

Full SAP Calculation Printout



Plot Reference	Plot 26			Issued on Date	22/12/2025
Assessment Reference	Plot 26	Plot Type Ref			
Plot Address	Flat 10, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	76 C	DER	6.30	TER	13.92
Environmental	95 A	% DER < TER			54.74
CO ₂ Emissions (t/year)	0.4	DFEE	44.45	TFEE	38.29
Compliance Check	See BREL	% DFEE < TFEE			-16.09
% DPER < TPER	11.44	DPER	65.37	TPER	73.81
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	71.0700 (1b)	3.3500 (2b)	238.0845 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		238.0845 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	238.0845 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.9800	(17)
Infiltration rate	0.1490	(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) =	0.1266 (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	0.1615	0.1583	0.1551	0.1393	0.1361	0.1203	0.1203	0.1172	0.1266	0.1361	0.1425	0.1488 (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	0.3015	0.2983	0.2951	0.2793	0.2761	0.2603	0.2603	0.2572	0.2666	0.2761	0.2825	0.2888 (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			2.7300	1.3258	3.6193		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	24.4600	25.0500	0.1300	3.2565	14.0000	350.7000 (29a)
Warm Sloping Roof	70.2900		70.2900	0.1200	8.4348	9.0000	632.6100 (30)
Flat Ceiling	10.3500		10.3500	0.1200	1.2420	9.0000	93.1500 (30)
Total net area of external elements Aum (A, m ²)			130.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.7535		(33)
Main dwelling							
Party Wall			52.6700	0.0000	0.0000	20.0000	1053.4000 (32)
Party Floor 1			71.0700			40.0000	2842.8000 (32d)
Internal Walls			140.7200			9.0000	1266.4800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6239.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							87.7887 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	10.2700	0.1690	1.7356
E3 Sill	8.3400	0.0070	0.0584
E4 Jamb	14.4600	0.0370	0.5350
E7 Party floor between dwellings (in blocks of flats)	13.6700	0.0370	0.5058
E16 Corner (normal)	2.5300	0.0890	0.2252
E18 Party wall between dwellings	5.0600	0.0310	0.1569
E11 Eaves (insulation at rafter level)	0.7400	0.1320	0.0977
E13 Gable (insulation at rafter level)	13.0400	0.0320	0.4173
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8200	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.1200	0.6072
R6 Flat ceiling	21.2800	0.0260	0.5533
E12 Gable (insulation at ceiling level)	1.9200	0.2500	0.4800
P5 Party wall - Roof (insulation at rafter level)	20.8200	0.1710	3.5602
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.9325 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	52.6860 (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	23.6865	23.4378	23.1890	21.9452	21.6964	20.4526	20.4526	20.2038	20.9501	21.6964	22.1940	22.6915	(38)
Heat transfer coeff	76.3726	76.1238	75.8750	74.6312	74.3824	73.1386	73.1386	72.8898	73.6361	74.3824	74.8800	75.3775	(39)
Average = Sum(39)m / 12 =												74.5690	
HLP	1.0746	1.0711	1.0676	1.0501	1.0466	1.0291	1.0291	1.0256	1.0361	1.0466	1.0536	1.0606	(40)
HLP (average)												1.0492	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2718 (42)
Hot water usage for mixer showers	62.3106	61.3742	60.0097	57.3989	55.4722	53.3236	52.1023	53.4565	54.9409	57.2479	59.9148	62.0719	(42a)
Hot water usage for baths	26.9188	26.5190	25.9561	24.9180	24.1408	23.2789	22.8134	23.3724	23.9811	24.9033	25.9627	26.8278	(42b)
Hot water usage for other uses	37.8957	36.5177	35.1396	33.7616	32.3836	31.0056	31.0056	32.3836	33.7616	35.1396	36.5177	37.8957	(42c)
Average daily hot water use (litres/day)													116.8569 (43)
Daily hot water use	127.1251	124.4109	121.1054	116.0785	111.9966	107.6080	105.9212	109.2125	112.6837	117.2909	122.3952	126.7954	(44)
Energy conte	201.3351	177.1595	186.1344	158.9057	150.7689	132.3166	128.1025	135.2279	138.9502	159.1626	174.3744	198.5309	(45)
Energy content (annual)										Total = Sum(45)m =		1940.9688	
Distribution loss (46)m = 0.15 x (45)m	30.2003	26.5739	27.9202	23.8359	22.6153	19.8475	19.2154	20.2842	20.8425	23.8744	26.1562	29.7796	(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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823	(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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2258.2998	(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	66.9439	58.9055	61.8897	52.8361	50.1307	43.9953	42.5941	44.9633	46.2009	52.9216	57.9795	66.0115	(65)

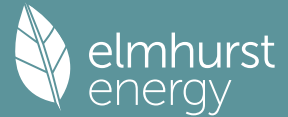
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	100.7668	111.5632	100.7668	104.1257	100.7668	104.1257	100.7668	100.7668	104.1257	100.7668	104.1257	100.7668	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.7814	201.8545	196.6303	185.5087	171.4697	158.2749	149.4601	147.3869	152.6111	163.7327	177.7718	190.9665	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	(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)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	(71)
Water heating gains (Table 5)	89.9784	87.6570	83.1851	73.3835	67.3799	61.1046	57.2501	60.4345	64.1680	71.1311	80.5270	88.7252	(72)
Total internal gains	447.6038	458.1520	437.6594	420.0952	396.6936	380.5824	364.5542	365.6655	377.9820	392.7079	419.5018	437.5357	(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	2.7300		10.6334		0.4000		0.0000		0.7700		8.9410 (74)	
South	19.6100		46.7521		0.3500		0.7000		0.7700		155.6602 (78)	

Solar gains	164.6012	272.0180	353.7718	413.6604	445.2854	435.3220	422.4150	399.0613	374.1353	295.3069	195.5403	141.9584 (83)
Total gains	612.2050	730.1700	791.4312	833.7556	841.9790	815.9044	786.9692	764.7268	752.1173	688.0148	615.0421	579.4941 (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	22.6926	22.7668	22.8414	23.2221	23.2998	23.6960	23.6960	23.7769	23.5359	23.2998	23.1450	22.9922	
alpha	2.5128	2.5178	2.5228	2.5481	2.5533	2.5797	2.5797	2.5851	2.5691	2.5533	2.5430	2.5328	
util living area	0.9110	0.8691	0.8220	0.7462	0.6450	0.5061	0.3838	0.4076	0.5693	0.7593	0.8729	0.9201 (86)	
MIT	18.7130	19.1142	19.5632	20.0964	20.5210	20.8212	20.9360	20.9235	20.7416	20.1909	19.3811	18.6510 (87)	
Th 2	20.0216	20.0245	20.0274	20.0418	20.0447	20.0591	20.0591	20.0620	20.0534	20.0447	20.0389	20.0331 (88)	
util rest of house	0.9005	0.8545	0.8019	0.7172	0.6027	0.4465	0.3096	0.3337	0.5118	0.7260	0.8563	0.9105 (89)	
MIT 2	17.3661	17.8649	18.4212	19.0777	19.5768	19.9136	20.0202	20.0133	19.8314	19.2056	18.2160	17.2957 (90)	
Living area fraction	fLA = Living area / (4) =												0.4559 (91)
MIT	17.9801	18.4344	18.9418	19.5421	20.0072	20.3274	20.4377	20.4282	20.2463	19.6548	18.7471	17.9136 (92)	
Temperature adjustment													0.0000
adjusted MIT	17.9801	18.4344	18.9418	19.5421	20.0072	20.3274	20.4377	20.4282	20.2463	19.6548	18.7471	17.9136 (93)	

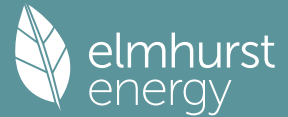
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8724	0.8257	0.7761	0.7005	0.6010	0.4641	0.3402	0.3634	0.5241	0.7109	0.8292	0.8835 (94)
Useful gains	534.0919	602.8732	614.1963	584.0576	506.0163	378.6910	267.7250	277.8774	394.1731	489.0950	509.9630	511.9642 (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	1044.7848	1030.2902	944.0255	794.2323	617.9134	418.8907	280.6843	293.6158	452.5927	673.5148	872.1360	1033.6962 (97)
Space heating kWh	379.9555	287.2242	245.3929	151.3258	83.2514	0.0000	0.0000	0.0000	0.0000	137.2084	260.7646	388.1686 (98a)
Space heating requirement - total per year (kWh/year)	1933.2915											
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	379.9555	287.2242	245.3929	151.3258	83.2514	0.0000	0.0000	0.0000	0.0000	137.2084	260.7646	388.1686 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1933.2915											
Space heating per m2	(98c) / (4) = 27.2026 (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	379.9555	287.2242	245.3929	151.3258	83.2514	0.0000	0.0000	0.0000	0.0000	137.2084	260.7646	388.1686 (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)	379.9555	287.2242	245.3929	151.3258	83.2514	0.0000	0.0000	0.0000	0.0000	137.2084	260.7646	388.1686 (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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823 (64)
Efficiency of water heater (217)m	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353 (216)
Fuel for water heating, kWh/month	66.3363	58.5533	61.9192	53.7544	51.6426	46.0280	45.0561	47.1266	47.9556	54.0816	58.2493	65.5214 (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	20.7224	18.7170	20.7224	20.0539	20.7224	20.0539	20.7224	20.7224	20.0539	20.7224	20.0539	20.7224 (231)
Lighting	19.0702	15.2988	13.7749	10.0921	7.7954	6.3689	7.1112	9.2435	12.0063	15.7530	17.7930	19.6002 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
(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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
(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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
(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	1933.2915 (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	344.1353
Water heating fuel used	656.2244 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	243.9890 (230a)
Total electricity for the above, kWh/year	243.9890 (231)
Electricity for lighting (calculated in Appendix L)	153.9076 (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	2987.4125 (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	1933.2915	0.1548	299.3698 (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)	656.2244	0.1412	92.6428 (264)
Space and water heating			392.0126 (265)
Pumps, fans and electric keep-hot	243.9890	0.1387	33.8443 (267)
Energy for lighting	153.9076	0.1443	22.2136 (268)
Total CO2, kg/year			448.0705 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.3000 (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	1933.2915	1.5733	3041.5915 (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)	656.2244	1.5220	998.7926 (278)
Space and water heating			4040.3841 (279)
Pumps, fans and electric keep-hot	243.9890	1.5128	369.1065 (281)
Energy for lighting	153.9076	1.5338	236.0687 (282)
Total Primary energy kWh/year			4645.5594 (286)
Dwelling Primary energy Rate (DPER)			65.3700 (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	71.0700 (1b)	x 3.3500 (2b)	= 238.0845 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.0845 (5)

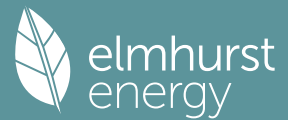
2. Ventilation rate

	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	3 * 10 = 30.0000 (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) =	30.0000 / (5) =	0.1260 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3760	(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) =		0.3196 (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	0.4075	0.3995	0.3915	0.3516	0.3436	0.3036	0.3036	0.2956	0.3196	0.3436	0.3596	0.3755 (22b)
	0.5830	0.5798	0.5766	0.5618	0.5590	0.5461	0.5461	0.5437	0.5511	0.5590	0.5646	0.5705 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1200	1.0000	2.1200		(26)
TER Opening Type			15.6500	1.1450	17.9198		(27)
EXT Wall	49.5100	17.7700	31.7400	0.1800	5.7132		(29a)
Warm Sloping Roof	70.2900		70.2900	0.1100	7.7319		(30)
Flat Ceiling	10.3500		10.3500	0.1100	1.1385		(30)
Total net area of external elements Aum (A, m2)			130.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.6234		(33)
Main dwelling							
Party Wall			52.6700	0.0000	0.0000		(32)

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

87.7887 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.2700	0.0500	0.5135
E3 Sill	8.3400	0.0500	0.4170
E4 Jamb	14.4600	0.0500	0.7230
E7 Party floor between dwellings (in blocks of flats)	13.6700	0.0700	0.9569
E16 Corner (normal)	2.5300	0.0900	0.2277
E18 Party wall between dwellings	5.0600	0.0600	0.3036
E11 Eaves (insulation at rafter level)	0.7400	0.0400	0.0296
E13 Gable (insulation at rafter level)	13.0400	0.0800	1.0432
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8200	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.0600	0.3036
R6 Flat ceiling	21.2800	0.0600	1.2768
E12 Gable (insulation at ceiling level)	1.9200	0.0600	0.1152
P5 Party wall - Roof (insulation at rafter level)	20.8200	0.0800	1.6656
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.5757 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	42.1991 (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	45.8072	45.5539	45.3056	44.1394	43.9212	42.9054	42.9054	42.7173	43.2967	43.9212	44.3626	44.8240 (38)
Heat transfer coeff	88.0063	87.7530	87.5047	86.3385	86.1203	85.1046	85.1046	84.9165	85.4958	86.1203	86.5617	87.0232 (39)
Average = Sum(39)m / 12 =												86.3375

