

Full SAP Calculation Printout



Plot Reference	Plot 16			Issued on Date	22/12/2025
Assessment Reference	Plot 16	Plot Type Ref			
Plot Address	Flat 3, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	86 B	DER	3.84	TER	12.69
Environmental	97 A	% DER < TER			69.74
CO ₂ Emissions (t/year)	0.23	DFEE	28.38	TFEE	32.49
Compliance Check	See BREL	% DFEE < TFEE			12.67
% DPER < TPER	40.54	DPER	40.00	TPER	67.26
Assessor Details	Daniel Smith			Assessor ID	CJ06-0001
Client	J Greenwood (Builders) Limited, Steve Brown				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	70.8300 (1b)	2.5000 (2b)	177.0750 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	177.0750 (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	2.6200	(17)
Infiltration rate	0.1310	(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) =	0.1114 (21)

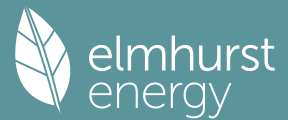
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1420	0.1392	0.1364	0.1225	0.1197	0.1058	0.1058	0.1030	0.1114	0.1197	0.1253	0.1308 (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	0.2820	0.2792	0.2764	0.2625	0.2597	0.2458	0.2458	0.2430	0.2514	0.2597	0.2653	0.2708 (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			6.3400	1.3258	8.4053		(27)
Window S/W			4.3500	1.3258	5.7670		(27)
Ground Floor			12.0700	0.1500	1.8105	110.0000	1327.7000 (28b)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999 (29a)
Total net area of external elements Aum(A, m ²)			93.7800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.7664		(33)
Main dwelling							
Party Wall			11.3100	0.0000	0.0000	45.0000	508.9500 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Floor			58.7600			40.0000	2350.4000 (32d)
Party Ceiling			70.8300			30.0000	2124.9000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	16106.3999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		227.3952 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	51.1100	0.0370	1.8911
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	30.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	6.7500	0.0250	0.1688
E3 Sill	4.4500	0.0220	0.0979
E4 Jamb	18.3200	0.0170	0.3114
E16 Corner (normal)	8.0400	0.0420	0.3377
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608
E24 Eaves (insulation at ceiling level - inverted)	4.8800	0.1500	0.7320
E14 Flat roof	9.4700	0.1600	1.5152
E20 Exposed floor (normal)	9.8700	0.0540	0.5330
E21 Exposed floor (inverted)	4.4800	0.3200	1.4336
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.8084 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	36.5749 (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	16.4769	16.3143	16.1516	15.3382	15.1756	14.3622	14.3622	14.1996	14.6876	15.1756	15.5009	15.8262	(38)
Heat transfer coeff	53.0518	52.8891	52.7265	51.9131	51.7504	50.9371	50.9371	50.7744	51.2624	51.7504	52.0758	52.4011	(39)
Average = Sum(39)m / 12 =												51.8724	
HLP	0.7490	0.7467	0.7444	0.7329	0.7306	0.7191	0.7191	0.7168	0.7237	0.7306	0.7352	0.7398	(40)
HLP (average)												0.7324	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2661 (42)
Hot water usage for mixer showers	62.2148	61.2798	59.9174	57.3106	55.3869	53.2416	52.0222	53.3743	54.8565	57.1599	59.8227	61.9764	(42a)
Hot water usage for baths	26.8776	26.4785	25.9163	24.8799	24.1038	23.2433	22.7785	23.3366	23.9444	24.8652	25.9230	26.7868	(42b)
Hot water usage for other uses	37.8372	36.4613	35.0854	33.7095	32.3336	30.9577	30.9577	32.3336	33.7095	35.0854	36.4613	37.8372	(42c)
Average daily hot water use (litres/day)												116.6772	(43)
Daily hot water use	126.9296	124.2196	120.9191	115.9000	111.8243	107.4426	105.7583	109.0445	112.5104	117.1105	122.2069	126.6004	(44)
Energy conte	201.0255	176.8870	185.8482	158.6613	150.5370	132.1132	127.9055	135.0199	138.7365	158.9178	174.1062	198.2256	(45)
Energy content (annual)												1937.9838	
Distribution loss (46)m = 0.15 x (45)m	30.1538	26.5331	27.8772	23.7992	22.5806	19.8170	19.1858	20.2530	20.8105	23.8377	26.1159	29.7338	(46)
Water storage loss (or HIU loss):												201.0000	(47)
Store volume												1.6100	(48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400	(49)
Temperature factor from Table 2b												0.8694	(55)
Enter (49) or (54) in (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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770	(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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770	(64)
12Total per year (kWh/year)												2255.3148	(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	66.8410	58.8149	61.7945	52.7549	50.0536	43.9276	42.5286	44.8941	46.1299	52.8402	57.8903	65.9100	(65)

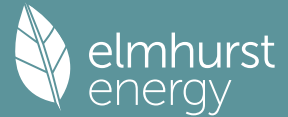
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.0879	117.4544	106.0879	109.6241	106.0879	109.6241	106.0879	106.0879	109.6241	106.0879	109.6241	106.0879	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.2264	201.2938	196.0841	184.9934	170.9934	157.8353	149.0449	146.9775	152.1872	163.2779	177.2780	190.4360	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	(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)	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	(71)
Water heating gains (Table 5)	89.8400	87.5222	83.0572	73.2707	67.2763	61.0106	57.1621	60.3416	64.0693	71.0217	80.4032	88.5887	(72)
Total internal gains	452.1459	463.2620	442.2207	424.8798	401.3491	385.4616	369.2864	370.3986	382.8722	397.3791	424.2969	442.1042	(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
East	6.3400	19.6403	0.4000	0.0000	0.7700	38.3519 (76)

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Southeast	1.1500	36.7938	0.4000	0.0000	0.7700	13.0324 (77)
South	3.2000	46.7521	0.4000	0.0000	0.7700	46.0788 (78)

Solar gains	97.4631	172.6887	250.0576	326.4785	376.2089	376.8720	362.0286	325.2346	277.0059	194.9539	118.0493	82.5081 (83)
Total gains	549.6090	635.9507	692.2784	751.3584	777.5580	762.3337	731.3150	695.6331	659.8781	592.3330	542.3462	524.6123 (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	84.3327	84.5921	84.8530	86.1825	86.4534	87.8338	87.8338	88.1152	87.2764	86.4534	85.9133	85.3799
alpha	6.6222	6.6395	6.6569	6.7455	6.7636	6.8556	6.8556	6.8743	6.8184	6.7636	6.7276	6.6920
util living area	0.9835	0.9592	0.9083	0.7814	0.6095	0.4269	0.3064	0.3356	0.5325	0.8259	0.9597	0.9871 (86)
MIT	20.3889	20.5725	20.7597	20.9272	20.9870	20.9990	20.9999	20.9998	20.9958	20.9129	20.6392	20.3575 (87)
Th 2	20.2977	20.2998	20.3018	20.3118	20.3139	20.3240	20.3240	20.3260	20.3199	20.3139	20.3098	20.3058 (88)
util rest of house	0.9794	0.9501	0.8901	0.7486	0.5675	0.3821	0.2594	0.2865	0.4814	0.7899	0.9492	0.9839 (89)
MIT 2	19.5931	19.8221	20.0483	20.2436	20.3037	20.3234	20.3239	20.3259	20.3173	20.2345	19.9156	19.5602 (90)
Living area fraction									fLA = Living area / (4) =			0.4487 (91)
MIT	19.9501	20.1588	20.3675	20.5503	20.6103	20.6265	20.6272	20.6283	20.6217	20.5389	20.2403	19.9179 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9501	20.1588	20.3675	20.5503	20.6103	20.6265	20.6272	20.6283	20.6217	20.5389	20.2403	19.9179 (93)

