2278
E9 Balcony between dwellings, wall insulation continuous	5.0800	0.1500	0.7620
E15 Flat roof with parapet	7.4300	0.1320	0.9808
E24 Eaves (insulation at ceiling level - inverted)	4.2400	0.1500	0.6360
P4 Party wall - Roof (insulation at ceiling level)	8.3000	0.0400	0.3320
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0618 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	26.3014 (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	18.6934	18.4854	18.2774	17.2374	17.0294	15.9893	15.9893	15.7813	16.4053	17.0294	17.4454	17.8614	(38)
Heat transfer coeff	44.9948	44.7868	44.5788	43.5387	43.3307	42.2907	42.2907	42.0827	42.7067	43.3307	43.7468	44.1628	(39)
Average = Sum(39)m / 12 =												43.4867	
HLP	0.6428	0.6398	0.6368	0.6220	0.6190	0.6042	0.6042	0.6012	0.6101	0.6190	0.6250	0.6309	(40)
HLP (average)												0.6212	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2461 (42)
Hot water usage for mixer showers	61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427	(42a)
Hot water usage for baths	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432	(42b)
Hot water usage for other uses	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326	(42c)
Average daily hot water use (litres/day)												116.0487	(43)
Daily hot water use	126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184	(44)
Energy conte	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	134.2926	137.9892	158.0618	173.1684	197.1578	(45)
Energy content (annual)										Total = Sum(45)m =		1927.5450	
Distribution loss (46)m = 0.15 x (45)m	29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737	(46)
Water storage loss (or HIU loss):													
Store volume												201.0000	(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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092	(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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2244.8760	(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	66.4809	58.4981	61.4617	52.4707	49.7840	43.6910	42.2995	44.6523	45.8814	52.5556	57.5785	65.5550	(65)

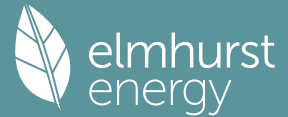
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.8207	114.9443	103.8207	107.2813	103.8207	107.2813	103.8207	103.8207	107.2813	103.8207	107.2813	103.8207	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	(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)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	(71)
Water heating gains (Table 5)	89.3561	87.0508	82.6098	72.8760	66.9139	60.6820	56.8542	60.0165	63.7242	70.6392	79.9701	88.1115	(72)
Total internal gains	447.1657	458.0313	437.3075	420.0511	396.7639	380.9620	364.9682	366.0832	378.4108	392.8484	419.5045	437.2159	(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
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North			3.6800		10.6334		0.4000		0.0000		0.7700		12.0523 (74)
South			7.5200		46.7521		0.4000		0.0000		0.7700		108.2853 (78)

Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	567.5033	658.4073	702.3495	738.2373	747.5094	727.6670	699.7825	676.1879	661.4507	611.5471	562.7275	540.8317 (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	70.4107	70.7377	71.0678	72.7655	73.1148	74.9128	74.9128	75.2831	74.1831	73.1148	72.4195	71.7373	
alpha	5.6940	5.7158	5.7379	5.8510	5.8743	5.9942	5.9942	6.0189	5.9455	5.8743	5.8280	5.7825	
util living area	0.9416	0.8869	0.8140	0.6821	0.5324	0.3713	0.2658	0.2862	0.4435	0.7001	0.8845	0.9507 (86)	
MIT	20.4743	20.6676	20.8189	20.9433	20.9878	20.9989	20.9999	20.9998	20.9967	20.9452	20.7313	20.4464 (87)	
Th 2	20.3916	20.3943	20.3970	20.4103	20.4129	20.4263	20.4263	20.4289	20.4209	20.4129	20.4076	20.4023 (88)	
util rest of house	0.9328	0.8725	0.7933	0.6545	0.5005	0.3383	0.2312	0.2507	0.4069	0.6680	0.8676	0.9431 (89)	
MIT 2	19.7867	20.0227	20.2030	20.3541	20.4022	20.4255	20.4262	20.4288	20.4185	20.3607	20.1142	19.7615 (90)	
Living area fraction									fLA = Living area / (4) =			0.4163 (91)	
MIT	20.0729	20.2912	20.4594	20.5994	20.6460	20.6642	20.6650	20.6665	20.6592	20.6040	20.3711	20.0466 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.0729	20.2912	20.4594	20.5994	20.6460	20.6642	20.6650	20.6665	20.6592	20.6040	20.3711	20.0466 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9277	0.8699	0.7956	0.6635	0.5132	0.3520	0.2456	0.2655	0.4220	0.6787	0.8665	0.9380 (94)	
Useful gains	526.4913	572.7496	558.7613	489.8308	383.6521	256.1382	171.8837	179.5020	279.1430	415.0322	487.6162	507.3115 (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	709.7003	689.3205	622.2919	509.3778	387.6372	256.4587	171.9124	179.5471	280.1218	433.4806	580.5674	699.8300 (97)	
Space heating kWh	136.3075	78.3357	47.2668	14.0738	2.9649	0.0000	0.0000	0.0000	0.0000	13.7256	66.9249	143.2337 (98a)	
Space heating requirement - total per year (kWh/year)												502.8328	
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	136.3075	78.3357	47.2668	14.0738	2.9649	0.0000	0.0000	0.0000	0.0000	13.7256	66.9249	143.2337 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												502.8328	
Space heating per m2										(98c) / (4) =		7.1833 (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	136.3075	78.3357	47.2668	14.0738	2.9649	0.0000	0.0000	0.0000	0.0000	13.7256	66.9249	143.2337 (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)	136.3075	78.3357	47.2668	14.0738	2.9649	0.0000	0.0000	0.0000	0.0000	13.7256	66.9249	143.2337 (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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092 (64)	
Efficiency of water heater (217)m	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912 (216)	
Fuel for water heating, kWh/month	65.8826	58.1540	61.4994	53.3953	51.3014	45.7281	44.7654	46.8200	47.6409	53.7218	57.8558	65.0740 (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	13.5997	12.2836	13.5997	13.1610	13.5997	13.1610	13.5997	13.5997	13.1610	13.5997	13.1610	13.5997 (231)	
Lighting	19.2063	15.4080	13.8732	10.1641	7.8510	6.4144	7.1620	9.3094	12.0920	15.8654	17.9199	19.7401 (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												502.8328 (211)	
Space heating fuel - main system 2												0.0000 (213)	

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Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	344.3912
Water heating fuel used	651.8389 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	160.1250 (230a)
Total electricity for the above, kWh/year	160.1250 (231)
Electricity for lighting (calculated in Appendix L)	155.0058 (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	1469.8025 (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	502.8328	0.1585	79.7070 (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)	651.8389	0.1412	92.0221 (264)
Space and water heating			171.7291 (265)
Pumps, fans and electric keep-hot	160.1250	0.1387	22.2113 (267)
Energy for lighting	155.0058	0.1443	22.3721 (268)
Total CO2, kg/year			216.3125 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0900 (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	502.8328	1.5867	797.8685 (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)	651.8389	1.5220	992.1119 (278)
Space and water heating			1789.9804 (279)
Pumps, fans and electric keep-hot	160.1250	1.5128	242.2371 (281)
Energy for lighting	155.0058	1.5338	237.7531 (282)
Total Primary energy kWh/year			2269.9706 (286)
Dwelling Primary energy Rate (DPER)			32.4300 (287)