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2383	1.2347	1.2312	1.2148	1.2118	1.1975	1.1975	1.1948	1.2030	1.2118	1.2180	1.2245 (40)
HLP (average)												1.2148
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

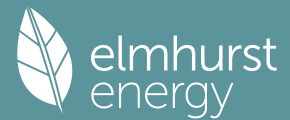
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2718 (42)
Hot water usage for mixer showers												
62.3106	61.3742	60.0097	57.3989	55.4722	53.3236	52.1023	53.4565	54.9409	57.2479	59.9148	62.0719 (42a)	
Hot water usage for baths												
26.9188	26.5190	25.9561	24.9180	24.1408	23.2789	22.8134	23.3724	23.9811	24.9033	25.9627	26.8278 (42b)	
Hot water usage for other uses												
37.8957	36.5177	35.1396	33.7616	32.3836	31.0056	31.0056	32.3836	33.7616	35.1396	36.5177	37.8957 (42c)	
Average daily hot water use (litres/day)												116.8569 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
127.1251	124.4109	121.1054	116.0785	111.9966	107.6080	105.9212	109.2125	112.6837	117.2909	122.3952	126.7954 (44)	
Energy content (annual)	201.3351	177.1595	186.1344	158.9057	150.7689	132.3166	128.1025	135.2279	138.9502	159.1626	174.3744	198.5309 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1940.9688
30.2003	26.5739	27.9202	23.8359	22.6153	19.8475	19.2154	20.2842	20.8425	23.8744	26.1562	29.7796 (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 (58)	
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												
247.9300	219.2452	232.7293	203.9975	197.3638	177.4085	174.6974	181.8228	184.0421	205.7575	219.4662	245.1258 (62)	
WWHRS	-28.4858	-25.1931	-26.3807	-21.8443	-20.3581	-17.4206	-16.3290	-17.3643	-18.0240	-21.2483	-24.0717	-27.9583 (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												
219.4442	194.0521	206.3486	182.1533	177.0057	159.9879	158.3684	164.4585	166.0181	184.5092	195.3945	217.1675 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2224.9080 (64)
Electric shower(s)												2225 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month												
104.2198	92.5741	99.1656	88.9096	87.4066	80.0688	79.8700	82.2392	82.2744	90.1975	94.0529	103.2874 (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	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	100.7985	111.5984	100.7985	104.1585	100.7985	104.1585	100.7985	100.7985	104.1585	100.7985	104.1585	100.7985 (67)

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.7814	201.8545	196.6303	185.5087	171.4697	158.2749	149.4601	147.3869	152.6111	163.7327	177.7718	190.9665 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728 (71)
Water heating gains (Table 5)	140.0804	137.7591	133.2871	123.4856	117.4820	111.2066	107.3522	110.5365	114.2700	121.2332	130.6291	138.8272 (72)
Total internal gains	500.7376	511.2892	490.7932	473.2300	449.8274	430.7173	414.6880	415.7993	428.1169	445.8417	472.6366	490.6695 (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				1.9100	10.6334	0.6300	0.7000		0.7700		6.2069 (74)	
South				13.7400	46.7521	0.6300	0.7000		0.7700		196.3177 (78)	
Solar gains	202.5246	333.3795	429.7126	495.2636	525.9709	510.8928	497.1455	475.0483	452.0643	360.9069	240.3604	174.8109 (83)
Total gains	703.2622	844.6687	920.5058	968.4936	975.7983	941.6101	911.8336	890.8476	880.1812	806.7486	712.9970	665.4804 (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	19.6928	19.7497	19.8057	20.0732	20.1241	20.3643	20.3643	20.4094	20.2711	20.1241	20.0215	19.9153
alpha	2.3129	2.3166	2.3204	2.3382	2.3416	2.3576	2.3576	2.3606	2.3514	2.3416	2.3348	2.3277
util living area	0.8962	0.8508	0.8011	0.7265	0.6290	0.4987	0.3794	0.4010	0.5534	0.7364	0.8545	0.9059 (86)
MIT	18.4834	18.9162	19.4029	19.9687	20.4337	20.7714	20.9133	20.8982	20.6878	20.0873	19.2063	18.4116 (87)
Th 2	19.8895	19.8923	19.8951	19.9081	19.9106	19.9220	19.9220	19.9241	19.9176	19.9106	19.9056	19.9005 (88)
util rest of house	0.8833	0.8335	0.7779	0.6938	0.5822	0.4324	0.2963	0.3185	0.4897	0.6986	0.8347	0.8942 (89)
MIT 2	17.0017	17.5366	18.1363	18.8278	19.3709	19.7433	19.8729	19.8634	19.6592	18.9853	17.9164	16.9189 (90)
Living area fraction	17.6772	18.1655	18.7137	19.3479	19.8554	20.2120	20.3472	20.3352	20.1281	19.4877	18.5044	17.5994 (92)
MIT	17.6772	18.1655	18.7137	19.3479	19.8554	20.2120	20.3472	20.3352	20.1281	19.4877	18.5044	17.5994 (93)
Temperature adjustment												0.0000
adjusted MIT	17.6772	18.1655	18.7137	19.3479	19.8554	20.2120	20.3472	20.3352	20.1281	19.4877	18.5044	17.5994 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8506	0.8007	0.7491	0.6752	0.5797	0.4510	0.3301	0.3511	0.5028	0.6821	0.8038	0.8624 (94)
Ext temp.	598.1998	676.3225	689.5333	653.9087	565.6627	424.6889	300.9544	312.7384	442.5936	550.2882	573.0797	573.8847 (95)
Heat loss rate W	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)
Space heating kWh	1177.2767	1164.0909	1068.7587	902.0567	702.3466	477.6055	318.9023	334.1624	515.3797	765.4094	987.1866	1166.0563 (97)
Space heating requirement - total per year (kWh/year)	430.8332	327.7803	282.1437	178.6665	101.6928	0.0000	0.0000	0.0000	0.0000	160.0501	298.1570	440.5757 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	430.8332	327.7803	282.1437	178.6665	101.6928	0.0000	0.0000	0.0000	0.0000	160.0501	298.1570	440.5757 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2219.8994
Space heating per m2										(98c) / (4) =		31.2354 (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)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
430.8332	327.7803	282.1437	178.6665	101.6928	0.0000	0.0000	0.0000	0.0000	0.0000	160.0501	298.1570	440.5757 (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)	466.7749	355.1250	305.6811	193.5715	110.1764	0.0000	0.0000	0.0000	0.0000	173.4021	323.0303	477.3301 (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	219.4442	194.0521	206.3486	182.1533	177.0057	159.9879	158.3684	164.4585	166.0181	184.5092	195.3945	217.1675 (64)
Water heating requirement	85.5442	85.2256	84.7618	84.0164	82.8645	79.8000	79.8000	79.8000	79.8000	83.7425	85.0046	79.8000 (216)
Efficiency of water heater (217)m	256.5272	227.6921	243.4452	216.8067	213.6087	200.4861	198.4567	206.0884	208.0427	220.3294	229.8635	253.6647 (219)
Fuel for water heating, kWh/month	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)
Space cooling fuel requirement (221)m	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)
Pumps and Fa	20.9439	16.8020	15.1283	11.0837	8.5613	6.9947	7.8099	10.1517	13.1860	17.3008	19.5412	21.5260 (232)
Lighting	Electricity generated by PVs (Appendix M) (negative quantity)											

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(233a)m	-19.0351	-28.1985	-42.5683	-50.3477	-56.4774	-53.5193	-52.8669	-48.8211	-42.0705	-33.3274	-21.4055	-16.3019	(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	-6.9800	-14.9951	-30.3920	-46.5213	-62.3756	-62.9881	-62.2467	-52.3076	-37.8226	-21.7283	-9.4097	-5.4967	(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												2405.0914	(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												2675.0113	(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)												169.0296	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-878.2032	(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												4456.9292	(238)

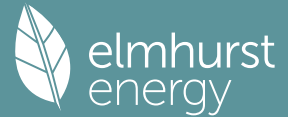
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2405.0914	0.2100	505.0692 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2675.0113	0.2100	561.7524 (264)
Space and water heating			1066.8216 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	169.0296	0.1443	24.3962 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-464.9396	0.1336	-62.0952
PV Unit electricity exported	-413.2636	0.1253	-51.8001
Total			-113.8953 (269)
Total CO2, kg/year			989.2517 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.9200 (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	2405.0914	1.1300	2717.7533 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2675.0113	1.1300	3022.7628 (278)
Space and water heating			5740.5161 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	169.0296	1.5338	259.2632 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-464.9396	1.4935	-694.4059
PV Unit electricity exported	-413.2636	0.4601	-190.1309
Total			-884.5368 (283)
Total Primary energy kWh/year			5245.3433 (286)
Target Primary Energy Rate (TPER)			73.8100 (287)

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Plot Reference	Plot 26			Issued on Date	22/12/2025
Assessment Reference	Plot 26	Plot Type Ref			
Plot Address	Flat 10, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	76 C	DER	6.30	TER	13.92
Environmental	95 A	% DER < TER			54.74
CO ₂ Emissions (t/year)	0.4	DFEE	44.45	TFEE	38.29
Compliance Check	See BREL	% DFEE < TFEE			-16.09
% DPER < TPER	11.44	DPER	65.37	TPER	73.81
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	71.0700 (1b)	3.3500 (2b)	238.0845 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		238.0845 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	238.0845 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1260 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.9800 (17)
Infiltration rate	0.2750 (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) = 0.2338 (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	0.2980	0.2922	0.2863	0.2571	0.2513	0.2221	0.2221	0.2162	0.2338	0.2513	0.2630	0.2747 (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	0.5444	0.5427	0.5410	0.5331	0.5316	0.5247	0.5247	0.5234	0.5273	0.5316	0.5346	0.5377 (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			2.7300	1.3258	3.6193		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	24.4600	25.0500	0.1300	3.2565	14.0000	350.7000 (29a)
Warm Sloping Roof	70.2900		70.2900	0.1200	8.4348	9.0000	632.6100 (30)
Flat Ceiling	10.3500		10.3500	0.1200	1.2420	9.0000	93.1500 (30)
Total net area of external elements Aum(A, m ²)			130.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.7535		(33)
Main dwelling							
Party Wall			52.6700	0.0000	0.0000	20.0000	1053.4000 (32)
Party Floor 1			71.0700			40.0000	2842.8000 (32d)
Internal Walls			140.7200			9.0000	1266.4800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		6239.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							87.7887 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				10.2700	0.1690	1.7356	

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7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	18.1553	18.1811	18.2065	18.3266	18.3492	18.4554	18.4554	18.4752	18.4144	18.3492	18.3035	18.2559
alpha	2.2104	2.2121	2.2138	2.2218	2.2233	2.2304	2.2304	2.2317	2.2276	2.2233	2.2202	2.2171
util living area	0.9317	0.8989	0.8619	0.8014	0.7163	0.5921	0.4678	0.4948	0.6514	0.8138	0.9031	0.9389 (86)
MIT	17.9250	18.3505	18.8811	19.5410	20.1391	20.6124	20.8375	20.8094	20.4851	19.6995	18.6959	17.8403 (87)
Th 2	19.8072	19.8086	19.8101	19.8169	19.8182	19.8242	19.8242	19.8253	19.8219	19.8182	19.8156	19.8129 (88)
util rest of house	0.9222	0.8853	0.8426	0.7720	0.6697	0.5174	0.3644	0.3933	0.5831	0.7803	0.8877	0.9303 (89)
MIT 2	17.0454	17.4603	17.9770	18.6140	19.1714	19.5861	19.7531	19.7370	19.4854	18.7778	17.8108	16.9662 (90)
Living area fraction									fLA = Living area / (4) =			0.4559 (91)
MIT	17.4464	17.8661	18.3892	19.0366	19.6125	20.0540	20.2474	20.2259	19.9411	19.1980	18.2143	17.3647 (92)
Temperature adjustment												0.0000
adjusted MIT	17.4464	17.8661	18.3892	19.0366	19.6125	20.0540	20.2474	20.2259	19.9411	19.1980	18.2143	17.3647 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8969	0.8571	0.8146	0.7493	0.6606	0.5331	0.4037	0.4301	0.5907	0.7594	0.8608	0.9063 (94)
Useful gains	509.7261	589.1711	612.0455	599.5289	536.5428	421.2511	308.3888	318.1932	428.2863	498.5053	496.9887	486.2133 (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	1254.9495	1235.9824	1131.7452	958.5876	747.3445	512.1706	342.5214	358.8965	549.7446	812.0859	1052.3749	1249.7736 (97)
Space heating kWh	554.4462	434.6572	386.6565	258.5223	156.8364	0.0000	0.0000	0.0000	0.0000	233.3040	399.8781	568.0888 (98a)
Space heating requirement - total per year (kWh/year)												2992.3895
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	554.4462	434.6572	386.6565	258.5223	156.8364	0.0000	0.0000	0.0000	0.0000	233.3040	399.8781	568.0888 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2992.3895
Space heating per m2												(98c) / (4) = 42.1048 (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	882.7277	694.9133	712.9300	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6915	0.7591	0.7415	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	610.4361	527.5207	528.6266	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	885.5388	856.8966	830.7170	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	198.0740	245.0557	224.7552	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	49.5185	61.2639	56.1888	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												166.9712 (107)
Energy for space heating												42.1048 (99)
Energy for space cooling												2.3494 (108)
Total												44.4542 (109)
Fabric Energy Efficiency (DFEE)												44.5 (109)