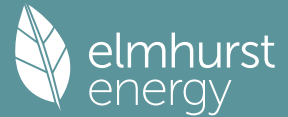
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9770	0.9480	0.8919	0.7603	0.5859	0.4022	0.2805	0.3086	0.5042	0.8022	0.9480	0.9817 (94)
Useful gains	536.9709	602.8720	617.4471	571.2573	455.5363	306.6146	205.1110	214.6434	332.7122	475.1977	514.1177	515.0050 (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	830.2683	807.0249	731.1825	604.8026	461.1096	306.9739	205.1353	214.6893	334.3190	514.3431	684.2899	823.6357 (97)
Space heating kWh	218.2133	137.1908	84.6191	24.1526	4.1465	0.0000	0.0000	0.0000	0.0000	29.1242	122.5240	229.6213 (98a)
Space heating requirement - total per year (kWh/year)												849.5917
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	218.2133	137.1908	84.6191	24.1526	4.1465	0.0000	0.0000	0.0000	0.0000	29.1242	122.5240	229.6213 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												849.5917
Space heating per m2										(98c) / (4) =		11.9948 (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	218.2133	137.1908	84.6191	24.1526	4.1465	0.0000	0.0000	0.0000	0.0000	29.1242	122.5240	229.6213 (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)	218.2133	137.1908	84.6191	24.1526	4.1465	0.0000	0.0000	0.0000	0.0000	29.1242	122.5240	229.6213 (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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770 (64)
Efficiency of water heater (217)m	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922 (216)
Fuel for water heating, kWh/month	66.2353	58.4645	61.8258	53.6745	51.5667	45.9613	44.9914	47.0584	47.8856	54.0016	58.1617	65.4219 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.7609	12.4292	13.7609	13.3170	13.7609	13.3170	13.7609	13.3170	13.3170	13.7609	13.3170	13.7609 (231)
Lighting	19.6760	15.7848	14.2125	10.4127	8.0430	6.5712	7.3371	9.5371	12.3877	16.2534	18.3581	20.2228 (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												849.5917 (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	344.1922
Water heating fuel used	655.2486 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	162.0236 (230a)
Total electricity for the above, kWh/year	162.0236 (231)
Electricity for lighting (calculated in Appendix L)	158.7964 (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	1825.6604 (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	849.5917	0.1581	134.3575 (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)	655.2486	0.1412	92.5047 (264)
Space and water heating			226.8621 (265)
Pumps, fans and electric keep-hot	162.0236	0.1387	22.4747 (267)
Energy for lighting	158.7964	0.1443	22.9192 (268)
Total CO2, kg/year			272.2560 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.8400 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	849.5917	1.5854	1346.9324 (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)	655.2486	1.5220	997.3062 (278)
Space and water heating			2344.2386 (279)
Pumps, fans and electric keep-hot	162.0236	1.5128	245.1093 (281)
Energy for lighting	158.7964	1.5338	243.5672 (282)
Total Primary energy kWh/year			2832.9152 (286)
Dwelling Primary energy Rate (DPER)			40.0000 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	70.8300 (1b)	x 2.5000 (2b)	= 177.0750 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 177.0750 (5)

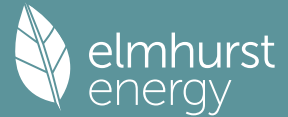
2. Ventilation rate

	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) =	0.1694 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4194	(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) =		0.3565 (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	0.4545	0.4456	0.4367	0.3922	0.3832	0.3387	0.3387	0.3298	0.3565	0.3832	0.4011	0.4189 (22b)
	0.6033	0.5993	0.5954	0.5769	0.5734	0.5574	0.5574	0.5544	0.5635	0.5734	0.5804	0.5877 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			10.6900	1.1450	12.2405		(27)
Ground Floor			12.0700	0.1300	1.5691		(28b)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836		(29a)
Total net area of external elements Aum(A, m2)			93.7800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		26.5932		(33)
Main dwelling							
Party Wall			11.3100	0.0000	0.0000		(32)
Corridor			29.1300	0.0000	0.0000		(32)

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

227.3952 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	51.1100	0.0700	3.5777
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	30.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	6.7500	0.0500	0.3375
E3 Sill	4.4500	0.0500	0.2225
E4 Jamb	18.3200	0.0500	0.9160
E16 Corner (normal)	8.0400	0.0900	0.7236
E25 Staggered party wall between dwellings	5.3600	0.0600	0.3216
E24 Eaves (insulation at ceiling level - inverted)	4.8800	0.2400	1.1712
E14 Flat roof	9.4700	0.0800	0.7576
E20 Exposed floor (normal)	9.8700	0.3200	3.1584
E21 Exposed floor (inverted)	4.4800	0.3200	1.4336
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.0200	0.0836

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

12.7033 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 39.2965 (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	35.2540	35.0196	34.7899	33.7106	33.5087	32.5688	32.5688	32.3947	32.9308	33.5087	33.9172	34.3442 (38)
Heat transfer coeff	74.5505	74.3161	74.0863	73.0071	72.8052	71.8652	71.8652	71.6911	72.2273	72.8052	73.2137	73.6407 (39)
Average = Sum(39)m / 12 =												73.0061

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0525	1.0492	1.0460	1.0307	1.0279	1.0146	1.0146	1.0122	1.0197	1.0279	1.0337	1.0397 (40)
HLP (average)												1.0307
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2661 (42)
Hot water usage for mixer showers	62.2148	61.2798	59.9174	57.3106	55.3869	53.2416	52.0222	53.3743	54.8565	57.1599	59.8227	61.9764 (42a)	
Hot water usage for baths	26.8776	26.4785	25.9163	24.8799	24.1038	23.2433	22.7785	23.3366	23.9444	24.8652	25.9230	26.7868 (42b)	
Hot water usage for other uses	37.8372	36.4613	35.0854	33.7095	32.3336	30.9577	30.9577	32.3336	33.7095	35.0854	36.4613	37.8372 (42c)	
Average daily hot water use (litres/day)												116.6772 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.9296	124.2196	120.9191	115.9000	111.8243	107.4426	105.7583	109.0445	112.5104	117.1105	122.2069	126.6004 (44)	
Energy content (annual)	201.0255	176.8870	185.8482	158.6613	150.5370	132.1132	127.9055	135.0199	138.7365	158.9178	174.1062	198.2256 (45)	
Distribution loss (46)m = 0.15 x (45)m	30.1538	26.5331	27.8772	23.7992	22.5806	19.8170	19.1858	20.2530	20.8105	23.8377	26.1159	29.7338 (46)	
Water storage loss (or HIU loss):													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	247.6204	218.9727	232.4431	203.7532	197.1319	177.2050	174.5004	181.6148	183.8284	205.5127	219.1980	244.8205 (62)	
WWHRS	-28.4420	-25.1543	-26.3402	-21.8107	-20.3268	-17.3938	-16.3039	-17.3376	-17.9963	-21.2156	-24.0347	-27.9153 (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	219.1784	193.8184	206.1029	181.9425	176.8051	159.8112	158.1965	164.2772	165.8321	184.2971	195.1633	216.9052 (64)	
12Total per year (kWh/year)												2222.3299 (64)	
Electric shower(s)												2222 (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	104.1169	92.4835	99.0704	88.8284	87.3295	80.0011	79.8045	82.1700	82.2034	90.1161	93.9638	103.1859 (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	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	106.0879	117.4544	106.0879	109.6241	106.0879	109.6241	106.0879	106.0879	109.6241	106.0879	109.6241	106.0879 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	199.2264	201.2938	196.0841	184.9934	170.9934	157.8353	149.0449	146.9775	152.1872	163.2779	177.2780	190.4360 (68)

Pumps, fans	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000
Water heating gains (Table 5)	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442
Total internal gains	139.9421	137.6243	133.1592	123.3727	117.3783	111.1126	107.2641	110.4436	114.1713	121.1238	130.5052	138.6908	(72)
	505.2479	516.3641	495.3228	477.9819	454.4512	435.5636	419.3885	420.5006	432.9743	450.4812	477.3989	495.2063	(73)