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

1. Overall dwelling characteristics

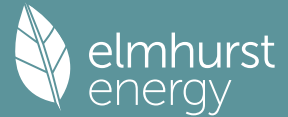
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	70.0000 (1b)	x 2.5000 (2b)	= 175.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 175.0000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1143 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3643 (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) = 0.3096 (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												

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Effective ac	0.3948	0.3871	0.3793	0.3406	0.3329	0.2942	0.2942	0.2864	0.3096	0.3329	0.3483	0.3638 (22b)
	0.5779	0.5749	0.5719	0.5580	0.5554	0.5433	0.5433	0.5410	0.5479	0.5554	0.5607	0.5662 (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 Opening Type			11.2000	1.1450	12.8244		(27)
EXT Wall	33.4700	11.2000	22.2700	0.1800	4.0086		(29a)
Flat Roof	22.5500		22.5500	0.1100	2.4805		(30)
Total net area of external elements Aum(A, m2)			56.0200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.3135		(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000		(32)
Corridor			25.2500	0.0000	0.0000		(32)

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

162.9317 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5500	0.0700	1.2285
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.7200	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885
E3 Sill	2.5000	0.0500	0.1250
E4 Jamb	10.4800	0.0500	0.5240
E16 Corner (normal)	5.3600	0.0900	0.4824
E18 Party wall between dwellings	2.6800	0.0600	0.1608
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824
E17 Corner (inverted - internal area greater than external area)	2.6800	-0.0900	-0.2412
E9 Balcony between dwellings, wall insulation continuous	5.0800	0.0200	0.1016
E15 Flat roof with parapet	7.4300	0.5600	4.1608
E24 Eaves (insulation at ceiling level - inverted)	4.2400	0.2400	1.0176
P4 Party wall - Roof (insulation at ceiling level)	8.3000	0.1200	0.9960

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

9.3264 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 28.6399 (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	33.3755	33.2008	33.0295	32.2249	32.0743	31.3736	31.3736	31.2438	31.6435	32.0743	32.3789	32.6973 (38)
Heat transfer coeff	62.0155	61.8407	61.6694	60.8648	60.7143	60.0135	60.0135	59.8837	60.2834	60.7143	61.0188	61.3372 (39)
Average = Sum(39)m / 12 =												60.8641

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8859	0.8834	0.8810	0.8695	0.8673	0.8573	0.8573	0.8555	0.8612	0.8673	0.8717	0.8762 (40)
HLP (average)												0.8695
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

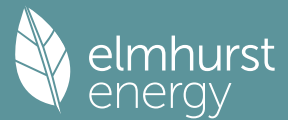
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2461 (42)
Hot water usage for mixer showers	61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427 (42a)
Hot water usage for baths	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432 (42b)
Hot water usage for other uses	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326 (42c)
Average daily hot water use (litres/day)												116.0487 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184 (44)
Energy content (annual)	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	134.2926	137.9892	158.0618	173.1684	197.1578 (45)
Distribution loss (46)m = 0.15 x (45)m	29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	246.5375	218.0199	231.4421	202.8986	196.3211	176.4934	173.8115	180.8875	183.0811	204.6567	218.2602	243.7527 (62)
PV diverter	-28.2888	-25.0189	-26.1983	-21.6933	-20.2173	-17.3001	-16.2161	-17.2442	-17.8994	-21.1014	-23.9053	-27.7650 (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 (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	218.2487	193.0011	205.2437	181.2053	176.1038	159.1933	157.5954	163.6433	165.1817	183.5553	194.3549	215.9878 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				2213.3143 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	103.7568	92.1667	98.7376	88.5442	87.0599	79.7645	79.5754	81.9282	81.9549	89.8315	93.6520	102.8309 (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	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.8207	114.9443	103.8207	107.2813	103.8207	107.2813	103.8207	103.8207	107.2813	103.8207	107.2813	103.8207 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												

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Cooking gains	197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918 (68)
Pumps, fans	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306 (69)
Losses e.g. evaporation	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
(negative values) (Table 5)												
Water heating gains (Table 5)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450 (71)
Total internal gains	139.4581	137.1528	132.7118	122.9781	117.0160	110.7840	106.9562	110.1186	113.8262	120.7412	130.0722	138.2136 (72)
	500.2677	511.1334	490.4096	473.1532	449.8659	431.0640	415.0703	416.1853	428.5128	445.9504	472.6065	490.3179 (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			
North				3.6800	10.6334	0.6300	0.7000	0.7700	11.9589 (74)			
South				7.5200	46.7521	0.6300	0.7000	0.7700	107.4461 (78)			
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)
Total gains	619.6727	709.9564	753.3974	788.8734	797.8932	775.0820	747.2898	723.8867	709.3592	662.9543	614.7196	593.1307 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	51.0859	51.2303	51.3726	52.0517	52.1808	52.7901	52.7901	52.9045	52.5537	52.1808	51.9203	51.6508
alpha	4.4057	4.4154	4.4248	4.4701	4.4787	4.5193	4.5193	4.5270	4.5036	4.4787	4.4614	4.4434
util living area	0.9554	0.9232	0.8781	0.7880	0.6559	0.4849	0.3513	0.3776	0.5632	0.7970	0.9209	0.9616 (86)
MIT	19.9959	20.2295	20.4727	20.7390	20.9061	20.9811	20.9965	20.9951	20.9626	20.7656	20.3591	19.9559 (87)
Th 2	20.1795	20.1816	20.1837	20.1935	20.1953	20.2039	20.2039	20.2055	20.2006	20.1953	20.1916	20.1877 (88)
util rest of house	0.9475	0.9107	0.8587	0.7569	0.6108	0.4282	0.2887	0.3137	0.5051	0.7611	0.9059	0.9548 (89)
MIT 2	19.0247	19.3141	19.6110	19.9301	20.1123	20.1910	20.2023	20.2031	20.1730	19.9676	19.4861	18.9812 (90)
Living area fraction												0.4163 (91)
MIT	19.4290	19.6952	19.9697	20.2668	20.4427	20.5199	20.5329	20.5328	20.5017	20.2998	19.8495	19.3869 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4290	19.6952	19.9697	20.2668	20.4427	20.5199	20.5329	20.5328	20.5017	20.2998	19.8495	19.3869 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9389	0.9021	0.8531	0.7599	0.6251	0.4510	0.3147	0.3401	0.5275	0.7660	0.8986	0.9465	(94)
Useful gains	581.8175	640.4632	642.7538	599.4488	498.7366	349.5315	235.1405	246.2178	374.1588	507.8445	552.3907	561.4219	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	938.2314	914.9428	830.6714	691.8402	530.8088	355.2738	236.0252	247.4851	385.9161	588.9155	777.9616	931.5234	(97)
Space heating kWh	265.1720	184.4503	139.8107	66.5218	23.8617	0.0000	0.0000	0.0000	0.0000	60.3168	162.4111	275.3556	(98a)
Space heating requirement - total per year (kWh/year)												1177.9001	
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	265.1720	184.4503	139.8107	66.5218	23.8617	0.0000	0.0000	0.0000	0.0000	60.3168	162.4111	275.3556	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1177.9001	
Space heating per m2												(98c) / (4) =	16.8271 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	265.1720	184.4503	139.8107	66.5218	23.8617	0.0000	0.0000	0.0000	0.0000	60.3168	162.4111	275.3556 (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)	287.2936	199.8379	151.4742	72.0713	25.8524	0.0000	0.0000	0.0000	0.0000	65.3487	175.9600	298.3267 (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	218.2487	193.0011	205.2437	181.2053	176.1038	159.1933	157.5954	163.6433	165.1817	183.5553	194.3549	215.9878 (64)
Efficiency of water heater (217)m	84.4976	83.9583	83.2174	82.0326	80.7769	79.8000	79.8000	79.8000	79.8000	81.8518	83.6599	79.8000 (216)
Fuel for water heating, kWh/month	258.2898	229.8774	246.6356	220.8943	218.0124	199.4903	197.4880	205.0668	206.9946	224.2533	232.3154	255.2881 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	21.5719	17.3058	15.5819	11.4160	8.8180	7.2044	8.0441	10.4560	13.5814	17.8195	20.1271	22.1714 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-18.7693	-27.8136	-41.9981	-49.6842	-55.7412	-52.8253	-52.1866	-48.1950	-41.5274	-32.8852	-21.1116	-16.0736 (233a)