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

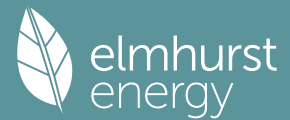
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	71.0700 (1b)	x 3.3500 (2b)	= 238.0845 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.0845 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1260 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3760 (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) = 0.3196 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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	0.4075	0.3995	0.3915	0.3516	0.3436	0.3036	0.3036	0.2956	0.3196	0.3436	0.3596	0.3755	(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	0.5830	0.5798	0.5766	0.5618	0.5590	0.5461	0.5461	0.5437	0.5511	0.5590	0.5646	0.5705	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1200	1.0000	2.1200			(26)
TER Opening Type			15.6500	1.1450	17.9198			(27)
EXT Wall	49.5100	17.7700	31.7400	0.1800	5.7132			(29a)
Warm Sloping Roof	70.2900		70.2900	0.1100	7.7319			(30)
Flat Ceiling	10.3500		10.3500	0.1100	1.1385			(30)
Total net area of external elements Aum(A, m2)			130.1500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	34.6234		(33)
Main dwelling								
Party Wall			52.6700	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								87.7887 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	10.2700	0.0500	0.5135	
E3 Sill	8.3400	0.0500	0.4170	
E4 Jamb	14.4600	0.0500	0.7230	
E7 Party floor between dwellings (in blocks of flats)	13.6700	0.0700	0.9569	
E16 Corner (normal)	2.5300	0.0900	0.2277	
E18 Party wall between dwellings	5.0600	0.0600	0.3036	
E11 Eaves (insulation at rafter level)	0.7400	0.0400	0.0296	
E13 Gable (insulation at rafter level)	13.0400	0.0800	1.0432	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8200	0.0000	0.0000	
E25 Staggered party wall between dwellings	5.0600	0.0600	0.3036	
R6 Flat ceiling	21.2800	0.0600	1.2768	
E12 Gable (insulation at ceiling level)	1.9200	0.0600	0.1152	
P5 Party wall - Roof (insulation at rafter level)	20.8200	0.0800	1.6656	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.5757	(36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	42.1991 (37)

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

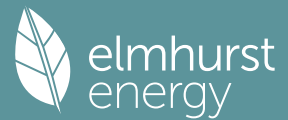
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	45.8072	45.5539	45.3056	44.1394	43.9212	42.9054	42.9054	42.7173	43.2967	43.9212	44.3626	44.8240	(38)
Heat transfer coeff	88.0063	87.7530	87.5047	86.3385	86.1203	85.1046	85.1046	84.9165	85.4958	86.1203	86.5617	87.0232	(39)
Average = Sum(39)m / 12 =													86.3375

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	1.2383	1.2347	1.2312	1.2148	1.2118	1.1975	1.1975	1.1948	1.2030	1.2118	1.2180	1.2245	(40)
HLP (average)													1.2148
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2718 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													26.9188 (42b)
Hot water usage for other uses													37.8957 (42c)
Average daily hot water use (litres/day)													59.4086 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	64.8145	63.0367	61.0957	58.6797	56.5244	54.2845	53.8189	55.7560	57.7427	60.0430	62.4804	64.7235	(44)
Energy conte	102.6504	89.7634	93.9018	80.3295	76.0927	66.7491	65.0893	69.0376	71.2026	81.4777	89.0148	101.3414	(45)
Energy content (annual)										Total = Sum(45)m =			986.6503
Distribution loss (46)m = 0.15 x (45)m													0.0000 (46)
Water storage loss (or HIU loss):													
Total storage loss													0.0000 (56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month	87.2528	76.2989	79.8166	68.2801	64.6788	56.7367	55.3259	58.6819	60.5222	69.2561	75.6626	86.1402	(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	87.2528	76.2989	79.8166	68.2801	64.6788	56.7367	55.3259	58.6819	60.5222	69.2561	75.6626	86.1402	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			838.6528 (64)
Electric shower(s)													839 (64)

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	49.9004	44.4617	48.5504	46.3311	47.2005	45.0247	46.5255	47.2005	46.3311	48.5504	47.6375	49.9004 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											567.6141 (64a)
Heat gains from water heating, kWh/month	34.2883	30.1901	32.0917	28.6528	27.9698	25.4404	25.4629	26.4706	26.7133	29.4516	30.8250	34.0101 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	100.7985	111.5984	100.7985	104.1585	100.7985	104.1585	100.7985	100.7985	104.1585	100.7985	104.1585	100.7985 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.7814	201.8545	196.6303	185.5087	171.4697	158.2749	149.4601	147.3869	152.6111	163.7327	177.7718	190.9665 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591 (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)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728 (71)
Water heating gains (Table 5)	46.0864	44.9258	43.1341	39.7955	37.5938	35.3338	34.2243	35.5788	37.1018	39.5855	42.8125	45.7126 (72)
Total internal gains	403.7436	415.4559	397.6402	386.5400	366.9393	354.8445	341.5601	340.8415	350.9487	361.1940	381.8200	394.5548 (73)

6. Solar gains

[Jan]												
			Area		Solar flux		g		FF		Access	Gains
			m2		Table 6a		Specific data		Specific data		factor	W
					W/m2		or Table 6b		or Table 6c		Table 6d	
North			1.9100		10.6334		0.6300		0.7000		0.7700	6.2069 (74)
South			13.7400		46.7521		0.6300		0.7000		0.7700	196.3177 (78)
Solar gains	202.5246	333.3795	429.7126	495.2636	525.9709	510.8928	497.1455	475.0483	452.0643	360.9069	240.3604	174.8109 (83)
Total gains	606.2682	748.8354	827.3528	881.8036	892.9101	865.7373	838.7057	815.8898	803.0129	722.1010	622.1805	569.3658 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	19.6928	19.7497	19.8057	20.0732	20.1241	20.3643	20.3643	20.4094	20.2711	20.1241	20.0215	19.9153
util living area	2.3129	2.3166	2.3204	2.3382	2.3416	2.3576	2.3576	2.3606	2.3514	2.3416	2.3348	2.3277
	0.9200	0.8770	0.8299	0.7573	0.6618	0.5300	0.4069	0.4309	0.5881	0.7719	0.8835	0.9289 (86)
MIT	18.2661	18.7305	19.2502	19.8603	20.3644	20.7388	20.8990	20.8810	20.6427	19.9762	19.0265	18.1887 (87)
Th 2	19.8895	19.8923	19.8951	19.9081	19.9106	19.9220	19.9220	19.9241	19.9176	19.9106	19.9056	19.9005 (88)
util rest of house	0.9095	0.8619	0.8088	0.7262	0.6157	0.4621	0.3194	0.3442	0.5238	0.7365	0.8666	0.9196 (89)
MIT 2	17.4297	17.8807	18.3834	18.9707	19.4342	19.7611	19.8769	19.8681	19.6844	19.0933	18.1864	17.3615 (90)
Living area fraction	17.8110	18.2681	18.7785	19.3763	19.8583	20.2068	20.3429	20.3299	20.1213	19.4958	18.5694	17.7386 (92)
MIT	17.8110	18.2681	18.7785	19.3763	19.8583	20.2068	20.3429	20.3299	20.1213	19.4958	18.5694	17.7386 (93)
Temperature adjustment												0.0000
adjusted MIT	17.8110	18.2681	18.7785	19.3763	19.8583	20.2068	20.3429	20.3299	20.1213	19.4958	18.5694	17.7386 (93)

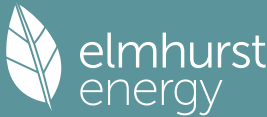
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8844	0.8349	0.7838	0.7093	0.6133	0.4809	0.3548	0.3782	0.5367	0.7212	0.8412	0.8956 (94)
Ext temp.	536.1704	625.2052	648.4847	625.4542	547.5865	416.3592	297.5676	308.5652	430.9438	520.7677	523.3738	509.9384 (95)
Heat loss rate W	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)
Space heating	1189.0524	1173.0929	1074.4285	904.5060	702.5956	477.1630	318.5377	333.7126	514.7938	766.1124	992.8110	1178.1722 (97)
Space heating requirement - total per year (kWh/year)	485.7442	368.1805	316.9022	200.9173	115.3268	0.0000	0.0000	0.0000	0.0000	182.5365	337.9948	497.1660 (98a)
Solar heating kWh												2504.7682
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	485.7442	368.1805	316.9022	200.9173	115.3268	0.0000	0.0000	0.0000	0.0000	182.5365	337.9948	497.1660 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2504.7682
Space heating per m2										(98c) / (4) =		35.2437 (99)

8c. Space cooling requirement

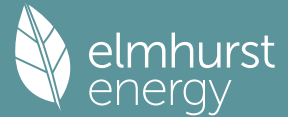
Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	799.9832	629.7740	645.3654	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.7677	0.8276	0.8142	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	614.1210	521.1816	525.4597	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	973.8711	944.2471	919.5368	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	259.0201	314.7607	293.1934	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	64.7550	78.6902	73.2983	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												216.7435 (107)
Energy for space heating												35.2437 (99)

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Energy for space cooling	3.0497	(108)
Total	38.2934	(109)
Fabric Energy Efficiency (TFEE)	38.3	(109)

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Plot Reference	Plot 26				Issued on Date	22/12/2025	
Assessment Reference	Plot 26			Plot Type Ref			
Plot Address	Flat 10, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	76 C	DER	6.30	TER	13.92		
Environmental	95 A	% DER < TER				54.74	
CO ₂ Emissions (t/year)	0.4	DFEE	44.45	TFEE	38.29		
Compliance Check	See BREL	% DFEE < TFEE				-16.09	
% DPER < TPER	11.44	DPER	65.37	TPER	73.81		
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	71.0700 (1b)	3.3500 (2b)	238.0845 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		238.0845 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	238.0845 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.9800	(17)
Infiltration rate	0.1490	(18)
Number of sides sheltered	2	(19)

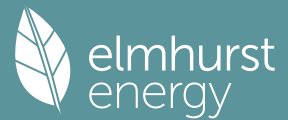
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1266 (21)