[Jan												Gains
	Area				Solar flux	g		FF		Access		W
	m2				Table 6a	Specific data		Specific data		factor		
					W/m2	or Table 6b		or Table 6c		Table 6d		
East	6.3400				19.6403	0.6300		0.7000		0.7700		38.0547 (76)
Southeast	1.1500				36.7938	0.6300		0.7000		0.7700		12.9314 (77)
South	3.2000				46.7521	0.6300		0.7000		0.7700		45.7217 (78)
Solar gains	96.7078	171.3504	248.1197	323.9483	373.2933	373.9513	359.2229	322.7140	274.8591	193.4430	117.1344	81.8687 (83)
Total gains	601.9557	687.7145	743.4425	801.9302	827.7445	809.5149	778.6113	743.2146	707.8333	643.9241	594.5333	577.0749 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	60.0130	60.2023	60.3890	61.2817	61.4517	62.2554	62.2554	62.4066	61.9434	61.4517	61.1088	60.7544
alpha	5.0009	5.0135	5.0259	5.0854	5.0968	5.1504	5.1504	5.1604	5.1296	5.0968	5.0739	5.0503
util living area	0.9862	0.9725	0.9457	0.8733	0.7423	0.5544	0.4038	0.4400	0.6651	0.8956	0.9717	0.9885 (86)
MIT	19.9176	20.1226	20.3824	20.6945	20.8953	20.9813	20.9970	20.9953	20.9538	20.6987	20.2662	19.8893 (87)
Th 2	20.0398	20.0425	20.0452	20.0578	20.0602	20.0712	20.0712	20.0732	20.0669	20.0602	20.0554	20.0504 (88)
util rest of house	0.9824	0.9653	0.9314	0.8422	0.6874	0.4796	0.3198	0.3532	0.5892	0.8628	0.9629	0.9854 (89)
MIT 2	18.7987	19.0578	19.3810	19.7596	19.9751	20.0605	20.0701	20.0715	20.0371	19.7747	19.2506	18.7707 (90)
Living area fraction										fLA = Living area / (4) =		0.4487 (91)
MIT	19.3007	19.5356	19.8303	20.1790	20.3880	20.4737	20.4860	20.4860	20.4484	20.1893	19.7063	19.2726 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3007	19.5356	19.8303	20.1790	20.3880	20.4737	20.4860	20.4860	20.4484	20.1893	19.7063	19.2726 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9786	0.9606	0.9276	0.8465	0.7074	0.5126	0.3575	0.3922	0.6213	0.8678	0.9590	0.9820 (94)
Useful gains	589.0906	660.5936	689.6148	678.8626	585.5421	414.9204	278.3539	291.4711	439.8072	558.8141	570.1316	566.6930 (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	1118.3117	1087.6576	987.5900	823.4501	632.5292	422.1123	279.2668	292.9296	458.5298	698.1496	922.9500	1109.9566 (97)
Space heating kWh	393.7405	286.9870	221.6936	104.1030	34.9584	0.0000	0.0000	0.0000	0.0000	103.6656	254.0292	404.1882 (98a)
Space heating requirement - total per year (kWh/year)												1803.3655
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	393.7405	286.9870	221.6936	104.1030	34.9584	0.0000	0.0000	0.0000	0.0000	103.6656	254.0292	404.1882 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1803.3655
Space heating per m2										(98c) / (4) =		25.4605 (99)

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													92.3000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	393.7405	286.9870	221.6936	104.1030	34.9584	0.0000	0.0000	0.0000	0.0000	103.6656	254.0292	404.1882	(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)	426.5877	310.9285	240.1881	112.7876	37.8748	0.0000	0.0000	0.0000	0.0000	112.3138	275.2213	437.9070	(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	219.1784	193.8184	206.1029	181.9425	176.8051	159.8112	158.1965	164.2772	165.8321	184.2971	195.1633	216.9052	(64)	
Efficiency of water heater	85.3575	84.9384	84.2236	82.8562	81.1579	79.8000	79.8000	79.8000	79.8000	82.8219	84.6520	85.4350	(216)	
Fuel for water heating, kWh/month	256.7770	228.1870	244.7091	219.5882	217.8533	200.2647	198.2413	205.8612	207.8096	222.5223	230.5479	253.8834	(217)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	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	22.0430	17.6837	15.9222	11.6653	9.0106	7.3617	8.2198	10.6844	13.8779	18.2086	20.5666	22.6556	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-18.9864	-28.1318	-42.4719	-50.2354	-56.3501	-53.3977	-52.7524	-48.7233	-41.9901	-33.2585	-21.3548	-16.2600	(233a)	

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Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-6.9409	-14.9160	-30.2420	-46.3064	-62.1015	-62.7162	-61.9725	-52.0639	-37.6332	-21.6113	-9.3563	-5.4650	(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												1953.8088	(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												2686.2450	(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)												177.8994	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-875.2376	(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												4028.7156	(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	1953.8088	0.2100	410.2999	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2686.2450	0.2100	564.1115	(264)
Space and water heating			974.4113	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	177.8994	0.1443	25.6764	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-463.9125	0.1336	-61.9571	
PV Unit electricity exported	-411.3251	0.1253	-51.5539	
Total			-113.5110	(269)
Total CO2, kg/year			898.5059	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6900	(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	1953.8088	1.1300	2207.8040	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2686.2450	1.1300	3035.4569	(278)
Space and water heating			5243.2608	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	177.8994	1.5338	272.8680	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-463.9125	1.4935	-692.8682	
PV Unit electricity exported	-411.3251	0.4600	-189.2274	
Total			-882.0956	(283)
Total Primary energy kWh/year			4764.1340	(286)
Target Primary Energy Rate (TPER)			67.2600	(287)

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Plot Reference	Plot 16			Issued on Date	22/12/2025
Assessment Reference	Plot 16	Plot Type Ref			
Plot Address	Flat 3, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	86 B	DER	3.84	TER	12.69
Environmental	97 A	% DER < TER			69.74
CO ₂ Emissions (t/year)	0.23	DFEE	28.38	TFEE	32.49
Compliance Check	See BREL	% DFEE < TFEE			12.67
% DPER < TPER	40.54	DPER	40.00	TPER	67.26
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	70.8300 (1b)	2.5000 (2b)	177.0750 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	177.0750 (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) =	0.1694 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.6200	(17)
Infiltration rate	0.3004	(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) =	0.2554 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.3256	0.3192	0.3128	0.2809	0.2745	0.2426	0.2426	0.2362	0.2554	0.2745	0.2873	0.3000 (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	0.5530	0.5509	0.5489	0.5395	0.5377	0.5294	0.5294	0.5279	0.5326	0.5377	0.5413	0.5450 (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			6.3400	1.3258	8.4053		(27)
Window S/W			4.3500	1.3258	5.7670		(27)
Ground Floor			12.0700	0.1500	1.8105	110.0000	1327.7000 (28b)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999 (29a)
Total net area of external elements Aum(A, m ²)			93.7800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.7664		(33)
Main dwelling							
Party Wall			11.3100	0.0000	0.0000	45.0000	508.9500 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Floor			58.7600			40.0000	2350.4000 (32d)
Party Ceiling			70.8300			30.0000	2124.9000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16106.3999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							227.3952 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)				51.1100	0.0370	1.8911	