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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	-6.8542	-14.7297	-29.8637	-45.7264	-61.3223	-61.9280	-61.1940	-51.4112	-37.1629	-21.3417	-9.2396	-5.3968	(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												1276.1648	(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												2694.6061	(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)												174.0974	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-864.9813	(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												3365.8870	(238)

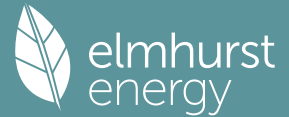
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1276.1648	0.2100	267.9946 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2694.6061	0.2100	565.8673 (264)
Space and water heating			833.8619 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	174.0974	0.1443	25.1276 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-458.8109	0.1335	-61.2741
PV Unit electricity exported	-406.1704	0.1253	-50.9081
Total			-112.1822 (269)
Total CO2, kg/year			758.7366 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.8400 (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	1276.1648	1.1300	1442.0662 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2694.6061	1.1300	3044.9049 (278)
Space and water heating			4486.9711 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	174.0974	1.5338	267.0365 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-458.8109	1.4935	-685.2426
PV Unit electricity exported	-406.1704	0.4600	-186.8569
Total			-872.0996 (283)
Total Primary energy kWh/year			4012.0089 (286)
Target Primary Energy Rate (TPER)			57.3100 (287)

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Plot Reference	Plot 21			Issued on Date	22/12/2025	
Assessment Reference	Plot 21	Plot Type Ref				
Plot Address	Flat 6, 4 Cross Road Manchester, M21 9SX			SAP Version	10.2	
SAP Rating	88 B	DER	3.09	TER	10.84	
Environmental	98 A	% DER < TER				71.49
CO ₂ Emissions (t/year)	0.19	DFEE	20.35	TFEE	23.18	
Compliance Check	See BREL	% DFEE < TFEE				12.23
% DPER < TPER	43.42	DPER	32.43	TPER	57.31	
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001	
Client	J Greenwood (Builders) Limited, Steve Brown					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		
Dwelling volume			

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	3.3900	(17)
Infiltration rate	0.1695	(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) =	0.1441 (21)

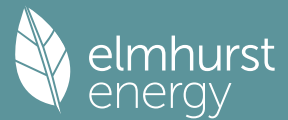
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1837	0.1801	0.1765	0.1585	0.1549	0.1369	0.1369	0.1333	0.1441	0.1549	0.1621	0.1693 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.3237	0.3201	0.3165	0.2985	0.2949	0.2769	0.2769	0.2733	0.2841	0.2949	0.3021	0.3093 (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 N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.4700	11.2000	22.2700	0.1800	4.0086	110.0000	2449.7001 (29a)
Flat Roof	22.5500		22.5500	0.1500	3.3825	9.0000	202.9500 (30)
Total net area of external elements Aum(A, m ²)			56.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	22.2396	(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			25.2500	0.0000	0.0000	45.0000	1136.2500 (32)
Party Floor			70.0000			40.0000	2800.0000 (32d)
Party Ceiling			47.4500			30.0000	1423.5000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11405.2201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		162.9317 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5500	0.0370	0.6493
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.7200	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
E17 Corner (inverted - internal area greater than external area)	2.6800	-0.0850	-0.2278
E9 Balcony between dwellings, wall insulation continuous	5.0800	0.1500	0.7620
E15 Flat roof with parapet	7.4300	0.1320	0.9808
E24 Eaves (insulation at ceiling level - inverted)	4.2400	0.1500	0.6360
P4 Party wall - Roof (insulation at ceiling level)	8.3000	0.0400	0.3320
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.0618 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	26.3014 (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	18.6934	18.4854	18.2774	17.2374	17.0294	15.9893	15.9893	15.7813	16.4053	17.0294	17.4454	17.8614	(38)
Heat transfer coeff	44.9948	44.7868	44.5788	43.5387	43.3307	42.2907	42.2907	42.0827	42.7067	43.3307	43.7468	44.1628	(39)
Average = Sum(39)m / 12 =												43.4867	
HLP	0.6428	0.6398	0.6368	0.6220	0.6190	0.6042	0.6042	0.6012	0.6101	0.6190	0.6250	0.6309	(40)
HLP (average)												0.6212	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2461 (42)
Hot water usage for mixer showers	61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427	(42a)
Hot water usage for baths	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432	(42b)
Hot water usage for other uses	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326	(42c)
Average daily hot water use (litres/day)												116.0487	(43)
Daily hot water use	126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184	(44)
Energy conte	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	134.2926	137.9892	158.0618	173.1684	197.1578	(45)
Energy content (annual)										Total = Sum(45)m =		1927.5450	
Distribution loss (46)m = 0.15 x (45)m	29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737	(46)
Water storage loss (or HIU loss):													
Store volume												201.0000	(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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092	(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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092	(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	66.4809	58.4981	61.4617	52.4707	49.7840	43.6910	42.2995	44.6523	45.8814	52.5556	57.5785	65.5550	(65)

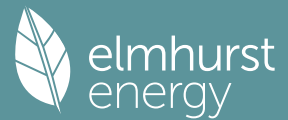
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.9427	19.4893	15.8498	11.9993	8.9696	7.5725	8.1824	10.6358	14.2753	18.1258	21.1554	22.5525	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.4732	297.5289	289.8286	273.4356	252.7424	233.2937	220.3007	217.2450	224.9453	241.3383	262.0316	281.4803	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	(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)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	(71)
Water heating gains (Table 5)	89.3561	87.0508	82.6098	72.8760	66.9139	60.6820	56.8542	60.0165	63.7242	70.6392	79.9701	88.1115	(72)
Total internal gains	501.4174	499.7144	483.9336	453.9563	424.2713	397.1936	380.9827	383.5427	398.5902	425.7487	458.8025	487.7897	(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
North	3.6800	10.6334	0.4000	0.0000	0.7700	12.0523 (74)