	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	0.1615	0.1583	0.1551	0.1393	0.1361	0.1203	0.1203	0.1172	0.1266	0.1361	0.1425	0.1488 (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	0.3015	0.2983	0.2951	0.2793	0.2761	0.2603	0.2603	0.2572	0.2666	0.2761	0.2825	0.2888 (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			2.7300	1.3258	3.6193		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	24.4600	25.0500	0.1300	3.2565	14.0000	350.7000 (29a)
Warm Sloping Roof	70.2900		70.2900	0.1200	8.4348	9.0000	632.6100 (30)
Flat Ceiling	10.3500		10.3500	0.1200	1.2420	9.0000	93.1500 (30)
Total net area of external elements Aum (A, m ²)			130.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.7535		(33)
Main dwelling							
Party Wall			52.6700	0.0000	0.0000	20.0000	1053.4000 (32)
Party Floor 1			71.0700			40.0000	2842.8000 (32d)
Internal Walls			140.7200			9.0000	1266.4800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6239.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							87.7887 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	10.2700	0.1690	1.7356
E3 Sill	8.3400	0.0070	0.0584
E4 Jamb	14.4600	0.0370	0.5350
E7 Party floor between dwellings (in blocks of flats)	13.6700	0.0370	0.5058
E16 Corner (normal)	2.5300	0.0890	0.2252
E18 Party wall between dwellings	5.0600	0.0310	0.1569
E11 Eaves (insulation at rafter level)	0.7400	0.1320	0.0977
E13 Gable (insulation at rafter level)	13.0400	0.0320	0.4173
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8200	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.1200	0.6072
R6 Flat ceiling	21.2800	0.0260	0.5533
E12 Gable (insulation at ceiling level)	1.9200	0.2500	0.4800
P5 Party wall - Roof (insulation at rafter level)	20.8200	0.1710	3.5602
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.9325 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	52.6860 (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	23.6865	23.4378	23.1890	21.9452	21.6964	20.4526	20.4526	20.2038	20.9501	21.6964	22.1940	22.6915	(38)
Heat transfer coeff	76.3726	76.1238	75.8750	74.6312	74.3824	73.1386	73.1386	72.8898	73.6361	74.3824	74.8800	75.3775	(39)
Average = Sum(39)m / 12 =												74.5690	
HLP	1.0746	1.0711	1.0676	1.0501	1.0466	1.0291	1.0291	1.0256	1.0361	1.0466	1.0536	1.0606	(40)
HLP (average)												1.0492	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2718 (42)
Hot water usage for mixer showers	62.3106	61.3742	60.0097	57.3989	55.4722	53.3236	52.1023	53.4565	54.9409	57.2479	59.9148	62.0719	(42a)
Hot water usage for baths	26.9188	26.5190	25.9561	24.9180	24.1408	23.2789	22.8134	23.3724	23.9811	24.9033	25.9627	26.8278	(42b)
Hot water usage for other uses	37.8957	36.5177	35.1396	33.7616	32.3836	31.0056	31.0056	32.3836	33.7616	35.1396	36.5177	37.8957	(42c)
Average daily hot water use (litres/day)													116.8569 (43)
Daily hot water use	127.1251	124.4109	121.1054	116.0785	111.9966	107.6080	105.9212	109.2125	112.6837	117.2909	122.3952	126.7954	(44)
Energy conte	201.3351	177.1595	186.1344	158.9057	150.7689	132.3166	128.1025	135.2279	138.9502	159.1626	174.3744	198.5309	(45)
Energy content (annual)										Total = Sum(45)m =		1940.9688	
Distribution loss (46)m = 0.15 x (45)m	30.2003	26.5739	27.9202	23.8359	22.6153	19.8475	19.2154	20.2842	20.8425	23.8744	26.1562	29.7796	(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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823	(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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2258.2998	(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	66.9439	58.9055	61.8897	52.8361	50.1307	43.9953	42.5941	44.9633	46.2009	52.9216	57.9795	66.0115	(65)

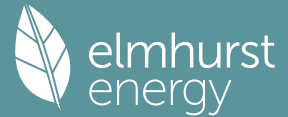
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	100.7668	111.5632	100.7668	104.1257	100.7668	104.1257	100.7668	100.7668	104.1257	100.7668	104.1257	100.7668	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.7814	201.8545	196.6303	185.5087	171.4697	158.2749	149.4601	147.3869	152.6111	163.7327	177.7718	190.9665	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	(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)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	(71)
Water heating gains (Table 5)	89.9784	87.6570	83.1851	73.3835	67.3799	61.1046	57.2501	60.4345	64.1680	71.1311	80.5270	88.7252	(72)
Total internal gains	447.6038	458.1520	437.6594	420.0952	396.6936	380.5824	364.5542	365.6655	377.9820	392.7079	419.5018	437.5357	(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	2.7300		10.6334		0.4000		0.0000		0.7700		8.9410 (74)	
South	19.6100		46.7521		0.3500		0.7000		0.7700		155.6602 (78)	

Solar gains	164.6012	272.0180	353.7718	413.6604	445.2854	435.3220	422.4150	399.0613	374.1353	295.3069	195.5403	141.9584 (83)
Total gains	612.2050	730.1700	791.4312	833.7556	841.9790	815.9044	786.9692	764.7268	752.1173	688.0148	615.0421	579.4941 (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	22.6926	22.7668	22.8414	23.2221	23.2998	23.6960	23.6960	23.7769	23.5359	23.2998	23.1450	22.9922
alpha	2.5128	2.5178	2.5228	2.5481	2.5533	2.5797	2.5797	2.5851	2.5691	2.5533	2.5430	2.5328
util living area	0.9110	0.8691	0.8220	0.7462	0.6450	0.5061	0.3838	0.4076	0.5693	0.7593	0.8729	0.9201 (86)
MIT	18.7130	19.1142	19.5632	20.0964	20.5210	20.8212	20.9360	20.9235	20.7416	20.1909	19.3811	18.6510 (87)
Th 2	20.0216	20.0245	20.0274	20.0418	20.0447	20.0591	20.0591	20.0620	20.0534	20.0447	20.0389	20.0331 (88)
util rest of house	0.9005	0.8545	0.8019	0.7172	0.6027	0.4465	0.3096	0.3337	0.5118	0.7260	0.8563	0.9105 (89)
MIT 2	17.3661	17.8649	18.4212	19.0777	19.5768	19.9136	20.0202	20.0133	19.8314	19.2056	18.2160	17.2957 (90)
Living area fraction									fLA = Living area / (4) =			0.4559 (91)
MIT	17.9801	18.4344	18.9418	19.5421	20.0072	20.3274	20.4377	20.4282	20.2463	19.6548	18.7471	17.9136 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9801	18.4344	18.9418	19.5421	20.0072	20.3274	20.4377	20.4282	20.2463	19.6548	18.7471	17.9136 (93)

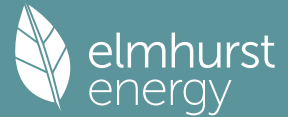
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8724	0.8257	0.7761	0.7005	0.6010	0.4641	0.3402	0.3634	0.5241	0.7109	0.8292	0.8835 (94)
Useful gains	534.0919	602.8732	614.1963	584.0576	506.0163	378.6910	267.7250	277.8774	394.1731	489.0950	509.9630	511.9642 (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	1044.7848	1030.2902	944.0255	794.2323	617.9134	418.8907	280.6843	293.6158	452.5927	673.5148	872.1360	1033.6962 (97)
Space heating kWh	379.9555	287.2242	245.3929	151.3258	83.2514	0.0000	0.0000	0.0000	0.0000	137.2084	260.7646	388.1686 (98a)
Space heating requirement - total per year (kWh/year)												1933.2915
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	379.9555	287.2242	245.3929	151.3258	83.2514	0.0000	0.0000	0.0000	0.0000	137.2084	260.7646	388.1686 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1933.2915
Space heating per m2										(98c) / (4) =		27.2026 (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	379.9555	287.2242	245.3929	151.3258	83.2514	0.0000	0.0000	0.0000	0.0000	137.2084	260.7646	388.1686 (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)	379.9555	287.2242	245.3929	151.3258	83.2514	0.0000	0.0000	0.0000	0.0000	137.2084	260.7646	388.1686 (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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823 (64)
Efficiency of water heater (217)m	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353 (216)
Fuel for water heating, kWh/month	66.3363	58.5533	61.9192	53.7544	51.6426	46.0280	45.0561	47.1266	47.9556	54.0816	58.2493	65.5214 (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	20.7224	18.7170	20.7224	20.0539	20.7224	20.0539	20.7224	20.7224	20.0539	20.7224	20.0539	20.7224 (231)
Lighting	19.0702	15.2988	13.7749	10.0921	7.7954	6.3689	7.1112	9.2435	12.0063	15.7530	17.7930	19.6002 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
(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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
(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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
(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												1933.2915 (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	344.1353
Water heating fuel used	656.2244 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)	
mechanical ventilation fans (SFP = 0.8400)	243.9890 (230a)
Total electricity for the above, kWh/year	243.9890 (231)
Electricity for lighting (calculated in Appendix L)	153.9076 (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	2987.4125 (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	1933.2915	0.1548	299.3698 (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)	656.2244	0.1412	92.6428 (264)
Space and water heating			392.0126 (265)
Pumps, fans and electric keep-hot	243.9890	0.1387	33.8443 (267)
Energy for lighting	153.9076	0.1443	22.2136 (268)
Total CO2, kg/year			448.0705 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.3000 (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	1933.2915	1.5733	3041.5915 (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)	656.2244	1.5220	998.7926 (278)
Space and water heating			4040.3841 (279)
Pumps, fans and electric keep-hot	243.9890	1.5128	369.1065 (281)
Energy for lighting	153.9076	1.5338	236.0687 (282)
Total Primary energy kWh/year			4645.5594 (286)
Dwelling Primary energy Rate (DPER)			65.3700 (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	71.0700 (1b)	x 3.3500 (2b)	= 238.0845 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 238.0845 (5)

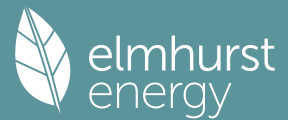
2. Ventilation rate

	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	3 * 10 = 30.0000 (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) =	30.0000 / (5) =	0.1260 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3760	(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) =		0.3196 (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	0.4075	0.3995	0.3915	0.3516	0.3436	0.3036	0.3036	0.2956	0.3196	0.3436	0.3596	0.3755 (22b)
	0.5830	0.5798	0.5766	0.5618	0.5590	0.5461	0.5461	0.5437	0.5511	0.5590	0.5646	0.5705 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1200	1.0000	2.1200		(26)
TER Opening Type			15.6500	1.1450	17.9198		(27)
EXT Wall	49.5100	17.7700	31.7400	0.1800	5.7132		(29a)
Warm Sloping Roof	70.2900		70.2900	0.1100	7.7319		(30)
Flat Ceiling	10.3500		10.3500	0.1100	1.1385		(30)
Total net area of external elements Aum (A, m2)			130.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.6234		(33)
Main dwelling							
Party Wall			52.6700	0.0000	0.0000		(32)

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

87.7887 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.2700	0.0500	0.5135
E3 Sill	8.3400	0.0500	0.4170
E4 Jamb	14.4600	0.0500	0.7230
E7 Party floor between dwellings (in blocks of flats)	13.6700	0.0700	0.9569
E16 Corner (normal)	2.5300	0.0900	0.2277
E18 Party wall between dwellings	5.0600	0.0600	0.3036
E11 Eaves (insulation at rafter level)	0.7400	0.0400	0.0296
E13 Gable (insulation at rafter level)	13.0400	0.0800	1.0432
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8200	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.0600	0.3036
R6 Flat ceiling	21.2800	0.0600	1.2768
E12 Gable (insulation at ceiling level)	1.9200	0.0600	0.1152
P5 Party wall - Roof (insulation at rafter level)	20.8200	0.0800	1.6656

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

7.5757 (36)

Point Thermal bridges

(33) + (36) + (36a) = 42.1991 (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	45.8072	45.5539	45.3056	44.1394	43.9212	42.9054	42.9054	42.7173	43.2967	43.9212	44.3626	44.8240 (38)
Heat transfer coeff	88.0063	87.7530	87.5047	86.3385	86.1203	85.1046	85.1046	84.9165	85.4958	86.1203	86.5617	87.0232 (39)
Average = Sum(39)m / 12 =												86.3375

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2383	1.2347	1.2312	1.2148	1.2118	1.1975	1.1975	1.1948	1.2030	1.2118	1.2180	1.2245 (40)
HLP (average)												1.2148
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