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P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	30.1800	0.0000	0.0000										
E2 Other lintels (including other steel lintels)	6.7500	0.0250	0.1688										
E3 Sill	4.4500	0.0220	0.0979										
E4 Jamb	18.3200	0.0170	0.3114										
E16 Corner (normal)	8.0400	0.0420	0.3377										
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608										
E24 Eaves (insulation at ceiling level - inverted)	4.8800	0.1500	0.7320										
E14 Flat roof	9.4700	0.1600	1.5152										
E20 Exposed floor (normal)	9.8700	0.0540	0.5330										
E21 Exposed floor (inverted)	4.4800	0.3200	1.4336										
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				7.8084 (36)									
Point Thermal Bridges			(36a) =	0.0000									
Total fabric heat loss		(33) + (36) + (36a) =		36.5749 (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	32.3145	32.1942	32.0763	31.5226	31.4190	30.9368	30.9368	30.8475	31.1226	31.4190	31.6286	31.8477	(38)
Average = Sum(39)m / 12 =	68.8894	68.7691	68.6512	68.0975	67.9939	67.5117	67.5117	67.4224	67.6974	67.9939	68.2035	68.4226	(39)
												68.0970	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9726	0.9709	0.9692	0.9614	0.9600	0.9532	0.9532	0.9519	0.9558	0.9600	0.9629	0.9660	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												0.9614	
												31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													2.2661 (42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	26.8776	26.4785	25.9163	24.8799	24.1038	23.2433	22.7785	23.3366	23.9444	24.8652	25.9230	26.7868	(42b)
Hot water usage for other uses	37.8372	36.4613	35.0854	33.7095	32.3336	30.9577	30.9577	32.3336	33.7095	35.0854	36.4613	37.8372	(42c)
Average daily hot water use (litres/day)													59.3172 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	64.7148	62.9397	61.0017	58.5894	56.4374	54.2010	53.7362	55.6702	57.6539	59.9506	62.3843	64.6239	(44)
Energy content (annual)	102.4924	89.6254	93.7574	80.2059	75.9756	66.6464	64.9892	68.9314	71.0930	81.3524	88.8779	101.1855	(45)
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	87.1186	76.1815	79.6938	68.1751	64.5793	56.6495	55.2408	58.5917	60.4291	69.1495	75.5462	86.0077	(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	87.1186	76.1815	79.6938	68.1751	64.5793	56.6495	55.2408	58.5917	60.4291	69.1495	75.5462	86.0077	(64)
12Total per year (kWh/year)													
Electric shower(s)	49.8237	44.3933	48.4758	46.2599	47.1279	44.9554	46.4540	47.1279	46.2599	48.4758	47.5643	49.8237	(64a)
Heat gains from water heating, kWh/month	34.2356	30.1437	32.0424	28.6087	27.9268	25.4012	25.4237	26.4299	26.6722	29.4063	30.7776	33.9578	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	106.0879	117.4544	106.0879	109.6241	106.0879	109.6241	106.0879	106.0879	109.6241	106.0879	109.6241	106.0879	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	199.2264	201.2938	196.0841	184.9934	170.9934	157.8353	149.0449	146.9775	152.1872	163.2779	177.2780	190.4360	(68)
Pumps, fans	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	(69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Water heating gains (Table 5)	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	(71)
Total internal gains	46.0155	44.8567	43.0677	39.7343	37.5360	35.2795	34.1716	35.5241	37.0448	39.5246	42.7467	45.6423	(72)
	408.3214	420.5965	402.2313	391.3435	371.6088	359.7305	346.2960	345.5811	355.8477	365.8820	386.6404	399.1577	(73)

6. Solar gains													

[Jan]													
Area													
m2													
Solar flux													
Table 6a													
W/m2													
Specific data													
or Table 6b													
Specific data													
or Table 6c													
Access													
factor													
Table 6d													
Gains													
W													
East													
Southeast													
South													
Solar gains	97.4631	172.6887	250.0576	326.4785	376.2089	376.8720	362.0286	325.2346	277.0059	194.9539	118.0493	82.5081	(83)
Total gains	505.7846	593.2852	652.2890	717.8220	747.8178	736.6025	708.3246	670.8156	632.8535	560.8359	504.6896	481.6659	(84)

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7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	64.9447	65.0583	65.1700	65.6999	65.8000	66.2700	66.2700	66.3578	66.0882	65.8000	65.5978	65.3878
alpha	5.3296	5.3372	5.3447	5.3800	5.3867	5.4180	5.4180	5.4239	5.4059	5.3867	5.3732	5.3592
util living area	0.9929	0.9831	0.9614	0.8952	0.7651	0.5726	0.4172	0.4585	0.6944	0.9232	0.9839	0.9945 (86)
MIT	19.9053	20.1149	20.3775	20.6930	20.8981	20.9826	20.9974	20.9957	20.9532	20.6793	20.2361	19.8662 (87)
Th 2	20.1062	20.1077	20.1090	20.1156	20.1168	20.1226	20.1226	20.1236	20.1204	20.1168	20.1143	20.1118 (88)
util rest of house	0.9909	0.9784	0.9507	0.8682	0.7134	0.4998	0.3351	0.3731	0.6214	0.8970	0.9786	0.9929 (89)
MIT 2	19.1138	19.3215	19.5782	19.8777	20.0511	20.1147	20.1218	20.1223	20.0961	19.8730	19.4482	19.0795 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.4689	19.6775	19.9368	20.2435	20.4311	20.5041	20.5147	20.5142	20.4807	20.2348	19.8017	19.4325 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.4689	19.6775	19.9368	20.2435	20.4311	20.5041	20.5147	20.5142	20.4807	20.2348	19.8017	19.4325 (93)

8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9891	0.9757	0.9483	0.8725	0.7327	0.5320	0.3720	0.4115	0.6525	0.9010	0.9763	0.9913 (94)
Useful gains	500.2711	578.8419	618.5761	626.2781	547.8958	391.8997	263.4904	276.0300	412.9083	505.2984	492.7521	477.4961 (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	1044.9782	1016.2357	922.4551	772.4641	593.6642	398.5948	264.2853	277.3873	431.9541	655.1077	866.3005	1042.2442 (97)
Space heating kWh	405.2621	293.9287	226.0859	105.2539	34.0517	0.0000	0.0000	0.0000	0.0000	111.4581	268.9549	420.1726 (98a)
Space heating requirement - total per year (kWh/year)	1865.1679											
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	405.2621	293.9287	226.0859	105.2539	34.0517	0.0000	0.0000	0.0000	0.0000	111.4581	268.9549	420.1726 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1865.1679											
Space heating per m2	(98c) / (4) = 26.3330 (99)											

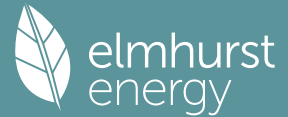
8c. Space cooling requirement												
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	634.6097	499.5863	512.4100	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9292	0.9669	0.9547	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	589.6518	483.0577	489.2226	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	816.8215	785.9917	744.2598	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	163.5622	225.3829	189.7477	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	40.8905	56.3457	47.4369	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	144.6732 (107)											
Energy for space heating	26.3330 (99)											
Energy for space cooling	2.0425 (108)											
Total	28.3756 (109)											
Fabric Energy Efficiency (DFEE)	28.4 (109)											

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

1. Overall dwelling characteristics									
		Area	Storey height		Volume				
		(m2)	(m)		(m3)				
Main dwelling		70.8300	(1b)	x	2.5000	(2b)	=	177.0750	(1b) - (3b)
Ground floor									
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	70.8300								
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)		=	177.0750	(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)

Full SAP Calculation Printout



Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1694 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.4194 (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) = 0.3565 (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	0.4545	0.4456	0.4367	0.3922	0.3832	0.3387	0.3387	0.3298	0.3565	0.3832	0.4011	0.4189	(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	0.6033	0.5993	0.5954	0.5769	0.5734	0.5574	0.5574	0.5544	0.5635	0.5734	0.5804	0.5877	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			10.6900	1.1450	12.2405		(27)
Ground Floor			12.0700	0.1300	1.5691		(28b)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836		(29a)
Total net area of external elements Aum(A, m2)							(31)
Fabric heat loss, W/K = Sum (A x U)							(33)
(26)...(30) + (32) =							26.5932
Main dwelling							
Party Wall			11.3100	0.0000	0.0000		(32)
Corridor			29.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							227.3952 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	51.1100	0.0700	3.5777
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	30.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	6.7500	0.0500	0.3375
E3 Sill	4.4500	0.0500	0.2225
E4 Jamb	18.3200	0.0500	0.9160
E16 Corner (normal)	8.0400	0.0900	0.7236
E25 Staggered party wall between dwellings	5.3600	0.0600	0.3216
E24 Eaves (insulation at ceiling level - inverted)	4.8800	0.2400	1.1712
E14 Flat roof	9.4700	0.0800	0.7576
E20 Exposed floor (normal)	9.8700	0.3200	3.1584
E21 Exposed floor (inverted)	4.4800	0.3200	1.4336
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.0200	0.0836
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			12.7033 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 39.2965 (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	
	35.2540	35.0196	34.7899	33.7106	33.5087	32.5688	32.5688	32.3947	32.9308	33.5087	33.9172	34.3442	(38)
Heat transfer coeff	74.5505	74.3161	74.0863	73.0071	72.8052	71.8652	71.8652	71.6911	72.2273	72.8052	73.2137	73.6407	(39)
Average = Sum(39)m / 12 =													73.0061