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South	7.5200			46.7521			0.4000			0.0000			0.7700			108.2853 (78)		
Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158	(83)					
Total gains	621.7549	700.0903	748.9755	772.1425	775.0169	743.8986	715.7970	693.6474	681.6301	644.4474	602.0255	591.4056	(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	70.4107	70.7377	71.0678	72.7655	73.1148	74.9128	74.9128	75.2831	74.1831	73.1148	72.4195	71.7373						
alpha	5.6940	5.7158	5.7379	5.8510	5.8743	5.9942	5.9942	6.0189	5.9455	5.8743	5.8280	5.7825						
util living area																		
	0.9183	0.8634	0.7824	0.6573	0.5145	0.3633	0.2599	0.2790	0.4306	0.6711	0.8578	0.9304	(86)					
MIT	20.5630	20.7173	20.8534	20.9530	20.9898	20.9990	20.9999	20.9998	20.9972	20.9558	20.7768	20.5341	(87)					
Th 2	20.3916	20.3943	20.3970	20.4103	20.4129	20.4263	20.4263	20.4289	20.4209	20.4129	20.4076	20.4023	(88)					
util rest of house																		
	0.9072	0.8473	0.7605	0.6299	0.4835	0.3309	0.2260	0.2444	0.3951	0.6391	0.8388	0.9205	(89)					
MIT 2	19.8944	20.0809	20.2415	20.3640	20.4040	20.4256	20.4262	20.4289	20.4188	20.3712	20.1666	19.8686	(90)					
Living area fraction									fLA = Living area / (4) =						0.4163 (91)			
MIT	20.1727	20.3458	20.4962	20.6092	20.6478	20.6643	20.6650	20.6665	20.6596	20.6146	20.4206	20.1456	(92)					
Temperature adjustment												0.0000						
adjusted MIT	20.1727	20.3458	20.4962	20.6092	20.6478	20.6643	20.6650	20.6665	20.6596	20.6146	20.4206	20.1456	(93)					

8. Space heating requirement																		

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
Utilisation	0.9028	0.8460	0.7642	0.6393	0.4960	0.3444	0.2401	0.2588	0.4098	0.6503	0.8393	0.9159	(94)					
Useful gains	561.2992	592.2506	572.3448	493.5979	384.3746	256.1790	171.8876	179.5088	279.3028	419.0726	505.2721	541.6573	(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																		
	714.1889	691.7698	623.9341	509.8048	387.7166	256.4631	171.9129	179.5478	280.1391	433.9379	582.7334	704.2033	(97)					
Space heating kWh																		
	113.7500	66.8769	38.3824	11.6689	2.4865	0.0000	0.0000	0.0000	0.0000	11.0598	55.7722	120.9343	(98a)					
Space heating requirement - total per year (kWh/year)												420.9309						
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																		
	113.7500	66.8769	38.3824	11.6689	2.4865	0.0000	0.0000	0.0000	0.0000	11.0598	55.7722	120.9343	(98c)					
Space heating requirement after solar contribution - total per year (kWh/year)												420.9309						
Space heating per m2										(98c) / (4) =			6.0133	(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	113.7500	66.8769	38.3824	11.6689	2.4865	0.0000	0.0000	0.0000	0.0000	11.0598	55.7722	120.9343	(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)																		
	113.7500	66.8769	38.3824	11.6689	2.4865	0.0000	0.0000	0.0000	0.0000	11.0598	55.7722	120.9343	(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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092	(64)					
Efficiency of water heater																		
(217)m	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	(216)					
Fuel for water heating, kWh/month																		
	65.8826	58.1540	61.4994	53.3953	51.3014	45.7281	44.7654	46.8200	47.6409	53.7218	57.8558	65.0740	(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	13.5997	12.2836	13.5997	13.1610	13.5997	13.1610	13.5997	13.5997	13.1610	13.5997	13.1610	13.5997	(231)					
Lighting	19.2063	15.4080	13.8732	10.1641	7.8510	6.4144	7.1620	9.3094	12.0920	15.8654	17.9199	19.7401	(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													420.9309 (211)					
Space heating fuel - main system 2													0.0000 (213)					
Space heating fuel - secondary													0.0000 (215)					

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Efficiency of water heater	344.3912	
Water heating fuel used	651.8389	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)		
mechanical ventilation fans (SFP = 0.7500)	160.1250	(230a)
Total electricity for the above, kWh/year	160.1250	(231)
Electricity for lighting (calculated in Appendix L)	155.0058	(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	1387.9006	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price £/kWh	Fuel cost £/year	
Space heating - main system 1	420.9309	16.4900	69.4115	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	651.8389	16.4900	107.4882	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	160.1250	16.4900	26.4046	(249)
Energy for lighting	155.0058	16.4900	25.5605	(250)
Additional standing charges			0.0000	(251)
Total energy cost			228.8648	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.7164 (257)
SAP value	88.3864	
SAP rating (Section 12)	88	(258)
SAP band	B	

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	420.9309	0.1586	66.7489	(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)	651.8389	0.1412	92.0221	(264)
Space and water heating			158.7710	(265)
Pumps, fans and electric keep-hot	160.1250	0.1387	22.2113	(267)
Energy for lighting	155.0058	0.1443	22.3721	(268)
Total CO2, kg/year			203.3545	(272)
CO2 emissions per m2			2.9100	(273)
EI value			97.6305	
EI rating			98	(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

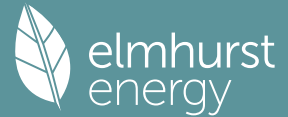
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	70.0000 (1b)	x 2.5000 (2b)	= 175.0000 (1b) - (3b)	
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.0000 (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)

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Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												3.3900 (17)
Infiltration rate												0.1695 (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) = 0.1441 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Adj infilt rate	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
	0.1549	0.1513	0.1513	0.1405	0.1441	0.1225	0.1189	0.1189	0.1225	0.1369	0.1369	0.1405 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2949	0.2913	0.2913	0.2805	0.2841	0.2625	0.2589	0.2589	0.2625	0.2769	0.2769	0.2805 (25)