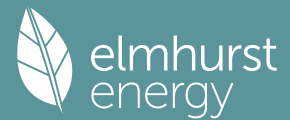
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2718 (42)
Hot water usage for mixer showers												
62.3106	61.3742	60.0097	57.3989	55.4722	53.3236	52.1023	53.4565	54.9409	57.2479	59.9148	62.0719 (42a)	
Hot water usage for baths												
26.9188	26.5190	25.9561	24.9180	24.1408	23.2789	22.8134	23.3724	23.9811	24.9033	25.9627	26.8278 (42b)	
Hot water usage for other uses												
37.8957	36.5177	35.1396	33.7616	32.3836	31.0056	31.0056	32.3836	33.7616	35.1396	36.5177	37.8957 (42c)	
Average daily hot water use (litres/day)												116.8569 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
127.1251	124.4109	121.1054	116.0785	111.9966	107.6080	105.9212	109.2125	112.6837	117.2909	122.3952	126.7954 (44)	
Energy content (annual)	201.3351	177.1595	186.1344	158.9057	150.7689	132.3166	128.1025	135.2279	138.9502	159.1626	174.3744	198.5309 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1940.9688
30.2003	26.5739	27.9202	23.8359	22.6153	19.8475	19.2154	20.2842	20.8425	23.8744	26.1562	29.7796 (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 (58)	
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												
247.9300	219.2452	232.7293	203.9975	197.3638	177.4085	174.6974	181.8228	184.0421	205.7575	219.4662	245.1258 (62)	
WWHRS	-28.4858	-25.1931	-26.3807	-21.8443	-20.3581	-17.4206	-16.3290	-17.3643	-18.0240	-21.2483	-24.0717	-27.9583 (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												
219.4442	194.0521	206.3486	182.1533	177.0057	159.9879	158.3684	164.4585	166.0181	184.5092	195.3945	217.1675 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2224.9080 (64)
Electric shower(s)												2225 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month												
104.2198	92.5741	99.1656	88.9096	87.4066	80.0688	79.8700	82.2392	82.2744	90.1975	94.0529	103.2874 (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	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910	113.5910 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	100.7985	111.5984	100.7985	104.1585	100.7985	104.1585	100.7985	100.7985	104.1585	100.7985	104.1585	100.7985 (67)

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.7814	201.8545	196.6303	185.5087	171.4697	158.2749	149.4601	147.3869	152.6111	163.7327	177.7718	190.9665 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591	34.3591 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728 (71)
Water heating gains (Table 5)	140.0804	137.7591	133.2871	123.4856	117.4820	111.2066	107.3522	110.5365	114.2700	121.2332	130.6291	138.8272 (72)
Total internal gains	500.7376	511.2892	490.7932	473.2300	449.8274	430.7173	414.6880	415.7993	428.1169	445.8417	472.6366	490.6695 (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				1.9100	10.6334	0.6300	0.7000		0.7700		6.2069 (74)	
South				13.7400	46.7521	0.6300	0.7000		0.7700		196.3177 (78)	
Solar gains	202.5246	333.3795	429.7126	495.2636	525.9709	510.8928	497.1455	475.0483	452.0643	360.9069	240.3604	174.8109 (83)
Total gains	703.2622	844.6687	920.5058	968.4936	975.7983	941.6101	911.8336	890.8476	880.1812	806.7486	712.9970	665.4804 (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	19.6928	19.7497	19.8057	20.0732	20.1241	20.3643	20.3643	20.4094	20.2711	20.1241	20.0215	19.9153		
alpha	2.3129	2.3166	2.3204	2.3382	2.3416	2.3576	2.3576	2.3606	2.3514	2.3416	2.3348	2.3277		
util living area														
	0.8962	0.8508	0.8011	0.7265	0.6290	0.4987	0.3794	0.4010	0.5534	0.7364	0.8545	0.9059 (86)		
MIT	18.4834	18.9162	19.4029	19.9687	20.4337	20.7714	20.9133	20.8982	20.6878	20.0873	19.2063	18.4116 (87)		
Th 2	19.8895	19.8923	19.8951	19.9081	19.9106	19.9220	19.9220	19.9241	19.9176	19.9106	19.9056	19.9005 (88)		
util rest of house														
	0.8833	0.8335	0.7779	0.6938	0.5822	0.4324	0.2963	0.3185	0.4897	0.6986	0.8347	0.8942 (89)		
MIT 2	17.0017	17.5366	18.1363	18.8278	19.3709	19.7433	19.8729	19.8634	19.6592	18.9853	17.9164	16.9189 (90)		
Living area fraction									fLA = Living area / (4) =					0.4559 (91)
MIT	17.6772	18.1655	18.7137	19.3479	19.8554	20.2120	20.3472	20.3352	20.1281	19.4877	18.5044	17.5994 (92)		
Temperature adjustment												0.0000		
adjusted MIT	17.6772	18.1655	18.7137	19.3479	19.8554	20.2120	20.3472	20.3352	20.1281	19.4877	18.5044	17.5994 (93)		

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8506	0.8007	0.7491	0.6752	0.5797	0.4510	0.3301	0.3511	0.5028	0.6821	0.8038	0.8624 (94)
Ext temp.	598.1998	676.3225	689.5333	653.9087	565.6627	424.6889	300.9544	312.7384	442.5936	550.2882	573.0797	573.8847 (95)
Heat loss rate W	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)
Space heating kWh	1177.2767	1164.0909	1068.7587	902.0567	702.3466	477.6055	318.9023	334.1624	515.3797	765.4094	987.1866	1166.0563 (97)
Space heating requirement - total per year (kWh/year)	430.8332	327.7803	282.1437	178.6665	101.6928	0.0000	0.0000	0.0000	0.0000	160.0501	298.1570	440.5757 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	430.8332	327.7803	282.1437	178.6665	101.6928	0.0000	0.0000	0.0000	0.0000	160.0501	298.1570	440.5757 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2219.8994
Space heating per m2												31.2354 (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)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
430.8332	327.7803	282.1437	178.6665	101.6928	0.0000	0.0000	0.0000	0.0000	0.0000	160.0501	298.1570	440.5757 (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)	466.7749	355.1250	305.6811	193.5715	110.1764	0.0000	0.0000	0.0000	0.0000	173.4021	323.0303	477.3301 (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	219.4442	194.0521	206.3486	182.1533	177.0057	159.9879	158.3684	164.4585	166.0181	184.5092	195.3945	217.1675 (64)
Efficiency of water heater (217)m	85.5442	85.2256	84.7618	84.0164	82.8645	79.8000	79.8000	79.8000	79.8000	83.7425	85.0046	79.8000 (216)
Fuel for water heating, kWh/month	256.5272	227.6921	243.4452	216.8067	213.6087	200.4861	198.4567	206.0884	208.0427	220.3294	229.8635	253.6647 (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	20.9439	16.8020	15.1283	11.0837	8.5613	6.9947	7.8099	10.1517	13.1860	17.3008	19.5412	21.5260 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												

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(233a)m	-19.0351	-28.1985	-42.5683	-50.3477	-56.4774	-53.5193	-52.8669	-48.8211	-42.0705	-33.3274	-21.4055	-16.3019	(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	-6.9800	-14.9951	-30.3920	-46.5213	-62.3756	-62.9881	-62.2467	-52.3076	-37.8226	-21.7283	-9.4097	-5.4967	(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												2405.0914	(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												2675.0113	(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)												169.0296	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-878.2032	(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												4456.9292	(238)

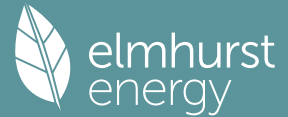
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2405.0914	0.2100	505.0692 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2675.0113	0.2100	561.7524 (264)
Space and water heating			1066.8216 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	169.0296	0.1443	24.3962 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-464.9396	0.1336	-62.0952
PV Unit electricity exported	-413.2636	0.1253	-51.8001
Total			-113.8953 (269)
Total CO2, kg/year			989.2517 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.9200 (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	2405.0914	1.1300	2717.7533 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2675.0113	1.1300	3022.7628 (278)
Space and water heating			5740.5161 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	169.0296	1.5338	259.2632 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-464.9396	1.4935	-694.4059
PV Unit electricity exported	-413.2636	0.4601	-190.1309
Total			-884.5368 (283)
Total Primary energy kWh/year			5245.3433 (286)
Target Primary Energy Rate (TPER)			73.8100 (287)

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Plot Reference	Plot 26				Issued on Date	22/12/2025	
Assessment Reference	Plot 26			Plot Type Ref			
Plot Address	Flat 10, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	76 C	DER	6.30	TER	13.92		
Environmental	95 A	% DER < TER				54.74	
CO ₂ Emissions (t/year)	0.4	DFEE	44.45	TFEE	38.29		
Compliance Check	See BREL	% DFEE < TFEE				-16.09	
% DPER < TPER	11.44	DPER	65.37	TPER	73.81		
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)	71.0700		
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	2.9800	(17)
Infiltration rate	0.1490	(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) =	0.1266 (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	0.1615	0.1583	0.1551	0.1393	0.1361	0.1203	0.1203	0.1172	0.1266	0.1361	0.1425	0.1488 (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	0.3015	0.2983	0.2951	0.2793	0.2761	0.2603	0.2603	0.2572	0.2666	0.2761	0.2825	0.2888 (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			2.7300	1.3258	3.6193		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	24.4600	25.0500	0.1300	3.2565	14.0000	350.7000 (29a)
Warm Sloping Roof	70.2900		70.2900	0.1200	8.4348	9.0000	632.6100 (30)
Flat Ceiling	10.3500		10.3500	0.1200	1.2420	9.0000	93.1500 (30)
Total net area of external elements Aum (A, m ²)			130.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.7535		(33)
Main dwelling							
Party Wall			52.6700	0.0000	0.0000	20.0000	1053.4000 (32)
Party Floor 1			71.0700			40.0000	2842.8000 (32d)
Internal Walls			140.7200			9.0000	1266.4800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6239.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							87.7887 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	10.2700	0.1690	1.7356
E3 Sill	8.3400	0.0070	0.0584
E4 Jamb	14.4600	0.0370	0.5350
E7 Party floor between dwellings (in blocks of flats)	13.6700	0.0370	0.5058
E16 Corner (normal)	2.5300	0.0890	0.2252
E18 Party wall between dwellings	5.0600	0.0310	0.1569
E11 Eaves (insulation at rafter level)	0.7400	0.1320	0.0977
E13 Gable (insulation at rafter level)	13.0400	0.0320	0.4173
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8200	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.1200	0.6072
R6 Flat ceiling	21.2800	0.0260	0.5533
E12 Gable (insulation at ceiling level)	1.9200	0.2500	0.4800
P5 Party wall - Roof (insulation at rafter level)	20.8200	0.1710	3.5602
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.9325 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss		(33) + (36) + (36a) =	52.6860 (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	23.6865	23.4378	23.1890	21.9452	21.6964	20.4526	20.4526	20.2038	20.9501	21.6964	22.1940	22.6915	(38)
Heat transfer coeff	76.3726	76.1238	75.8750	74.6312	74.3824	73.1386	73.1386	72.8898	73.6361	74.3824	74.8800	75.3775	(39)
Average = Sum(39)m / 12 =												74.5690	
HLP	1.0746	1.0711	1.0676	1.0501	1.0466	1.0291	1.0291	1.0256	1.0361	1.0466	1.0536	1.0606	(40)
HLP (average)												1.0492	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2718 (42)
Hot water usage for mixer showers													
62.3106	61.3742	60.0097	57.3989	55.4722	53.3236	52.1023	53.4565	54.9409	57.2479	59.9148	62.0719	62.0719	(42a)
Hot water usage for baths													
26.9188	26.5190	25.9561	24.9180	24.1408	23.2789	22.8134	23.3724	23.9811	24.9033	25.9627	26.8278	26.8278	(42b)
Hot water usage for other uses													
37.8957	36.5177	35.1396	33.7616	32.3836	31.0056	31.0056	32.3836	33.7616	35.1396	36.5177	37.8957	37.8957	(42c)
Average daily hot water use (litres/day)													116.8569 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.1251	124.4109	121.1054	116.0785	111.9966	107.6080	105.9212	109.2125	112.6837	117.2909	122.3952	126.7954	(44)
Energy conte	201.3351	177.1595	186.1344	158.9057	150.7689	132.3166	128.1025	135.2279	138.9502	159.1626	174.3744	198.5309	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
30.2003	26.5739	27.9202	23.8359	22.6153	19.8475	19.2154	20.2842	20.8425	23.8744	26.1562	29.7796	29.7796	(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	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823	225.4823	(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													
228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823	225.4823	(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
66.9439	58.9055	61.8897	52.8361	50.1307	43.9953	42.5941	44.9633	46.2009	52.9216	57.9795	66.0115	66.0115	(65)

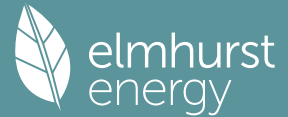
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
21.7872	19.3512	15.7375	11.9143	8.9061	7.5189	8.1244	10.5604	14.1742	17.9974	21.0056	22.3928	22.3928	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
298.1812	301.2753	293.4781	276.8787	255.9249	236.2313	223.0747	219.9805	227.7778	244.3772	265.3310	285.0246	285.0246	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	(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)													
-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	(71)
Water heating gains (Table 5)													
89.9784	87.6570	83.1851	73.3835	67.3799	61.1046	57.2501	60.4345	64.1680	71.1311	80.5270	88.7252	88.7252	(72)
Total internal gains													
506.2859	504.6227	488.7397	458.5156	428.5500	401.1938	384.7884	387.3146	402.4590	429.8448	463.2027	492.4817	492.4817	(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	2.7300	10.6334	0.4000	0.0000	0.7700	8.9410 (74)