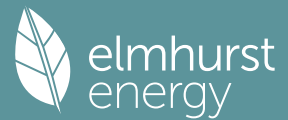
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	1.0525	1.0492	1.0460	1.0307	1.0279	1.0146	1.0146	1.0122	1.0197	1.0279	1.0337	1.0397	(40)
HLP (average)													1.0307
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2661 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
26.8776	26.4785	25.9163	24.8799	24.1038	23.2433	22.7785	23.3366	23.9444	24.8652	25.9230	26.7868		(42b)
Hot water usage for other uses													
37.8372	36.4613	35.0854	33.7095	32.3336	30.9577	30.9577	32.3336	33.7095	35.0854	36.4613	37.8372		(42c)
Average daily hot water use (litres/day)													59.3172 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	64.7148	62.9397	61.0017	58.5894	56.4374	54.2010	53.7362	55.6702	57.6539	59.9506	62.3843	64.6239	(44)
Energy conte	102.4924	89.6254	93.7574	80.2059	75.9756	66.6464	64.9892	68.9314	71.0930	81.3524	88.8779	101.1855	(45)
Energy content (annual)												985.1325	
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
87.1186	76.1815	79.6938	68.1751	64.5793	56.6495	55.2408	58.5917	60.4291	69.1495	75.5462	86.0077		(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	87.1186	76.1815	79.6938	68.1751	64.5793	56.6495	55.2408	58.5917	60.4291	69.1495	75.5462	86.0077	(64)
Total per year (kWh/year) = Sum(64)m =												837.3626	(64)
12Total per year (kWh/year)													837 (64)
Electric shower(s)	49.8237	44.3933	48.4758	46.2599	47.1279	44.9554	46.4540	47.1279	46.2599	48.4758	47.5643	49.8237	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												566.7414	(64a)

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Heat gains from water heating, kWh/month
34.2356 30.1437 32.0424 28.6087 27.9268 25.4012 25.4237 26.4299 26.6722 29.4063 30.7776 33.9578 (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	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.0879	117.4544	106.0879	109.6241	106.0879	109.6241	106.0879	106.0879	109.6241	106.0879	109.6241	106.0879	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.2264	201.2938	196.0841	184.9934	170.9934	157.8353	149.0449	146.9775	152.1872	163.2779	177.2780	190.4360	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	(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)	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	(71)
Water heating gains (Table 5)	46.0155	44.8567	43.0677	39.7343	37.5360	35.2795	34.1716	35.5241	37.0448	39.5246	42.7467	45.6423	(72)
Total internal gains	408.3214	420.5965	402.2313	391.3435	371.6088	359.7305	346.2960	345.5811	355.8477	365.8820	386.6404	399.1577	(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	
East					6.3400	19.6403	0.6300	0.7000				0.7700	38.0547 (76)	
Southeast					1.1500	36.7938	0.6300	0.7000				0.7700	12.9314 (77)	
South					3.2000	46.7521	0.6300	0.7000				0.7700	45.7217 (78)	
Solar gains	96.7078	171.3504	248.1197	323.9483	373.2933	373.9513	359.2229	322.7140	274.8591	193.4430	117.1344	81.8687 (83)		
Total gains	505.0292	591.9469	650.3510	715.2918	744.9021	733.6818	705.5189	668.2951	630.7067	559.3250	503.7748	481.0264 (84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	60.0130	60.2023	60.3890	61.2817	61.4517	62.2554	62.2554	62.4066	61.9434	61.4517	61.1088	60.7544	
alpha	5.0009	5.0135	5.0259	5.0854	5.0968	5.1504	5.1504	5.1604	5.1296	5.0968	5.0739	5.0503	
util living area	0.9934	0.9849	0.9667	0.9101	0.7937	0.6045	0.4442	0.4868	0.7253	0.9337	0.9855	0.9948	(86)
MIT	19.7649	19.9799	20.2586	20.6121	20.8566	20.9725	20.9953	20.9926	20.9316	20.6077	20.1307	19.7361	(87)
Th 2	20.0398	20.0425	20.0452	20.0578	20.0602	20.0712	20.0712	20.0732	20.0669	20.0602	20.0554	20.0504	(88)
util rest of house	0.9915	0.9807	0.9571	0.8849	0.7417	0.5257	0.3525	0.3921	0.6493	0.9095	0.9807	0.9933	(89)
MIT 2	18.9220	19.1366	19.4111	19.7546	19.9664	20.0586	20.0699	20.0710	20.0311	19.7595	19.2973	18.9018	(90)
Living area fraction									fLA = Living area / (4) =			0.4487	(91)
MIT	19.3002	19.5150	19.7914	20.1393	20.3658	20.4687	20.4851	20.4845	20.4351	20.1401	19.6712	19.2761	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3002	19.5150	19.7914	20.1393	20.3658	20.4687	20.4851	20.4845	20.4351	20.1401	19.6712	19.2761	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9896	0.9777	0.9540	0.8873	0.7597	0.5602	0.3937	0.4347	0.6808	0.9119	0.9782	0.9917	(94)
Useful gains	499.7855	578.7589	620.4432	634.6852	565.8777	411.0404	277.7740	290.4812	429.4142	510.0487	492.7771	477.0100	(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	1118.2725	1086.1274	984.7098	820.5515	630.9146	421.7522	279.2033	292.8233	457.5684	694.5672	920.3853	1110.2170	(97)
Space heating kWh	460.1544	340.9517	271.0143	133.8237	48.3875	0.0000	0.0000	0.0000	0.0000	137.2817	307.8779	471.1061	(98a)
Space heating requirement - total per year (kWh/year)												2170.5972	
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	460.1544	340.9517	271.0143	133.8237	48.3875	0.0000	0.0000	0.0000	0.0000	137.2817	307.8779	471.1061	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2170.5972	
Space heating per m2										(98c) / (4) =		30.6452	(99)

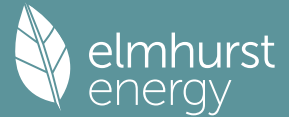
8c. Space cooling requirement

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	675.5330	531.8026	544.8527	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9044	0.9517	0.9363	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	610.9244	506.1296	510.1722	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	813.4076	782.7123	741.3137	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	145.7879	205.7775	171.9693	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	36.4470	51.4444	42.9923	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												130.8837	(107)
Energy for space heating												30.6452	(99)
Energy for space cooling												1.8479	(108)

Total
Fabric Energy Efficiency (TFEE)

32.4930 (109)
32.5 (109)

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Plot Reference	Plot 16				Issued on Date	22/12/2025	
Assessment Reference	Plot 16			Plot Type Ref			
Plot Address	Flat 3, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	86 B	DER	3.84	TER	12.69		
Environmental	97 A	% DER < TER				69.74	
CO ₂ Emissions (t/year)	0.23	DFEE	28.38	TFEE	32.49		
Compliance Check	See BREL	% DFEE < TFEE				12.67	
% DPER < TPER	40.54	DPER	40.00	TPER	67.26		
Assessor Details	Daniel Smith				Assessor ID	CJ06-0001	
Client	J Greenwood (Builders) Limited, Steve Brown						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	70.8300 (1b)	2.5000 (2b)	177.0750 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	177.0750 (5)

2. Ventilation rate

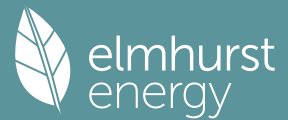
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	2.6200 (17)
Infiltration rate	0.1310 (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) = 0.1114 (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	0.1420	0.1392	0.1364	0.1225	0.1197	0.1058	0.1058	0.1030	0.1114	0.1197	0.1253	0.1308 (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	0.2820	0.2792	0.2764	0.2625	0.2597	0.2458	0.2458	0.2430	0.2514	0.2597	0.2653	0.2708 (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			6.3400	1.3258	8.4053		(27)
Window S/W			4.3500	1.3258	5.7670		(27)
Ground Floor			12.0700	0.1500	1.8105	110.0000	1327.7000 (28b)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999 (29a)
Total net area of external elements Aum(A, m ²)			93.7800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.7664		(33)
Main dwelling							
Party Wall			11.3100	0.0000	0.0000	45.0000	508.9500 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Floor			58.7600			40.0000	2350.4000 (32d)
Party Ceiling			70.8300			30.0000	2124.9000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		16106.3999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							227.3952 (35)