3. Heat losses and heat loss parameter

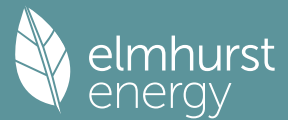
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.4700	11.2000	22.2700	0.1800	4.0086	110.0000	2449.7001 (29a)
Flat Roof	22.5500		22.5500	0.1500	3.3825	9.0000	202.9500 (32a)
Total net area of external elements Aum(A, m2)			56.0200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.2396		(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			25.2500	0.0000	0.0000	45.0000	1136.2500 (32)
Party Floor			70.0000			40.0000	2800.0000 (32d)
Party Ceiling			47.4500			30.0000	1423.5000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 11405.2201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							162.9317 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)				17.5500	0.0370	0.6493	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				50.7200	0.0000	0.0000	
E2 Other lintels (including other steel lintels)				5.7700	0.0250	0.1442	
E3 Sill				2.5000	0.0220	0.0550	
E4 Jamb				10.4800	0.0170	0.1782	
E16 Corner (normal)				5.3600	0.0420	0.2251	
E18 Party wall between dwellings				2.6800	0.0320	0.0858	
E25 Staggered party wall between dwellings				8.0400	0.0300	0.2412	
E17 Corner (inverted - internal area greater than external area)				2.6800	-0.0850	-0.2278	
E9 Balcony between dwellings, wall insulation continuous				5.0800	0.1500	0.7620	
E15 Flat roof with parapet				7.4300	0.1320	0.9808	
E24 Raves (insulation at ceiling level - inverted)				4.2400	0.1500	0.6360	
P4 Party wall - Roof (insulation at ceiling level)				8.3000	0.0400	0.3320	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.0618 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	26.3014 (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	17.0294	16.8213	16.8213	16.1973	16.4053	15.1573	14.9493	14.9493	15.1573	15.9893	15.9893	16.1973 (38)
Average = Sum(39)m / 12 =	43.3307	43.1227	43.1227	42.4987	42.7067	41.4587	41.2507	41.2507	41.4587	42.2907	42.2907	42.4987 (39)
												42.2734
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6190	0.6160	0.6160	0.6071	0.6101	0.5923	0.5893	0.5893	0.5923	0.6042	0.6042	0.6071 (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													2.2461 (42)
Hot water usage for mixer showers	61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427 (42a)	
Hot water usage for baths	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432 (42b)	
Hot water usage for other uses	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326 (42c)	
Average daily hot water use (litres/day)												116.0487 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184 (44)	
Distribution loss (46)m = 0.15 x (45)m	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	134.2926	137.9892	158.0618	173.1684	197.1578 (45)	
Water storage loss (or HIU loss):	29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737 (46)	
Store volume												201.0000 (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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092 (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)	

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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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092 (64)
Total per year (kWh/year) = Sum(64)m =												2244.8760 (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	66.4809	58.4981	61.4617	52.4707	49.7840	43.6910	42.2995	44.6523	45.8814	52.5556	57.5785	65.5550 (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	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.9427	19.4893	15.8498	11.9993	8.9696	7.5725	8.1824	10.6358	14.2753	18.1258	21.1554	22.5525	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.4732	297.5289	289.8286	273.4356	252.7424	233.2937	220.3007	217.2450	224.9453	241.3383	262.0316	281.4803	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	(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)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	(71)
Water heating gains (Table 5)	89.3561	87.0508	82.6098	72.8760	66.9139	60.6820	56.8542	60.0165	63.7242	70.6392	79.9701	88.1115	(72)
Total internal gains	501.4174	499.7144	483.9336	453.9563	424.2713	397.1936	380.9827	383.5427	398.5902	425.7487	458.8025	487.7897	(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
North					3.6800	9.3942	0.4000	0.0000	0.7700			10.6478 (74)
South					7.5200	41.2355	0.4000	0.0000	0.7700			95.5081 (78)
Solar gains	106.1559	181.3171	250.6009	306.9806	330.2024	334.2102	314.9500	287.8882	275.0128	208.1891	129.8386	93.4882 (83)
Total gains	607.5732	681.0315	734.5344	760.9370	754.4737	731.4037	695.9327	671.4309	673.6030	633.9378	588.6411	581.2780 (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	73.1148	73.4674	73.4674	74.5462	74.1831	76.4163	76.8016	76.8016	76.4163	74.9128	74.9128	74.5462	
alpha	5.8743	5.8978	5.8978	5.9697	5.9455	6.0944	6.1201	6.1201	6.0944	5.9942	5.9942	5.9697	
util living area	0.9003	0.8382	0.7443	0.6059	0.4561	0.3003	0.2193	0.2396	0.3870	0.6294	0.8298	0.9144	(86)
MIT	20.6644	20.7934	20.9030	20.9738	20.9955	20.9998	21.0000	21.0000	20.9988	20.9726	20.8394	20.6367	(87)
Th 2	20.4129	20.4156	20.4156	20.4236	20.4209	20.4370	20.4396	20.4396	20.4370	20.4263	20.4263	20.4236	(88)
util rest of house	0.8870	0.8199	0.7204	0.5773	0.4242	0.2684	0.1861	0.2052	0.3527	0.5963	0.8082	0.9026	(89)
MIT 2	20.0365	20.1905	20.3150	20.3987	20.4173	20.4368	20.4396	20.4396	20.4361	20.4013	20.2565	20.0128	(90)
Living area fraction	fLA = Living area / (4) =												0.4163 (91)
MIT	20.2979	20.4415	20.5598	20.6381	20.6580	20.6712	20.6729	20.6729	20.6703	20.6391	20.4992	20.2725	(92)
Temperature adjustment													0.0000
adjusted MIT	20.2979	20.4415	20.5598	20.6381	20.6580	20.6712	20.6729	20.6729	20.6703	20.6391	20.4992	20.2725	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	537.1883	558.9684	533.5920	447.4725	329.9210	206.0318	139.1282	147.3729	247.1714	385.8945	477.4143	522.6959	(94)
Ext temp.	5.2000	5.8000	7.4000	9.9000	12.9000	15.7000	17.3000	17.1000	14.7000	11.3000	7.9000	5.0000	(95)
Heat loss rate W	654.2026	631.3804	567.4859	456.3562	331.3194	206.0976	139.1341	147.3836	247.5224	394.9568	532.8274	649.0611	(97)
Space heating kWh	87.0586	48.6609	25.2170	6.3963	1.0404	0.0000	0.0000	0.0000	0.0000	6.7424	39.8975	94.0157	(98a)
Space heating requirement - total per year (kWh/year)													309.0288
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	87.0586	48.6609	25.2170	6.3963	1.0404	0.0000	0.0000	0.0000	0.0000	6.7424	39.8975	94.0157	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													309.0288
Space heating per m2													(98c) / (4) = 4.4147 (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	

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Space heating requirement	87.0586	48.6609	25.2170	6.3963	1.0404	0.0000	0.0000	0.0000	0.0000	6.7424	39.8975	94.0157	(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)	87.0586	48.6609	25.2170	6.3963	1.0404	0.0000	0.0000	0.0000	0.0000	6.7424	39.8975	94.0157	(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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092	(64)
Efficiency of water heater (217)m	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	(216)
Fuel for water heating, kWh/month	65.8826	58.1540	61.4994	53.3953	51.3014	45.7281	44.7654	46.8200	47.6409	53.7218	57.8558	65.0740	(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	13.5997	12.2836	13.5997	13.1610	13.5997	13.1610	13.5997	13.5997	13.1610	13.5997	13.1610	13.5997	(231)
Lighting	19.2063	15.4080	13.8732	10.1641	7.8510	6.4144	7.1620	9.3094	12.0920	15.8654	17.9199	19.7401	(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												309.0288	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.3912	
Water heating fuel used												651.8389	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)													
mechanical ventilation fans (SFP = 0.7500)												160.1250	(230a)
Total electricity for the above, kWh/year												160.1250	(231)
Electricity for lighting (calculated in Appendix L)												155.0058	(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												1275.9985	(238)