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South	19.6100		46.7521		0.3500		0.7000		0.7700		155.6602 (78)	
Solar gains	164.6012	272.0180	353.7718	413.6604	445.2854	435.3220	422.4150	399.0613	374.1353	295.3069	195.5403	141.9584 (83)
Total gains	670.8871	776.6407	842.5115	872.1760	873.8353	836.5158	807.2033	786.3759	776.5943	725.1517	658.7431	634.4401 (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	22.6926	22.7668	22.8414	23.2221	23.2998	23.6960	23.6960	23.7769	23.5359	23.2998	23.1450	22.9922
alpha	2.5128	2.5178	2.5228	2.5481	2.5533	2.5797	2.5797	2.5851	2.5691	2.5533	2.5430	2.5328
util living area												
	0.8946	0.8546	0.8040	0.7305	0.6306	0.4966	0.3755	0.3980	0.5567	0.7414	0.8570	0.9051 (86)
MIT	18.8483	19.2072	19.6489	20.1447	20.5467	20.8291	20.9392	20.9276	20.7551	20.2399	19.4699	18.7825 (87)
Th 2	20.0216	20.0245	20.0274	20.0418	20.0447	20.0591	20.0591	20.0620	20.0534	20.0447	20.0389	20.0331 (88)
util rest of house												
	0.8826	0.8389	0.7828	0.7008	0.5882	0.4375	0.3025	0.3254	0.4995	0.7071	0.8389	0.8941 (89)
MIT 2	17.5331	17.9780	18.5230	19.1325	19.6035	19.9204	20.0223	20.0161	19.8438	19.2602	18.3231	17.4587 (90)
Living area fraction									fLA = Living area /	(4) =		0.4559 (91)
MIT	18.1327	18.5384	19.0363	19.5939	20.0335	20.3347	20.4403	20.4317	20.2592	19.7069	18.8459	18.0622 (92)
Temperature adjustment												0.0000
adjusted MIT	18.1327	18.5384	19.0363	19.5939	20.0335	20.3347	20.4403	20.4317	20.2592	19.7069	18.8459	18.0622 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8537	0.8104	0.7581	0.6856	0.5876	0.4554	0.3327	0.3548	0.5125	0.6937	0.8122	0.8660 (94)
Useful gains	572.7449	629.3862	638.7166	597.9779	513.5023	380.9417	268.5703	278.9808	398.0136	503.0280	535.0288	549.4197 (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												
	1056.4394	1038.2044	951.1915	798.0993	619.8647	419.4265	280.8757	293.8668	453.5406	677.3902	879.5344	1044.8982 (97)
Space heating kWh												
	359.8687	274.7258	232.4813	144.0874	79.1336	0.0000	0.0000	0.0000	0.0000	129.7255	248.0440	368.6360 (98a)
Space heating requirement - total per year (kWh/year)												1836.7023
Solar heating kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh												
	359.8687	274.7258	232.4813	144.0874	79.1336	0.0000	0.0000	0.0000	0.0000	129.7255	248.0440	368.6360 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1836.7023
Space heating per m2										(98c) / (4) =		25.8436 (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												
	359.8687	274.7258	232.4813	144.0874	79.1336	0.0000	0.0000	0.0000	0.0000	129.7255	248.0440	368.6360 (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)												
	359.8687	274.7258	232.4813	144.0874	79.1336	0.0000	0.0000	0.0000	0.0000	129.7255	248.0440	368.6360 (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												
	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823 (64)
Efficiency of water heater (217)m												344.1353 (216)
	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353 (217)
Fuel for water heating, kWh/month												
	66.3363	58.5533	61.9192	53.7544	51.6426	46.0280	45.0561	47.1266	47.9556	54.0816	58.2493	65.5214 (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												
	20.7224	18.7170	20.7224	20.0539	20.7224	20.0539	20.7224	20.7224	20.0539	20.7224	20.0539	20.7224 (231)
Lighting												
	19.0702	15.2988	13.7749	10.0921	7.7954	6.3689	7.1112	9.2435	12.0063	15.7530	17.7930	19.6002 (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												1836.7023 (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	344.1353	
Water heating fuel used	656.2244	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)		
mechanical ventilation fans (SFP = 0.8400)	243.9890	(230a)
Total electricity for the above, kWh/year	243.9890	(231)
Electricity for lighting (calculated in Appendix L)	153.9076	(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	2890.8233	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price £/kWh	Fuel cost £/year	
Space heating - main system 1	1836.7023	16.4900	302.8722	(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)	656.2244	16.4900	108.2114	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	243.9890	16.4900	40.2338	(249)
Energy for lighting	153.9076	16.4900	25.3794	(250)
Additional standing charges			0.0000	(251)
Total energy cost			476.6968	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.4785 (257)
SAP value	76.0333	
SAP rating (Section 12)	76	(258)
SAP band	C	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1836.7023	0.1549	284.4195	(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)	656.2244	0.1412	92.6428	(264)
Space and water heating			377.0622	(265)
Pumps, fans and electric keep-hot	243.9890	0.1387	33.8443	(267)
Energy for lighting	153.9076	0.1443	22.2136	(268)
Total CO2, kg/year			433.1201	(272)
CO2 emissions per m2			6.0900	(273)
EI value			94.9997	
EI rating			95	(274)
EI band			A	

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

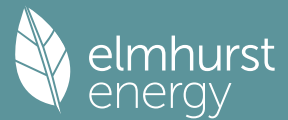
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	71.0700 (1b)	x 3.3500 (2b)	= 238.0845 (1b) - (3b)	
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	238.0845 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)

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Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												2.9800 (17)
Infiltration rate												0.1490 (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) = 0.1266 (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)
	0.1361	0.1330	0.1330	0.1235	0.1266	0.1077	0.1045	0.1045	0.1077	0.1203	0.1203	0.1235 (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	0.2761	0.2730	0.2730	0.2635	0.2666	0.2477	0.2445	0.2445	0.2477	0.2603	0.2603	0.2635 (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			2.7300	1.3258	3.6193		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	24.4600	25.0500	0.1300	3.2565	14.0000	350.7000 (29a)
Warm Sloping Roof	70.2900		70.2900	0.1200	8.4348	9.0000	632.6100 (30)
Flat Ceiling	10.3500		10.3500	0.1200	1.2420	9.0000	93.1500 (30)
Total net area of external elements Aum(A, m2)			130.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.7535		(33)
Main dwelling							
Party Wall			52.6700	0.0000	0.0000	20.0000	1053.4000 (32)
Party Floor 1			71.0700			40.0000	2842.8000 (32d)
Internal Walls			140.7200			9.0000	1266.4800 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	6239.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		87.7887 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	10.2700	0.1690	1.7356
E2 Other lintels (including other steel lintels)	8.3400	0.0070	0.0584
E3 Sill	14.4600	0.0370	0.5350
E4 Jamb	13.6700	0.0370	0.5058
E7 Party floor between dwellings (in blocks of flats)	2.5300	0.0890	0.2252
E16 Corner (normal)	5.0600	0.0310	0.1569
E18 Party wall between dwellings	0.7400	0.1320	0.0977
E11 Eaves (insulation at rafter level)	13.0400	0.0320	0.4173
E13 Gable (insulation at rafter level)	20.8200	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0600	0.1200	0.6072
E25 Staggered party wall between dwellings	21.2800	0.0260	0.5533
R6 Flat ceiling	1.9200	0.2500	0.4800
E12 Gable (insulation at ceiling level)	20.8200	0.1710	3.5602
P5 Party wall - Roof (insulation at rafter level)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		8.9325 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	52.6860 (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	21.6964	21.4477	21.4477	20.7014	20.9501	19.4575	19.2088	19.2088	19.4575	20.4526	20.4526	20.7014 (38)
Average = Sum(39)m / 12 =	74.3824	74.1337	74.1337	73.3874	73.6361	72.1436	71.8948	71.8948	72.1436	73.1386	73.1386	73.3874 (39)

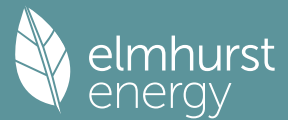
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0466	1.0431	1.0431	1.0326	1.0361	1.0151	1.0116	1.0116	1.0151	1.0291	1.0291	1.0326 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2718 (42)
Hot water usage for mixer showers												
	62.3106	61.3742	60.0097	57.3989	55.4722	53.3236	52.1023	53.4565	54.9409	57.2479	59.9148	62.0719 (42a)
Hot water usage for baths												
	26.9188	26.5190	25.9561	24.9180	24.1408	23.2789	22.8134	23.3724	23.9811	24.9033	25.9627	26.8278 (42b)
Hot water usage for other uses												
	37.8957	36.5177	35.1396	33.7616	32.3836	31.0056	31.0056	32.3836	33.7616	35.1396	36.5177	37.8957 (42c)
Average daily hot water use (litres/day)												116.8569 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	127.1251	124.4109	121.1054	116.0785	111.9966	107.6080	105.9212	109.2125	112.6837	117.2909	122.3952	126.7954 (44)
Energy conte	201.3351	177.1595	186.1344	158.9057	150.7689	132.3166	128.1025	135.2279	138.9502	159.1626	174.3744	198.5309 (45)
Energy content (annual)										Total = Sum(45)m =		1940.9688
Distribution loss (46)m = 0.15 x (45)m												
	30.2003	26.5739	27.9202	23.8359	22.6153	19.8475	19.2154	20.2842	20.8425	23.8744	26.1562	29.7796 (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												
	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823 (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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823 (64)
Total per year (kWh/year) = Sum(64)m =												2258.2998 (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	66.9439	58.9055	61.8897	52.8361	50.1307	43.9953	42.5941	44.9633	46.2009	52.9216	57.9795	66.0115 (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	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.7872	19.3512	15.7375	11.9143	8.9061	7.5189	8.1244	10.5604	14.1742	17.9974	21.0056	22.3928	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	298.1812	301.2753	293.4781	276.8787	255.9249	236.2313	223.0747	219.9805	227.7778	244.3772	265.3310	285.0246	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	(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)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	(71)
Water heating gains (Table 5)	89.9784	87.6570	83.1851	73.3835	67.3799	61.1046	57.2501	60.4345	64.1680	71.1311	80.5270	88.7252	(72)
Total internal gains	506.2859	504.6227	488.7397	458.5156	428.5500	401.1938	384.7884	387.3146	402.4590	429.8448	463.2027	492.4817	(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					2.7300	9.3942	0.4000	0.0000			0.7700			7.8990 (74)
South					19.6100	41.2355	0.3500	0.7000			0.7700			137.2930 (78)
Solar gains	145.1921	246.1159	334.4320	398.9902	419.0947	419.5293	397.2516	370.3734	363.4438	281.0753	177.2514			128.0747 (83)
Total gains	651.4779	750.7386	823.1718	857.5058	847.6447	820.7231	782.0400	757.6880	765.9028	710.9201	640.4541			620.5564 (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	23.2998	23.3780	23.3780	23.6157	23.5359	24.0229	24.1060	24.1060	24.0229	23.6960	23.6960	23.6157	
alpha	2.5533	2.5585	2.5585	2.5744	2.5691	2.6015	2.6071	2.6071	2.6015	2.5797	2.5797	2.5744	
util living area	0.8874	0.8455	0.7875	0.7015	0.5854	0.4294	0.3264	0.3521	0.5202	0.7199	0.8464	0.8983	(86)
MIT	19.0764	19.4127	19.8387	20.3099	20.6757	20.9025	20.9648	20.9556	20.8170	20.3589	19.6506	19.0023	(87)
Th 2	20.0447	20.0476	20.0476	20.0562	20.0534	20.0708	20.0737	20.0737	20.0708	20.0591	20.0591	20.0562	(88)
util rest of house	0.8741	0.8283	0.7640	0.6681	0.5366	0.3639	0.2496	0.2746	0.4594	0.6822	0.8264	0.8863	(89)
MIT 2	17.8343	18.2495	18.7699	19.3396	19.7549	20.0011	20.0559	20.0497	19.9219	19.4114	18.5608	17.7497	(90)
Living area fraction	fLA = Living area / (4) =												0.4559 (91)
MIT	18.4006	18.7798	19.2572	19.7820	20.1747	20.4120	20.4703	20.4627	20.3300	19.8434	19.0576	18.3208	(92)
Temperature adjustment													0.0000
adjusted MIT	18.4006	18.7798	19.2572	19.7820	20.1747	20.4120	20.4703	20.4627	20.3300	19.8434	19.0576	18.3208	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	551.2335	601.6625	610.9234	563.9138	460.4089	318.9582	221.3580	233.2423	365.3790	478.2677	513.2687	532.9534	(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	(96)
Heat loss rate W	981.8906	962.2399	879.0152	725.2112	535.6812	339.9408	227.9249	241.7576	406.1651	624.8493	816.0515	977.5759	(97)
Space heating kWh	320.4089	242.3080	199.4603	116.1341	56.0026	0.0000	0.0000	0.0000	0.0000	109.0567	218.0036	330.7991	(98a)
Space heating requirement - total per year (kWh/year)													1592.1733
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	320.4089	242.3080	199.4603	116.1341	56.0026	0.0000	0.0000	0.0000	0.0000	109.0567	218.0036	330.7991	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													1592.1733
Space heating per m2													(98c) / (4) = 22.4029 (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	320.4089	242.3080	199.4603	116.1341	56.0026	0.0000	0.0000	0.0000	0.0000	109.0567	218.0036	330.7991 (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)	320.4089	242.3080	199.4603	116.1341	56.0026	0.0000	0.0000	0.0000	0.0000	109.0567	218.0036	330.7991 (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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823 (64)
Efficiency of water heater (217)m	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353 (216)
Fuel for water heating, kWh/month	66.3363	58.5533	61.9192	53.7544	51.6426	46.0280	45.0561	47.1266	47.9556	54.0816	58.2493	65.5214 (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	20.7224	18.7170	20.7224	20.0539	20.7224	20.0539	20.7224	20.7224	20.0539	20.7224	20.0539	20.7224 (231)
Lighting	19.0702	15.2988	13.7749	10.0921	7.7954	6.3689	7.1112	9.2435	12.0063	15.7530	17.7930	19.6002 (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												1592.1733 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1353
Water heating fuel used												656.2244 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												243.9890 (230a)
Total electricity for the above, kWh/year												243.9890 (231)
Electricity for lighting (calculated in Appendix L)												153.9076 (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												2646.2943 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1592.1733	28.4300	452.6549 (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)	656.2244	28.4300	186.5646 (247)	
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)	
Pumps, fans and electric keep-hot	243.9890	28.4300	69.3661 (249)	
Energy for lighting	153.9076	28.4300	43.7559 (250)	
Additional standing charges			0.0000 (251)	
Total energy cost			752.3415 (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	1592.1733	0.1552	247.1834 (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)	656.2244	0.1412	92.6428 (264)	
Space and water heating			339.8261 (265)	
Pumps, fans and electric keep-hot	243.9890	0.1387	33.8443 (267)	
Energy for lighting	153.9076	0.1443	22.2136 (268)	
Total CO2, kg/year			395.8841 (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	1592.1733	1.5748	2507.2792 (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)	656.2244	1.5220	998.7926 (278)	
Space and water heating			3506.0718 (279)	
Pumps, fans and electric keep-hot	243.9890	1.5128	369.1065 (281)	