Full SAP Calculation Printout



List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	51.1100	0.0370	1.8911
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	30.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	6.7500	0.0250	0.1688
E3 Sill	4.4500	0.0220	0.0979
E4 Jamb	18.3200	0.0170	0.3114
E16 Corner (normal)	8.0400	0.0420	0.3377
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608
E24 Eaves (insulation at ceiling level - inverted)	4.8800	0.1500	0.7320
E14 Flat roof	9.4700	0.1600	1.5152
E20 Exposed floor (normal)	9.8700	0.0540	0.5330
E21 Exposed floor (inverted)	4.4800	0.3200	1.4336
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.8084 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	36.5749 (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	16.4769	16.3143	16.1516	15.3382	15.1756	14.3622	14.3622	14.1996	14.6876	15.1756	15.5009	15.8262	(38)
Heat transfer coeff	53.0518	52.8891	52.7265	51.9131	51.7504	50.9371	50.9371	50.7744	51.2624	51.7504	52.0758	52.4011	(39)
Average = Sum(39)m / 12 =												51.8724	
HLP	0.7490	0.7467	0.7444	0.7329	0.7306	0.7191	0.7191	0.7168	0.7237	0.7306	0.7352	0.7398	(40)
HLP (average)												0.7324	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2661 (42)
Hot water usage for mixer showers	62.2148	61.2798	59.9174	57.3106	55.3869	53.2416	52.0222	53.3743	54.8565	57.1599	59.8227	61.9764	(42a)
Hot water usage for baths	26.8776	26.4785	25.9163	24.8799	24.1038	23.2433	22.7785	23.3366	23.9444	24.8652	25.9230	26.7868	(42b)
Hot water usage for other uses	37.8372	36.4613	35.0854	33.7095	32.3336	30.9577	30.9577	32.3336	33.7095	35.0854	36.4613	37.8372	(42c)
Average daily hot water use (litres/day)												116.6772	(43)
Daily hot water use	126.9296	124.2196	120.9191	115.9000	111.8243	107.4426	105.7583	109.0445	112.5104	117.1105	122.2069	126.6004	(44)
Energy conte	201.0255	176.8870	185.8482	158.6613	150.5370	132.1132	127.9055	135.0199	138.7365	158.9178	174.1062	198.2256	(45)
Energy content (annual)										Total = Sum(45)m =		1937.9838	
Distribution loss (46)m = 0.15 x (45)m	30.1538	26.5331	27.8772	23.7992	22.5806	19.8170	19.1858	20.2530	20.8105	23.8377	26.1159	29.7338	(46)
Water storage loss (or HIU loss):												201.0000	(47)
Store volume												1.6100	(48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400	(49)
Temperature factor from Table 2b												0.8694	(55)
Enter (49) or (54) in (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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770	(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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2255.3148	(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)
												0.0000	(64a)
Heat gains from water heating, kWh/month	66.8410	58.8149	61.7945	52.7549	50.0536	43.9276	42.5286	44.8941	46.1299	52.8402	57.8903	65.9100	(65)

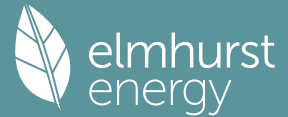
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.0879	117.4544	106.0879	109.6241	106.0879	109.6241	106.0879	106.0879	109.6241	106.0879	109.6241	106.0879	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.2264	201.2938	196.0841	184.9934	170.9934	157.8353	149.0449	146.9775	152.1872	163.2779	177.2780	190.4360	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	(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)	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	(71)
Water heating gains (Table 5)	89.8400	87.5222	83.0572	73.2707	67.2763	61.0106	57.1621	60.3416	64.0693	71.0217	80.4032	88.5887	(72)
Total internal gains	452.1459	463.2620	442.2207	424.8798	401.3491	385.4616	369.2864	370.3986	382.8722	397.3791	424.2969	442.1042	(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
East	6.3400	19.6403	0.4000	0.0000	0.7700	38.3519 (76)

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Southeast	1.1500	36.7938	0.4000	0.0000	0.7700	13.0324 (77)
South	3.2000	46.7521	0.4000	0.0000	0.7700	46.0788 (78)

Solar gains	97.4631	172.6887	250.0576	326.4785	376.2089	376.8720	362.0286	325.2346	277.0059	194.9539	118.0493	82.5081 (83)
Total gains	549.6090	635.9507	692.2784	751.3584	777.5580	762.3337	731.3150	695.6331	659.8781	592.3330	542.3462	524.6123 (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	84.3327	84.5921	84.8530	86.1825	86.4534	87.8338	87.8338	88.1152	87.2764	86.4534	85.9133	85.3799
alpha	6.6222	6.6395	6.6569	6.7455	6.7636	6.8556	6.8556	6.8743	6.8184	6.7636	6.7276	6.6920
util living area	0.9835	0.9592	0.9083	0.7814	0.6095	0.4269	0.3064	0.3356	0.5325	0.8259	0.9597	0.9871 (86)
MIT	20.3889	20.5725	20.7597	20.9272	20.9870	20.9990	20.9999	20.9998	20.9958	20.9129	20.6392	20.3575 (87)
Th 2	20.2977	20.2998	20.3018	20.3118	20.3139	20.3240	20.3240	20.3260	20.3199	20.3139	20.3098	20.3058 (88)
util rest of house	0.9794	0.9501	0.8901	0.7486	0.5675	0.3821	0.2594	0.2865	0.4814	0.7899	0.9492	0.9839 (89)
MIT 2	19.5931	19.8221	20.0483	20.2436	20.3037	20.3234	20.3239	20.3259	20.3173	20.2345	19.9156	19.5602 (90)
Living area fraction									fLA = Living area / (4) =			0.4487 (91)
MIT	19.9501	20.1588	20.3675	20.5503	20.6103	20.6265	20.6272	20.6283	20.6217	20.5389	20.2403	19.9179 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9501	20.1588	20.3675	20.5503	20.6103	20.6265	20.6272	20.6283	20.6217	20.5389	20.2403	19.9179 (93)

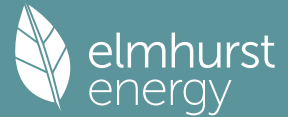
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9770	0.9480	0.8919	0.7603	0.5859	0.4022	0.2805	0.3086	0.5042	0.8022	0.9480	0.9817 (94)
Useful gains	536.9709	602.8720	617.4471	571.2573	455.5363	306.6146	205.1110	214.6434	332.7122	475.1977	514.1177	515.0050 (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	830.2683	807.0249	731.1825	604.8026	461.1096	306.9739	205.1353	214.6893	334.3190	514.3431	684.2899	823.6357 (97)
Space heating kWh	218.2133	137.1908	84.6191	24.1526	4.1465	0.0000	0.0000	0.0000	0.0000	29.1242	122.5240	229.6213 (98a)
Space heating requirement - total per year (kWh/year)												849.5917
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	218.2133	137.1908	84.6191	24.1526	4.1465	0.0000	0.0000	0.0000	0.0000	29.1242	122.5240	229.6213 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												849.5917
Space heating per m2										(98c) / (4) =		11.9948 (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	218.2133	137.1908	84.6191	24.1526	4.1465	0.0000	0.0000	0.0000	0.0000	29.1242	122.5240	229.6213 (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)	218.2133	137.1908	84.6191	24.1526	4.1465	0.0000	0.0000	0.0000	0.0000	29.1242	122.5240	229.6213 (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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770 (64)
Efficiency of water heater	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922 (216)
Fuel for water heating, kWh/month	66.2353	58.4645	61.8258	53.6745	51.5667	45.9613	44.9914	47.0584	47.8856	54.0016	58.1617	65.4219 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.7609	12.4292	13.7609	13.3170	13.7609	13.3170	13.7609	13.3170	13.7609	13.3170	13.7609	13.7609 (231)
Lighting	19.6760	15.7848	14.2125	10.4127	8.0430	6.5712	7.3371	9.5371	12.3877	16.2534	18.3581	20.2228 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												849.5917 (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	344.1922
Water heating fuel used	655.2486 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	162.0236 (230a)
Total electricity for the above, kWh/year	162.0236 (231)
Electricity for lighting (calculated in Appendix L)	158.7964 (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	1825.6604 (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	849.5917	0.1581	134.3575 (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)	655.2486	0.1412	92.5047 (264)
Space and water heating			226.8621 (265)
Pumps, fans and electric keep-hot	162.0236	0.1387	22.4747 (267)
Energy for lighting	158.7964	0.1443	22.9192 (268)
Total CO2, kg/year			272.2560 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.8400 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	849.5917	1.5854	1346.9324 (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)	655.2486	1.5220	997.3062 (278)
Space and water heating			2344.2386 (279)
Pumps, fans and electric keep-hot	162.0236	1.5128	245.1093 (281)
Energy for lighting	158.7964	1.5338	243.5672 (282)
Total Primary energy kWh/year			2832.9152 (286)
Dwelling Primary energy Rate (DPER)			40.0000 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	70.8300 (1b)	x 2.5000 (2b)	= 177.0750 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 177.0750 (5)