10a. Fuel costs - using BEDF prices (587)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	309.0288	28.4300	87.8569	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	651.8389	28.4300	185.3178	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	160.1250	28.4300	45.5235	(249)
Energy for lighting	155.0058	28.4300	44.0682	(250)
Additional standing charges			0.0000	(251)
Total energy cost			362.7664	(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	309.0288	0.1591	49.1525	(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)	651.8389	0.1412	92.0221	(264)
Space and water heating			141.1746	(265)
Pumps, fans and electric keep-hot	160.1250	0.1387	22.2113	(267)
Energy for lighting	155.0058	0.1443	22.3721	(268)
Total CO2, kg/year			185.7581	(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	309.0288	1.5887	490.9604	(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)	651.8389	1.5220	992.1119	(278)
Space and water heating			1483.0723	(279)
Pumps, fans and electric keep-hot	160.1250	1.5128	242.2371	(281)

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Energy for lighting
Total Primary energy kWh/year

155.0058

1.5338

237.7531 (282)
1963.0625 (286)

SAP 10 EPC IMPROVEMENTS

Plot 21

Current energy efficiency rating: B 88
Current environmental impact rating: A 98

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

Recommended measures: SAP change Cost change CO2 change
(none)

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

Potential energy efficiency rating: B 88
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 587 TEST (28 Nov 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, North West England):

	Current £363	Potential £363	£0
Electricity			
Space heating	£133	£133	£0
Water heating	£185	£185	£0
Lighting	£44	£44	£0
Total cost of fuels	£363	£363	£0
Total cost of uses	£362	£362	£0
Delivered energy	18 kWh/m ²	18 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m ²	3 kg/m ²	3 kg/m ²	0 kg/m ²
Primary energy	28 kWh/m ²	28 kWh/m ²	0 kWh/m ²

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	70.0000 (1b)	x 2.5000 (2b)	= 175.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 175.0000 (5)

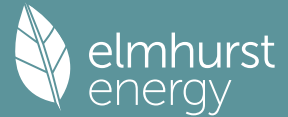
2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.3900 (17)
Infiltration rate 0.1695 (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) = 0.1441 (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	0.1837	0.1801	0.1765	0.1585	0.1549	0.1369	0.1369	0.1333	0.1441	0.1549	0.1621	0.1693 (22b)
Balanced mechanical ventilation with heat recovery												

Full SAP Calculation Printout



If mechanical ventilation 0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a) 0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 72.0000 (23c)

Effective ac	0.3237	0.3201	0.3165	0.2985	0.2949	0.2769	0.2769	0.2733	0.2841	0.2949	0.3021	0.3093 (25)
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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Window N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.4700	11.2000	22.2700	0.1800	4.0086	110.0000	2449.7001 (29a)
Flat Roof	22.5500		22.5500	0.1500	3.3825	9.0000	202.9500 (30)
Total net area of external elements Aum(A, m2)			56.0200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		22.2396		(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			25.2500	0.0000	0.0000	45.0000	1136.2500 (32)
Party Floor			70.0000			40.0000	2800.0000 (32d)
Party Ceiling			47.4500			30.0000	1423.5000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 11405.2201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 162.9317 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5500	0.0370	0.6493
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.7200	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
E17 Corner (inverted - internal area greater than external area)	2.6800	-0.0850	-0.2278
E9 Balcony between dwellings, wall insulation continuous	5.0800	0.1500	0.7620
E15 Flat roof with parapet	7.4300	0.1320	0.9808
E24 Eaves (insulation at ceiling level - inverted)	4.2400	0.1500	0.6360
P4 Party wall - Roof (insulation at ceiling level)	8.3000	0.0400	0.3320

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.0618 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 26.3014 (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	18.6934	18.4854	18.2774	17.2374	17.0294	15.9893	15.9893	15.7813	16.4053	17.0294	17.4454	17.8614 (38)
Average = Sum(39)m / 12 =	44.9948	44.7868	44.5788	43.5387	43.3307	42.2907	42.2907	42.0827	42.7067	43.3307	43.7468	44.1628 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6428	0.6398	0.6368	0.6220	0.6190	0.6042	0.6042	0.6012	0.6101	0.6190	0.6250	0.6309 (40)
HLP (average)												0.6212
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2461 (42)
Hot water usage for mixer showers												
61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427 (42a)	
Hot water usage for baths												
26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432 (42b)	
Hot water usage for other uses												
37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326 (42c)	
Average daily hot water use (litres/day)												116.0487 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184 (44)
Energy conte	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	134.2926	137.9892	158.0618	173.1684	197.1578 (45)
Energy content (annual)										Total = Sum(45)m =		1927.5450

Distribution loss (46)m = 0.15 x (45)m 29.9914 26.3901 27.7271 23.6710 22.4589 19.7102 19.0825 20.1439 20.6984 23.7093 25.9753 29.5737 (46)

Water storage loss (or HIU loss):
Store volume 201.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day):
Temperature factor from Table 2b 1.6100 (48)

Enter (49) or (54) in (55) 0.5400 (49)
Total storage loss 0.8694 (55)

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 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 0.0000 (61)

Total heat required for water heating calculated for each month 226.8940 200.2774 211.7986 183.8887 176.6776 157.4836 154.1680 161.2440 164.0712 185.0132 199.2504 224.1092 (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 226.8940 200.2774 211.7986 183.8887 176.6776 157.4836 154.1680 161.2440 164.0712 185.0132 199.2504 224.1092 (64)

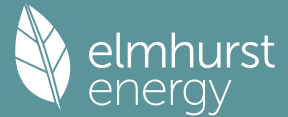
Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 66.4809 58.4981 61.4617 52.4707 49.7840 43.6910 42.2995 44.6523 45.8814 52.5556 57.5785 65.5550 (65)