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Energy for lighting
Total Primary energy kWh/year

153.9076

1.5338

236.0687 (282)
4111.2471 (286)

SAP 10 EPC IMPROVEMENTS

Plot 26

Current energy efficiency rating: C 76
Current environmental impact rating: A 95

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

Recommended measures: 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: C 76
Potential environmental impact rating: A 95

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 £752	Potential £752	Saving £0
Electricity			
Space heating	£522	£522	£0
Water heating	£187	£187	£0
Lighting	£44	£44	£0
Total cost of fuels	£752	£752	£0
Total cost of uses	£753	£753	£0
Delivered energy	37 kWh/m ²	37 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.4 tonnes	0.4 tonnes	0.0 tonnes
CO2 emissions per m ²	6 kg/m ²	6 kg/m ²	0 kg/m ²
Primary energy	58 kWh/m ²	58 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	71.0700 (1b)	x 3.3500 (2b)	= 238.0845 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	238.0845 (5)

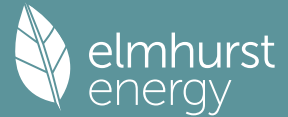
2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 2.9800 (17)
Infiltration rate 0.1490 (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) = 0.1266 (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	0.1615	0.1583	0.1551	0.1393	0.1361	0.1203	0.1203	0.1172	0.1266	0.1361	0.1425	0.1488 (22b)
Balanced mechanical ventilation with heat recovery												

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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	0.3015	0.2983	0.2951	0.2793	0.2761	0.2603	0.2603	0.2572	0.2666	0.2761	0.2825	0.2888 (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			2.7300	1.3258	3.6193		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	24.4600	25.0500	0.1300	3.2565	14.0000	350.7000 (29a)
Warm Sloping Roof	70.2900		70.2900	0.1200	8.4348	9.0000	632.6100 (30)
Flat Ceiling	10.3500		10.3500	0.1200	1.2420	9.0000	93.1500 (30)
Total net area of external elements Aum(A, m2)			130.1500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		43.7535		(33)
Main dwelling							
Party Wall			52.6700	0.0000	0.0000	20.0000	1053.4000 (32)
Party Floor 1			71.0700			40.0000	2842.8000 (32d)
Internal Walls			140.7200			9.0000	1266.4800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6239.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							87.7887 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.2700	0.1690	1.7356
E3 Sill	8.3400	0.0070	0.0584
E4 Jamb	14.4600	0.0370	0.5350
E7 Party floor between dwellings (in blocks of flats)	13.6700	0.0370	0.5058
E16 Corner (normal)	2.5300	0.0890	0.2252
E18 Party wall between dwellings	5.0600	0.0310	0.1569
E11 Eaves (insulation at rafter level)	0.7400	0.1320	0.0977
E13 Gable (insulation at rafter level)	13.0400	0.0320	0.4173
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8200	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.1200	0.6072
R6 Flat ceiling	21.2800	0.0260	0.5533
E12 Gable (insulation at ceiling level)	1.9200	0.2500	0.4800
P5 Party wall - Roof (insulation at rafter level)	20.8200	0.1710	3.5602
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.9325 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 52.6860 (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	23.6865	23.4378	23.1890	21.9452	21.6964	20.4526	20.4526	20.2038	20.9501	21.6964	22.1940	22.6915 (38)
Average = Sum(39)m / 12 =	76.3726	76.1238	75.8750	74.6312	74.3824	73.1386	73.1386	72.8898	73.6361	74.3824	74.8800	75.3775 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0746	1.0711	1.0676	1.0501	1.0466	1.0291	1.0291	1.0256	1.0361	1.0466	1.0536	1.0606 (40)
HLP (average)												1.0492
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2718 (42)

Hot water usage for mixer showers

62.3106	61.3742	60.0097	57.3989	55.4722	53.3236	52.1023	53.4565	54.9409	57.2479	59.9148	62.0719 (42a)
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Hot water usage for baths

26.9188	26.5190	25.9561	24.9180	24.1408	23.2789	22.8134	23.3724	23.9811	24.9033	25.9627	26.8278 (42b)
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Hot water usage for other uses

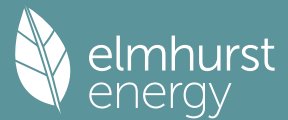
37.8957	36.5177	35.1396	33.7616	32.3836	31.0056	31.0056	32.3836	33.7616	35.1396	36.5177	37.8957 (42c)
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Average daily hot water use (litres/day)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	127.1251	124.4109	121.1054	116.0785	111.9966	107.6080	105.9212	109.2125	112.6837	117.2909	122.3952	126.7954 (44)
Energy conte	201.3351	177.1595	186.1344	158.9057	150.7689	132.3166	128.1025	135.2279	138.9502	159.1626	174.3744	198.5309 (45)
Energy content (annual)										Total = Sum(45)m =		1940.9688
Distribution loss (46)m = 0.15 x (45)m	30.2003	26.5739	27.9202	23.8359	22.6153	19.8475	19.2154	20.2842	20.8425	23.8744	26.1562	29.7796 (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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823 (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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823 (64)
								Total per year (kWh/year) = Sum(64)m =				2258.2998 (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	66.9439	58.9055	61.8897	52.8361	50.1307	43.9953	42.5941	44.9633	46.2009	52.9216	57.9795	66.0115 (65)

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

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Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	21.7872	19.3512	15.7375	11.9143	8.9061	7.5189	8.1244	10.5604	14.1742	17.9974	21.0056	22.3928 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	298.1812	301.2753	293.4781	276.8787	255.9249	236.2313	223.0747	219.9805	227.7778	244.3772	265.3310	285.0246 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027 (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)												
	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728 (71)
Water heating gains (Table 5)												
	89.9784	87.6570	83.1851	73.3835	67.3799	61.1046	57.2501	60.4345	64.1680	71.1311	80.5270	88.7252 (72)
Total internal gains												
	506.2859	504.6227	488.7397	458.5156	428.5500	401.1938	384.7884	387.3146	402.4590	429.8448	463.2027	492.4817 (73)

6. Solar gains

[Jan]												Gains
	Area				Solar flux		g	FF		Access	Gains	
	m2				Table 6a		Specific data	Specific data		factor	W	
					W/m2		or Table 6b	or Table 6c		Table 6d		
North	2.7300				10.6334		0.4000	0.0000		0.7700	8.9410 (74)	
South	19.6100				46.7521		0.3500	0.7000		0.7700	155.6602 (78)	
Solar gains	164.6012	272.0180	353.7718	413.6604	445.2854	435.3220	422.4150	399.0613	374.1353	295.3069	195.5403	141.9584 (83)
Total gains	670.8871	776.6407	842.5115	872.1760	873.8353	836.5158	807.2033	786.3759	776.5943	725.1517	658.7431	634.4401 (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	22.6926	22.7668	22.8414	23.2221	23.2998	23.6960	23.6960	23.7769	23.5359	23.2998	23.1450	22.9922
alpha	2.5128	2.5178	2.5228	2.5481	2.5533	2.5797	2.5797	2.5851	2.5691	2.5533	2.5430	2.5328
util living area												
	0.8946	0.8546	0.8040	0.7305	0.6306	0.4966	0.3755	0.3980	0.5567	0.7414	0.8570	0.9051 (86)
MIT												
	18.8483	19.2072	19.6489	20.1447	20.5467	20.8291	20.9392	20.9276	20.7551	20.2399	19.4699	18.7825 (87)
Th 2												
	20.0216	20.0245	20.0274	20.0418	20.0447	20.0591	20.0591	20.0620	20.0534	20.0447	20.0389	20.0331 (88)
util rest of house												
	0.8826	0.8389	0.7828	0.7008	0.5882	0.4375	0.3025	0.3254	0.4995	0.7071	0.8389	0.8941 (89)
MIT 2												
	17.5331	17.9780	18.5230	19.1325	19.6035	19.9204	20.0223	20.0161	19.8438	19.2602	18.3231	17.4587 (90)
Living area fraction												
	18.1327	18.5384	19.0363	19.5939	20.0335	20.3347	20.4403	20.4317	20.2592	19.7069	18.8459	18.0622 (92)
MIT												
	18.1327	18.5384	19.0363	19.5939	20.0335	20.3347	20.4403	20.4317	20.2592	19.7069	18.8459	18.0622 (93)
Temperature adjustment												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
adjusted MIT												
	18.1327	18.5384	19.0363	19.5939	20.0335	20.3347	20.4403	20.4317	20.2592	19.7069	18.8459	18.0622 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8537	0.8104	0.7581	0.6856	0.5876	0.4554	0.3327	0.3548	0.5125	0.6937	0.8122	0.8660 (94)
Useful gains	572.7449	629.3862	638.7166	597.9779	513.5023	380.9417	268.5703	278.9808	398.0136	503.0280	535.0288	549.4197 (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												
	1056.4394	1038.2044	951.1915	798.0993	619.8647	419.4265	280.8757	293.8668	453.5406	677.3902	879.5344	1044.8982 (97)
Space heating kWh												
	359.8687	274.7258	232.4813	144.0874	79.1336	0.0000	0.0000	0.0000	0.0000	129.7255	248.0440	368.6360 (98a)
Space heating requirement - total per year (kWh/year)												1836.7023
Solar heating kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh												
	359.8687	274.7258	232.4813	144.0874	79.1336	0.0000	0.0000	0.0000	0.0000	129.7255	248.0440	368.6360 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1836.7023
Space heating per m ²												(98c) / (4) = 25.8436 (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												
	359.8687	274.7258	232.4813	144.0874	79.1336	0.0000	0.0000	0.0000	0.0000	129.7255	248.0440	368.6360 (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)												
	359.8687	274.7258	232.4813	144.0874	79.1336	0.0000	0.0000	0.0000	0.0000	129.7255	248.0440	368.6360 (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