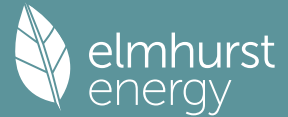
2. Ventilation rate

	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) =	0.1694 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4194	(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) =		0.3565 (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												

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Effective ac	0.4545	0.4456	0.4367	0.3922	0.3832	0.3387	0.3387	0.3298	0.3565	0.3832	0.4011	0.4189 (22b)
	0.6033	0.5993	0.5954	0.5769	0.5734	0.5574	0.5574	0.5544	0.5635	0.5734	0.5804	0.5877 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			10.6900	1.1450	12.2405		(27)
Ground Floor			12.0700	0.1300	1.5691		(28b)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836		(29a)
Total net area of external elements Aum(A, m2)			93.7800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		26.5932		(33)
Main dwelling							
Party Wall			11.3100	0.0000	0.0000		(32)
Corridor			29.1300	0.0000	0.0000		(32)

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

227.3952 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	51.1100	0.0700	3.5777
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	30.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	6.7500	0.0500	0.3375
E3 Sill	4.4500	0.0500	0.2225
E4 Jamb	18.3200	0.0500	0.9160
E16 Corner (normal)	8.0400	0.0900	0.7236
E25 Staggered party wall between dwellings	5.3600	0.0600	0.3216
E24 Eaves (insulation at ceiling level - inverted)	4.8800	0.2400	1.1712
E14 Flat roof	9.4700	0.0800	0.7576
E20 Exposed floor (normal)	9.8700	0.3200	3.1584
E21 Exposed floor (inverted)	4.4800	0.3200	1.4336
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.0200	0.0836

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

12.7033 (36)

Point Thermal bridges

(33a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 39.2965 (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	35.2540	35.0196	34.7899	33.7106	33.5087	32.5688	32.5688	32.3947	32.9308	33.5087	33.9172	34.3442 (38)
Heat transfer coeff	74.5505	74.3161	74.0863	73.0071	72.8052	71.8652	71.8652	71.6911	72.2273	72.8052	73.2137	73.6407 (39)
Average = Sum(39)m / 12 =												73.0061

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0525	1.0492	1.0460	1.0307	1.0279	1.0146	1.0146	1.0122	1.0197	1.0279	1.0337	1.0397 (40)
HLP (average)												1.0307
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

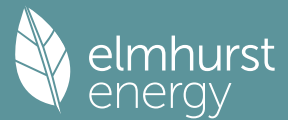
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2661 (42)
Hot water usage for mixer showers	62.2148	61.2798	59.9174	57.3106	55.3869	53.2416	52.0222	53.3743	54.8565	57.1599	59.8227	61.9764 (42a)
Hot water usage for baths	26.8776	26.4785	25.9163	24.8799	24.1038	23.2433	22.7785	23.3366	23.9444	24.8652	25.9230	26.7868 (42b)
Hot water usage for other uses	37.8372	36.4613	35.0854	33.7095	32.3336	30.9577	30.9577	32.3336	33.7095	35.0854	36.4613	37.8372 (42c)
Average daily hot water use (litres/day)												116.6772 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9296	124.2196	120.9191	115.9000	111.8243	107.4426	105.7583	109.0445	112.5104	117.1105	122.2069	126.6004 (44)
Energy content (annual)	201.0255	176.8870	185.8482	158.6613	150.5370	132.1132	127.9055	135.0199	138.7365	158.9178	174.1062	198.2256 (45)
Distribution loss (46)m = 0.15 x (45)m	30.1538	26.5331	27.8772	23.7992	22.5806	19.8170	19.1858	20.2530	20.8105	23.8377	26.1159	29.7338 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	247.6204	218.9727	232.4431	203.7532	197.1319	177.2050	174.5004	181.6148	183.8284	205.5127	219.1980	244.8205 (62)
WWHRS	-28.4420	-25.1543	-26.3402	-21.8107	-20.3268	-17.3938	-16.3039	-17.3376	-17.9963	-21.2156	-24.0347	-27.9153 (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	219.1784	193.8184	206.1029	181.9425	176.8051	159.8112	158.1965	164.2772	165.8321	184.2971	195.1633	216.9052 (64)
12Total per year (kWh/year)												2222.3299 (64)
Electric shower(s)												2222 (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	104.1169	92.4835	99.0704	88.8284	87.3295	80.0011	79.8045	82.1700	82.2034	90.1161	93.9638	103.1859 (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	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053	113.3053 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.0879	117.4544	106.0879	109.6241	106.0879	109.6241	106.0879	106.0879	109.6241	106.0879	109.6241	106.0879 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	199.2264	201.2938	196.0841	184.9934	170.9934	157.8353	149.0449	146.9775	152.1872	163.2779	177.2780	190.4360 (68)

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Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5											
	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305	34.3305 (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 (70)
Losses e.g. evaporation (negative values) (Table 5)											
	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442 (71)
Water heating gains (Table 5)											
	139.9421	137.6243	133.1592	123.3727	117.3783	111.1126	107.2641	110.4436	114.1713	121.1238	130.5052 (72)
Total internal gains											
	505.2479	516.3641	495.3228	477.9819	454.4512	435.5636	419.3885	420.5006	432.9743	450.4812	477.3989 (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
East				6.3400	19.6403	0.6300	0.7000		0.7700		38.0547 (76)
Southeast				1.1500	36.7938	0.6300	0.7000		0.7700		12.9314 (77)
South				3.2000	46.7521	0.6300	0.7000		0.7700		45.7217 (78)

Solar gains	96.7078	171.3504	248.1197	323.9483	373.2933	373.9513	359.2229	322.7140	274.8591	193.4430	117.1344 (83)
Total gains	601.9557	687.7145	743.4425	801.9302	827.7445	809.5149	778.6113	743.2146	707.8333	643.9241	594.5333 (84)

7. Mean internal temperature (heating season)											

Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	60.0130	60.2023	60.3890	61.2817	61.4517	62.2554	62.2554	62.4066	61.9434	61.4517	61.1088
alpha	5.0009	5.0135	5.0259	5.0854	5.0968	5.1504	5.1504	5.1604	5.1296	5.0968	5.0739
util living area	0.9862	0.9725	0.9457	0.8733	0.7423	0.5544	0.4038	0.4400	0.6651	0.8956	0.9717
											0.9885 (86)
MIT	19.9176	20.1226	20.3824	20.6945	20.8953	20.9813	20.9970	20.9953	20.9538	20.6987	20.2662
Th 2	20.0398	20.0425	20.0452	20.0578	20.0602	20.0712	20.0712	20.0732	20.0669	20.0602	20.0554
util rest of house	0.9824	0.9653	0.9314	0.8422	0.6874	0.4796	0.3198	0.3532	0.5892	0.8628	0.9629
MIT 2	18.7987	19.0578	19.3810	19.7596	19.9751	20.0605	20.0701	20.0715	20.0371	19.7747	19.2506
Living area fraction											FLA = Living area / (4) =
MIT	19.3007	19.5356	19.8303	20.1790	20.3880	20.4737	20.4860	20.4860	20.4484	20.1893	19.7063
Temperature adjustment											0.0000
adjusted MIT	19.3007	19.5356	19.8303	20.1790	20.3880	20.4737	20.4860	20.4860	20.4484	20.1893	19.7063
											19.2726 (93)