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

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	21.9427	19.4893	15.8498	11.9993	8.9696	7.5725	8.1824	10.6358	14.2753	18.1258	21.1554	22.5525 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	294.4732	297.5289	289.8286	273.4356	252.7424	233.2937	220.3007	217.2450	224.9453	241.3383	262.0316	281.4803 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229 (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)												
	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450 (71)
Water heating gains (Table 5)												
	89.3561	87.0508	82.6098	72.8760	66.9139	60.6820	56.8542	60.0165	63.7242	70.6392	79.9701	88.1115 (72)
Total internal gains												
	501.4174	499.7144	483.9336	453.9563	424.2713	397.1936	380.9827	383.5427	398.5902	425.7487	458.8025	487.7897 (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
North		3.6800	10.6334	0.4000	0.0000	0.7700	12.0523 (74)
South		7.5200	46.7521	0.4000	0.0000	0.7700	108.2853 (78)
Solar gains							
	120.3376	200.3759	265.0420	318.1862	346.7050	334.8143	310.1047
Total gains							
	621.7549	700.0903	748.9755	772.1425	775.0456	743.8986	715.7970
							283.0399
							218.6987
							143.2230
							103.6158 (83)
							591.4056 (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	70.4107	70.7377	71.0678	72.7655	73.1148	74.9128	74.9128	75.2831	74.1831	73.1148	72.4195	71.7373
alpha	5.6940	5.7158	5.7379	5.8510	5.8743	5.9942	5.9942	6.0189	5.9455	5.8743	5.8280	5.7825
util living area	0.9183	0.8634	0.7824	0.6573	0.5145	0.3633	0.2599	0.2790	0.4306	0.6711	0.8578	0.9304 (86)
MIT	20.5630	20.7173	20.8534	20.9530	20.9898	20.9990	20.9999	20.9998	20.9972	20.9558	20.7768	20.5341 (87)
Th 2	20.3916	20.3943	20.3970	20.4103	20.4129	20.4263	20.4263	20.4289	20.4209	20.4129	20.4076	20.4023 (88)
util rest of house	0.9072	0.8473	0.7605	0.6299	0.4835	0.3309	0.2260	0.2444	0.3951	0.6391	0.8388	0.9205 (89)
MIT 2	19.8944	20.0809	20.2415	20.3640	20.4040	20.4256	20.4262	20.4289	20.4188	20.3712	20.1666	19.8686 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	20.1727	20.3458	20.4962	20.6092	20.6478	20.6643	20.6650	20.6665	20.6596	20.6146	20.4206	20.1456 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1727	20.3458	20.4962	20.6092	20.6478	20.6643	20.6650	20.6665	20.6596	20.6146	20.4206	20.1456 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9028	0.8460	0.7642	0.6393	0.4960	0.3444	0.2401	0.2588	0.4098	0.6503	0.8393	0.9159 (94)
Useful gains	561.2992	592.2506	572.3448	493.5979	384.3746	256.1790	171.8876	179.5088	279.3028	419.0726	505.2721	541.6573 (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												
	714.1889	691.7698	623.9341	509.8048	387.7166	256.4631	171.9129	179.5478	280.1391	433.9379	582.7334	704.2033 (97)
Space heating kWh												
	113.7500	66.8769	38.3824	11.6689	2.4865	0.0000	0.0000	0.0000	0.0000	11.0598	55.7722	120.9343 (98a)
Space heating requirement - total per year (kWh/year)												420.9309
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												
	113.7500	66.8769	38.3824	11.6689	2.4865	0.0000	0.0000	0.0000	0.0000	11.0598	55.7722	120.9343 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												420.9309
Space heating per m ²												(98c) / (4) =
												6.0133 (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												
	113.7500	66.8769	38.3824	11.6689	2.4865	0.0000	0.0000	0.0000	0.0000	11.0598	55.7722	120.9343 (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)												
	113.7500	66.8769	38.3824	11.6689	2.4865	0.0000	0.0000	0.0000	0.0000	11.0598	55.7722	120.9343 (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

Full SAP Calculation Printout



Efficiency of water heater	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092 (64)
(217)m	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912 (216)
Fuel for water heating, kWh/month	65.8826	58.1540	61.4994	53.3953	51.3014	45.7281	44.7654	46.8200	47.6409	53.7218	57.8558	65.0740 (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	13.5997	12.2836	13.5997	13.1610	13.5997	13.1610	13.5997	13.5997	13.1610	13.5997	13.1610	13.5997 (231)
Lighting	19.2063	15.4080	13.8732	10.1641	7.8510	6.4144	7.1620	9.3094	12.0920	15.8654	17.9199	19.7401 (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												420.9309 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.3912
Water heating fuel used												651.8389 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)												
mechanical ventilation fans (SFP = 0.7500)												160.1250 (230a)
Total electricity for the above, kWh/year												160.1250 (231)
Electricity for lighting (calculated in Appendix L)												155.0058 (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												1387.9006 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	420.9309	16.4900	69.4115 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	651.8389	16.4900	107.4882 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	160.1250	16.4900	26.4046 (249)
Energy for lighting	155.0058	16.4900	25.5605 (250)
Additional standing charges			0.0000 (251)
Total energy cost			228.8648 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	0.7164 (257)
SAP value	88.3864
SAP rating (Section 12)	88 (258)
SAP band	B

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	420.9309	0.1586	66.7489 (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)	651.8389	0.1412	92.0221 (264)
Space and water heating			158.7710 (265)
Pumps, fans and electric keep-hot	160.1250	0.1387	22.2113 (267)
Energy for lighting	155.0058	0.1443	22.3721 (268)
Total CO2, kg/year			203.3545 (272)
CO2 emissions per m2			2.9100 (273)
EI value			97.6305
EI rating			98 (274)
EI band			A

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1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	70.0000 (1b)	2.5000 (2b)	175.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		175.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	175.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.3900 (17)
Infiltration rate		0.1695 (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) =	0.1441 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)
Adj infilt rate	0.1549	0.1513	0.1513	0.1405	0.1441	0.1225	0.1189	0.1189	0.1225	0.1369	0.1369	0.1405 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2949	0.2913	0.2913	0.2805	0.2841	0.2625	0.2589	0.2589	0.2625	0.2769	0.2769	0.2805 (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 N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.4700	11.2000	22.2700	0.1800	4.0086	110.0000	2449.7001 (29a)
Flat Roof	22.5500		22.5500	0.1500	3.3825	9.0000	202.9500 (30)
Total net area of external elements Aum(A, m ²)			56.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	22.2396	(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			25.2500	0.0000	0.0000	45.0000	1136.2500 (32)
Party Floor			70.0000			40.0000	2800.0000 (32d)
Party Ceiling			47.4500			30.0000	1423.5000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11405.2201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		162.9317 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5500	0.0370	0.6493
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.7200	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
E17 Corner (inverted - internal area greater than external area)	2.6800	-0.0850	-0.2278
E9 Balcony between dwellings, wall insulation continuous	5.0800	0.1500	0.7620
E15 Flat roof with parapet	7.4300	0.1320	0.9808
E24 Eaves (insulation at ceiling level - inverted)	4.2400	0.1500	0.6360
P4 Party wall - Roof (insulation at ceiling level)	8.3000	0.0400	0.3320

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		4.0618 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	26.3014 (37)

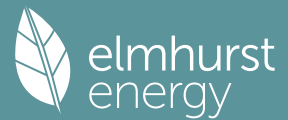
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	17.0294	16.8213	16.8213	16.1973	16.4053	15.1573	14.9493	14.9493	15.1573	15.9893	15.9893	16.1973 (38)
Average = Sum(39)m / 12 =	43.3307	43.1227	43.1227	42.4987	42.7067	41.4587	41.2507	41.2507	41.4587	42.2907	42.2907	42.4987 (39)
												42.2734