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Efficiency of water heater	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823	(64)
(217)m	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	(216)
Fuel for water heating, kWh/month	66.3363	58.5533	61.9192	53.7544	51.6426	46.0280	45.0561	47.1266	47.9556	54.0816	58.2493	65.5214	(217)
Space cooling fuel requirement													(219)
(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	20.7224	18.7170	20.7224	20.0539	20.7224	20.0539	20.7224	20.7224	20.0539	20.7224	20.0539	20.7224	(231)
Lighting	19.0702	15.2988	13.7749	10.0921	7.7954	6.3689	7.1112	9.2435	12.0063	15.7530	17.7930	19.6002	(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												1836.7023	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1353	
Water heating fuel used												656.2244	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												243.9890	(230a)
Total electricity for the above, kWh/year												243.9890	(231)
Electricity for lighting (calculated in Appendix L)												153.9076	(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												2890.8233	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1836.7023	16.4900	302.8722 (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)	656.2244	16.4900	108.2114 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	243.9890	16.4900	40.2338 (249)
Energy for lighting	153.9076	16.4900	25.3794 (250)
Additional standing charges			0.0000 (251)
Total energy cost			476.6968 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.4785 (257)
SAP value	76.0333
SAP rating (Section 12)	76 (258)
SAP band	C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1836.7023	0.1549	284.4195 (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)	656.2244	0.1412	92.6428 (264)
Space and water heating			377.0622 (265)
Pumps, fans and electric keep-hot	243.9890	0.1387	33.8443 (267)
Energy for lighting	153.9076	0.1443	22.2136 (268)
Total CO2, kg/year			433.1201 (272)
CO2 emissions per m2			6.0900 (273)
EI value			94.9997
EI rating			95 (274)
EI band			A

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1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	71.0700	3.3500	238.0845
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.0700		238.0845
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		2.9800 (17)
Infiltration rate		0.1490 (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) =	0.1266 (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	0.1361	0.1330	0.1330	0.1235	0.1266	0.1077	0.1045	0.1045	0.1077	0.1203	0.1203	0.1235 (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	0.2761	0.2730	0.2730	0.2635	0.2666	0.2477	0.2445	0.2445	0.2477	0.2603	0.2603	0.2635 (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			2.7300	1.3258	3.6193		(27)
Window S/W			19.6100	1.2357	24.2329		(27)
Door			2.1200	1.4000	2.9680		(26)
EXT Wall	49.5100	24.4600	25.0500	0.1300	3.2565	14.0000	350.7000 (29a)
Warm Sloping Roof	70.2900		70.2900	0.1200	8.4348	9.0000	632.6100 (30)
Flat Ceiling	10.3500		10.3500	0.1200	1.2420	9.0000	93.1500 (30)
Total net area of external elements Aum(A, m ²)			130.1500				(31)
Fabric heat loss, W/K = Sum (A x U)					43.7535		(33)
Main dwelling							
Party Wall			52.6700	0.0000	0.0000	20.0000	1053.4000 (32)
Party Floor 1			71.0700			40.0000	2842.8000 (32d)
Internal Walls			140.7200			9.0000	1266.4800 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	6239.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		87.7887 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.2700	0.1690	1.7356
E3 Sill	8.3400	0.0070	0.0584
E4 Jamb	14.4600	0.0370	0.5350
E7 Party floor between dwellings (in blocks of flats)	13.6700	0.0370	0.5058
E16 Corner (normal)	2.5300	0.0890	0.2252
E18 Party wall between dwellings	5.0600	0.0310	0.1569
E11 Eaves (insulation at rafter level)	0.7400	0.1320	0.0977
E13 Gable (insulation at rafter level)	13.0400	0.0320	0.4173
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	20.8200	0.0000	0.0000
E25 Staggered party wall between dwellings	5.0600	0.1200	0.6072
R6 Flat ceiling	21.2800	0.0260	0.5533
E12 Gable (insulation at ceiling level)	1.9200	0.2500	0.4800
P5 Party wall - Roof (insulation at rafter level)	20.8200	0.1710	3.5602

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		8.9325 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	52.6860 (37)

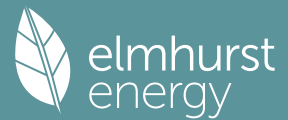
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	21.6964	21.4477	21.4477	20.7014	20.9501	19.4575	19.2088	19.2088	19.4575	20.4526	20.4526	20.7014 (38)
Average = Sum(39)m / 12 =	74.3824	74.1337	74.1337	73.3874	73.6361	72.1436	71.8948	71.8948	72.1436	73.1386	73.1386	73.3874 (39)
												73.1179

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0466	1.0431	1.0431	1.0326	1.0361	1.0151	1.0116	1.0116	1.0151	1.0291	1.0291	1.0326 (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	2.2718 (42)
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Hot water usage for mixer showers	62.3106	61.3742	60.0097	57.3989	55.4722	53.3236	52.1023	53.4565	54.9409	57.2479	59.9148	62.0719 (42a)
Hot water usage for baths	26.9188	26.5190	25.9561	24.9180	24.1408	23.2789	22.8134	23.3724	23.9811	24.9033	25.9627	26.8278 (42b)
Hot water usage for other uses	37.8957	36.5177	35.1396	33.7616	32.3836	31.0056	31.0056	32.3836	33.7616	35.1396	36.5177	37.8957 (42c)
Average daily hot water use (litres/day)												116.8569 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.1251	124.4109	121.1054	116.0785	111.9966	107.6080	105.9212	109.2125	112.6837	117.2909	122.3952	126.7954	(44)
Energy content (annual)	201.3351	177.1595	186.1344	158.9057	150.7689	132.3166	128.1025	135.2279	138.9502	159.1626	174.3744	198.5309	(45)
Distribution loss (46)m = 0.15 x (45)m	30.2003	26.5739	27.9202	23.8359	22.6153	19.8475	19.2154	20.2842	20.8425	23.8744	26.1562	29.7796	(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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823	(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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823	(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	66.9439	58.9055	61.8897	52.8361	50.1307	43.9953	42.5941	44.9633	46.2009	52.9216	57.9795	66.0115	(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	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	136.3091	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.7872	19.3512	15.7375	11.9143	8.9061	7.5189	8.1244	10.5604	14.1742	17.9974	21.0056	22.3928	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	298.1812	301.2753	293.4781	276.8787	255.9249	236.2313	223.0747	219.9805	227.7778	244.3772	265.3310	285.0246	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	50.9027	(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)	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	-90.8728	(71)
Water heating gains (Table 5)	89.9784	87.6570	83.1851	73.3835	67.3799	61.1046	57.2501	60.4345	64.1680	71.1311	80.5270	88.7252	(72)
Total internal gains	506.2859	504.6227	488.7397	458.5156	428.5500	401.1938	384.7884	387.3146	402.4590	429.8448	463.2027	492.4817	(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						2.7300	9.3942	0.4000	0.0000			0.7700			7.8990 (74)
South						19.6100	41.2355	0.3500	0.7000			0.7700			137.2930 (78)
Solar gains	145.1921	246.1159	334.4320	398.9902	419.0947	419.5293	397.2516	370.3734	363.4438	281.0753	177.2514	128.0747	(83)		
Total gains	651.4779	750.7386	823.1718	857.5058	847.6447	820.7231	782.0400	757.6880	765.9028	710.9201	640.4541	620.5564	(84)		

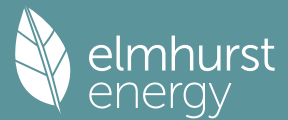
7. Mean internal temperature (heating season)

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	23.2998	23.3780	23.3780	23.6157	23.5359	24.0229	24.1060	24.1060	24.0229	23.6960	23.6960	23.6157	
alpha	2.5533	2.5585	2.5585	2.5744	2.5691	2.6015	2.6071	2.6071	2.6015	2.5797	2.5797	2.5744	
util living area	0.8874	0.8455	0.7875	0.7015	0.5854	0.4294	0.3264	0.3521	0.5202	0.7199	0.8464	0.8983 (86)	
MIT	19.0764	19.4127	19.8387	20.3099	20.6757	20.9025	20.9648	20.9556	20.8170	20.3589	19.6506	19.0023 (87)	
Th 2	20.0447	20.0476	20.0476	20.0562	20.0534	20.0708	20.0737	20.0737	20.0708	20.0591	20.0591	20.0562 (88)	
util rest of house	0.8741	0.8283	0.7640	0.6681	0.5366	0.3639	0.2496	0.2746	0.4594	0.6822	0.8264	0.8863 (89)	
MIT 2	17.8343	18.2495	18.7699	19.3396	19.7549	20.0011	20.0559	20.0497	19.9219	19.4114	18.5608	17.7497 (90)	
Living area fraction									FLA = Living area / (4) =				0.4559 (91)
MIT	18.4006	18.7798	19.2572	19.7820	20.1747	20.4120	20.4703	20.4627	20.3300	19.8434	19.0576	18.3208 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.4006	18.7798	19.2572	19.7820	20.1747	20.4120	20.4703	20.4627	20.3300	19.8434	19.0576	18.3208 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8461	0.8014	0.7422	0.6576	0.5432	0.3886	0.2831	0.3078	0.4771	0.6727	0.8014	0.8588 (94)
Useful gains	551.2335	601.6625	610.9234	563.9138	460.4089	318.9582	221.3580	233.2423	365.3790	478.2677	513.2687	532.9534 (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	981.8906	962.2399	879.0152	725.2112	535.6812	339.9408	227.9249	241.7576	406.1651	624.8493	816.0515	977.5759 (97)
Space heating kWh	320.4089	242.3080	199.4603	116.1341	56.0026	0.0000	0.0000	0.0000	0.0000	109.0567	218.0036	330.7991 (98a)
Space heating requirement - total per year (kWh/year)												1592.1733
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	320.4089	242.3080	199.4603	116.1341	56.0026	0.0000	0.0000	0.0000	0.0000	109.0567	218.0036	330.7991 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1592.1733
Space heating per m2										(98c) / (4) =		22.4029 (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	320.4089	242.3080	199.4603	116.1341	56.0026	0.0000	0.0000	0.0000	0.0000	109.0567	218.0036	330.7991 (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)	320.4089	242.3080	199.4603	116.1341	56.0026	0.0000	0.0000	0.0000	0.0000	109.0567	218.0036	330.7991 (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	228.2865	201.5027	213.0858	184.9877	177.7203	158.3986	155.0539	162.1793	165.0322	186.1140	200.4564	225.4823 (64)
Efficiency of water heater (217)m	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353	344.1353 (216)
Fuel for water heating, kWh/month	66.3363	58.5533	61.9192	53.7544	51.6426	46.0280	45.0561	47.1266	47.9556	54.0816	58.2493	65.5214 (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	20.7224	18.7170	20.7224	20.0539	20.7224	20.0539	20.7224	20.7224	20.0539	20.7224	20.0539	20.7224 (231)
Lighting	19.0702	15.2988	13.7749	10.0921	7.7954	6.3689	7.1112	9.2435	12.0063	15.7530	17.7930	19.6002 (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												1592.1733 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1353
Water heating fuel used												656.2244 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
Mechanical ventilation fans (SFP = 0.8400)												243.9890 (230a)
Total electricity for the above, kWh/year												243.9890 (231)
Electricity for lighting (calculated in Appendix L)												153.9076 (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												2646.2943 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1592.1733	28.4300	452.6549 (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)	656.2244	28.4300	186.5646 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	243.9890	28.4300	69.3661 (249)
Energy for lighting	153.9076	28.4300	43.7559 (250)
Additional standing charges			0.0000 (251)
Total energy cost			752.3415 (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	1592.1733	0.1552	247.1834 (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)	656.2244	0.1412	92.6428 (264)
Space and water heating			339.8261 (265)
Pumps, fans and electric keep-hot	243.9890	0.1387	33.8443 (267)
Energy for lighting	153.9076	0.1443	22.2136 (268)
Total CO2, kg/year			395.8841 (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	1592.1733	1.5748	2507.2792 (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)	656.2244	1.5220	998.7926 (278)
Space and water heating			3506.0718 (279)
Pumps, fans and electric keep-hot	243.9890	1.5128	369.1065 (281)
Energy for lighting	153.9076	1.5338	236.0687 (282)
Total Primary energy kWh/year			4111.2471 (286)