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.6190	0.6160	0.6160	0.6071	0.6101	0.5923	0.5893	0.5893	0.5923	0.6042	0.6042	0.6071 (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	2.2461 (42)
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Hot water usage for mixer showers	61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427 (42a)
Hot water usage for baths	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432 (42b)
Hot water usage for other uses	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326 (42c)
Average daily hot water use (litres/day)												116.0487 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184	(44)
Energy content (annual)	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	134.2926	137.9892	158.0618	173.1684	197.1578	(45)
Distribution loss (46)m = 0.15 x (45)m	29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737	(46)
Water storage loss (or HIU loss):													
Store volume													201.0000 (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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092	(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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	66.4809	58.4981	61.4617	52.4707	49.7840	43.6910	42.2995	44.6523	45.8814	52.5556	57.5785	65.5550	(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	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	134.7675	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.9427	19.4893	15.8498	11.9993	8.9696	7.5725	8.1824	10.6358	14.2753	18.1258	21.1554	22.5525	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.4732	297.5289	289.8286	273.4356	252.7424	233.2937	220.3007	217.2450	224.9453	241.3383	262.0316	281.4803	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	50.7229	(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)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	(71)
Water heating gains (Table 5)	89.3561	87.0508	82.6098	72.8760	66.9139	60.6820	56.8542	60.0165	63.7242	70.6392	79.9701	88.1115	(72)
Total internal gains	501.4174	499.7144	483.9336	453.9563	424.2713	397.1936	380.9827	383.5427	398.5902	425.7487	458.8025	487.7897	(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
North					3.6800	9.3942	0.4000	0.0000			0.7700			10.6478 (74)
South					7.5200	41.2355	0.4000	0.0000			0.7700			95.5081 (78)
Solar gains	106.1559	181.3171	250.6009	306.9806	330.2024	334.2102	314.9500	287.8882	275.0128	208.1891	129.8386			93.4882 (83)
Total gains	607.5732	681.0315	734.5344	760.9370	754.4737	731.4037	695.9327	671.4309	673.6030	633.9378	588.6411			581.2780 (84)

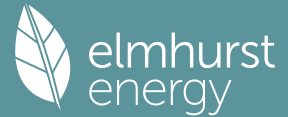
7. Mean internal temperature (heating season)

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	73.1148	73.4674	73.4674	74.5462	74.1831	76.4163	76.8016	76.8016	76.4163	74.9128	74.9128	74.5462	
alpha	5.8743	5.8978	5.8978	5.9697	5.9455	6.0944	6.1201	6.1201	6.0944	5.9942	5.9942	5.9697	
util living area	0.9003	0.8382	0.7443	0.6059	0.4561	0.3003	0.2193	0.2396	0.3870	0.6294	0.8298	0.9144	(86)
MIT	20.6644	20.7934	20.9030	20.9738	20.9955	20.9998	21.0000	21.0000	20.9988	20.9726	20.8394	20.6367	(87)
Th 2	20.4129	20.4156	20.4156	20.4236	20.4209	20.4370	20.4396	20.4396	20.4370	20.4263	20.4263	20.4236	(88)
util rest of house	0.8870	0.8199	0.7204	0.5773	0.4242	0.2684	0.1861	0.2052	0.3527	0.5963	0.8082	0.9026	(89)
MIT 2	20.0365	20.1905	20.3150	20.3987	20.4173	20.4368	20.4396	20.4396	20.4361	20.4013	20.2565	20.0128	(90)
Living area fraction	20.2979	20.4415	20.5598	20.6381	20.6580	20.6712	20.6729	20.6729	20.6703	20.6391	20.4992	20.2725	(91)
MIT	20.2979	20.4415	20.5598	20.6381	20.6580	20.6712	20.6729	20.6729	20.6703	20.6391	20.4992	20.2725	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2979	20.4415	20.5598	20.6381	20.6580	20.6712	20.6729	20.6729	20.6703	20.6391	20.4992	20.2725	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8842	0.8208	0.7264	0.5881	0.4373	0.2817	0.1999	0.2195	0.3669	0.6087	0.8110	0.8992	(94)
Useful gains	537.1883	558.9684	533.5920	447.4725	329.9210	206.0318	139.1282	147.3729	247.1714	385.8945	477.4143	522.6959	(95)

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Ext temp.	5.2000	5.8000	7.4000	9.9000	12.9000	15.7000	17.3000	17.1000	14.7000	11.3000	7.9000	5.0000 (96)
Heat loss rate W	654.2026	631.3804	567.4859	456.3562	331.3194	206.0976	139.1341	147.3836	247.5224	394.9568	532.8274	649.0611 (97)
Space heating kWh	87.0586	48.6609	25.2170	6.3963	1.0404	0.0000	0.0000	0.0000	0.0000	6.7424	39.8975	94.0157 (98a)
Space heating requirement - total per year (kWh/year)												309.0288
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	87.0586	48.6609	25.2170	6.3963	1.0404	0.0000	0.0000	0.0000	0.0000	6.7424	39.8975	94.0157 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												309.0288
Space heating per m2										(98c) / (4) =		4.4147 (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	87.0586	48.6609	25.2170	6.3963	1.0404	0.0000	0.0000	0.0000	0.0000	6.7424	39.8975	94.0157 (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)	87.0586	48.6609	25.2170	6.3963	1.0404	0.0000	0.0000	0.0000	0.0000	6.7424	39.8975	94.0157 (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	226.8940	200.2774	211.7986	183.8887	176.6776	157.4836	154.1680	161.2440	164.0712	185.0132	199.2504	224.1092 (64)
Efficiency of water heater (217)m	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912	344.3912 (216)
Fuel for water heating, kWh/month	65.8826	58.1540	61.4994	53.3953	51.3014	45.7281	44.7654	46.8200	47.6409	53.7218	57.8558	65.0740 (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	13.5997	12.2836	13.5997	13.1610	13.5997	13.1610	13.5997	13.5997	13.1610	13.5997	13.1610	13.5997 (231)
Lighting	19.2063	15.4080	13.8732	10.1641	7.8510	6.4144	7.1620	9.3094	12.0920	15.8654	17.9199	19.7401 (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												309.0288 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.3912
Water heating fuel used												651.8389 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)												
Mechanical ventilation fans (SFP = 0.7500)												160.1250 (230a)
Total electricity for the above, kWh/year												160.1250 (231)
Electricity for lighting (calculated in Appendix L)												155.0058 (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												1275.9985 (238)

10a. Fuel costs - using BEDF prices (587)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	309.0288	28.4300	87.8569 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	651.8389	28.4300	185.3178 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	160.1250	28.4300	45.5235 (249)
Energy for lighting	155.0058	28.4300	44.0682 (250)
Additional standing charges			0.0000 (251)
Total energy cost			362.7664 (255)

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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	309.0288	0.1591	49.1525 (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)	651.8389	0.1412	92.0221 (264)
Space and water heating			141.1746 (265)
Pumps, fans and electric keep-hot	160.1250	0.1387	22.2113 (267)
Energy for lighting	155.0058	0.1443	22.3721 (268)
Total CO2, kg/year			185.7581 (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	309.0288	1.5887	490.9604 (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)	651.8389	1.5220	992.1119 (278)
Space and water heating			1483.0723 (279)
Pumps, fans and electric keep-hot	160.1250	1.5128	242.2371 (281)
Energy for lighting	155.0058	1.5338	237.7531 (282)
Total Primary energy kWh/year			1963.0625 (286)