8. Space heating requirement											

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	0.9786	0.9606	0.9276	0.8465	0.7074	0.5126	0.3575	0.3922	0.6213	0.8678	0.9590
Useful gains	589.0906	660.5936	689.6148	678.8626	585.5421	414.9204	278.3539	291.4711	439.8072	558.8141	570.1316
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000
Heat loss rate W	1118.3117	1087.6576	987.5900	823.4501	632.5292	422.1123	279.2668	292.9296	458.5298	698.1496	922.9500
Space heating kWh	393.7405	286.9870	221.6936	104.1030	34.9584	0.0000	0.0000	0.0000	0.0000	103.6656	254.0292
Space heating requirement - total per year (kWh/year)											404.1882 (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
Solar heating contribution - total per year (kWh/year)											0.0000 (98b)
Space heating kWh	393.7405	286.9870	221.6936	104.1030	34.9584	0.0000	0.0000	0.0000	0.0000	103.6656	254.0292
Space heating requirement after solar contribution - total per year (kWh/year)											1803.3655 (98c)
Space heating per m2										(98c) / (4) =	25.4605 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)											0.0000 (201)
Fraction of space heat from main system(s)											1.0000 (202)
Efficiency of main space heating system 1 (in %)											92.3000 (206)
Efficiency of main space heating system 2 (in %)											0.0000 (207)
Efficiency of secondary/supplementary heating system, %											0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Space heating requirement	393.7405	286.9870	221.6936	104.1030	34.9584	0.0000	0.0000	0.0000	0.0000	103.6656	254.0292
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
Space heating fuel (main heating system)	426.5877	310.9285	240.1881	112.7876	37.8748	0.0000	0.0000	0.0000	0.0000	112.3138	275.2213
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
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
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
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
Water heating											
Water heating requirement	219.1784	193.8184	206.1029	181.9425	176.8051	159.8112	158.1965	164.2772	165.8321	184.2971	195.1633
Efficiency of water heater (217)m	85.3575	84.9384	84.2236	82.8562	81.1579	79.8000	79.8000	79.8000	79.8000	82.8219	84.6520
Fuel for water heating, kWh/month	256.7770	228.1870	244.7091	219.5882	217.8533	200.2647	198.2413	205.8612	207.8096	222.5223	230.5479
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
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
Lighting	22.0430	17.6837	15.9222	11.6653	9.0106	7.3617	8.2198	10.6844	13.8779	18.2086	20.5666
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-18.9864	-28.1318	-42.4719	-50.2354	-56.3501	-53.3977	-52.7524	-48.7233	-41.9901	-33.2585	-21.3548
											-16.2600 (233a)

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Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-6.9409	-14.9160	-30.2420	-46.3064	-62.1015	-62.7162	-61.9725	-52.0639	-37.6332	-21.6113	-9.3563	-5.4650	(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												1953.8088	(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												2686.2450	(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)												177.8994	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-875.2376	(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												4028.7156	(238)

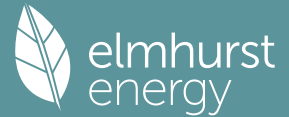
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1953.8088	0.2100	410.2999	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2686.2450	0.2100	564.1115	(264)
Space and water heating			974.4113	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	177.8994	0.1443	25.6764	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-463.9125	0.1336	-61.9571	
PV Unit electricity exported	-411.3251	0.1253	-51.5539	
Total			-113.5110	(269)
Total CO2, kg/year			898.5059	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6900	(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	1953.8088	1.1300	2207.8040	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2686.2450	1.1300	3035.4569	(278)
Space and water heating			5243.2608	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	177.8994	1.5338	272.8680	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-463.9125	1.4935	-692.8682	
PV Unit electricity exported	-411.3251	0.4600	-189.2274	
Total			-882.0956	(283)
Total Primary energy kWh/year			4764.1340	(286)
Target Primary Energy Rate (TPER)			67.2600	(287)

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Plot Reference	Plot 16				Issued on Date	22/12/2025	
Assessment Reference	Plot 16			Plot Type Ref			
Plot Address	Flat 3, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	86 B	DER	3.84	TER	12.69		
Environmental	97 A	% DER < TER				69.74	
CO ₂ Emissions (t/year)	0.23	DFEE	28.38	TFEE	32.49		
Compliance Check	See BREL	% DFEE < TFEE				12.67	
% DPER < TPER	40.54	DPER	40.00	TPER	67.26		
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	70.8300 (1b)	2.5000 (2b)	177.0750 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	177.0750 (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	2.6200 (17)
Infiltration rate	0.1310 (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) = 0.1114 (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	0.1420	0.1392	0.1364	0.1225	0.1197	0.1058	0.1058	0.1030	0.1114	0.1197	0.1253	0.1308 (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	0.2820	0.2792	0.2764	0.2625	0.2597	0.2458	0.2458	0.2430	0.2514	0.2597	0.2653	0.2708 (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			6.3400	1.3258	8.4053		(27)
Window S/W			4.3500	1.3258	5.7670		(27)
Ground Floor			12.0700	0.1500	1.8105	110.0000	1327.7000 (28b)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999 (29a)
Total net area of external elements Aum(A, m ²)			93.7800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.7664		(33)
Main dwelling							
Party Wall			11.3100	0.0000	0.0000	45.0000	508.9500 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Floor			58.7600			40.0000	2350.4000 (32d)
Party Ceiling			70.8300			30.0000	2124.9000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		16106.3999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							227.3952 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	51.1100	0.0370	1.8911
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	30.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	6.7500	0.0250	0.1688
E3 Sill	4.4500	0.0220	0.0979
E4 Jamb	18.3200	0.0170	0.3114
E16 Corner (normal)	8.0400	0.0420	0.3377
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608
E24 Eaves (insulation at ceiling level - inverted)	4.8800	0.1500	0.7320
E14 Flat roof	9.4700	0.1600	1.5152
E20 Exposed floor (normal)	9.8700	0.0540	0.5330
E21 Exposed floor (inverted)	4.4800	0.3200	1.4336
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.8084 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	36.5749 (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	16.4769	16.3143	16.1516	15.3382	15.1756	14.3622	14.3622	14.1996	14.6876	15.1756	15.5009	15.8262	(38)
Heat transfer coeff	53.0518	52.8891	52.7265	51.9131	51.7504	50.9371	50.9371	50.7744	51.2624	51.7504	52.0758	52.4011	(39)
Average = Sum(39)m / 12 =												51.8724	
HLP	0.7490	0.7467	0.7444	0.7329	0.7306	0.7191	0.7191	0.7168	0.7237	0.7306	0.7352	0.7398	(40)
HLP (average)												0.7324	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2661 (42)
Hot water usage for mixer showers	62.2148	61.2798	59.9174	57.3106	55.3869	53.2416	52.0222	53.3743	54.8565	57.1599	59.8227	61.9764	(42a)
Hot water usage for baths	26.8776	26.4785	25.9163	24.8799	24.1038	23.2433	22.7785	23.3366	23.9444	24.8652	25.9230	26.7868	(42b)
Hot water usage for other uses	37.8372	36.4613	35.0854	33.7095	32.3336	30.9577	30.9577	32.3336	33.7095	35.0854	36.4613	37.8372	(42c)
Average daily hot water use (litres/day)												116.6772	(43)
Daily hot water use	126.9296	124.2196	120.9191	115.9000	111.8243	107.4426	105.7583	109.0445	112.5104	117.1105	122.2069	126.6004	(44)
Energy conte	201.0255	176.8870	185.8482	158.6613	150.5370	132.1132	127.9055	135.0199	138.7365	158.9178	174.1062	198.2256	(45)
Energy content (annual)										Total = Sum(45)m =		1937.9838	
Distribution loss (46)m = 0.15 x (45)m	30.1538	26.5331	27.8772	23.7992	22.5806	19.8170	19.1858	20.2530	20.8105	23.8377	26.1159	29.7338	(46)
Water storage loss (or HIU loss):												201.0000	(47)
Store volume												1.6100	(48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400	(49)
Temperature factor from Table 2b												0.8694	(55)
Enter (49) or (54) in (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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770	(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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770	(64)
								Total per year (kWh/year) = Sum(64)m =				2255.3148	(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	66.8410	58.8149	61.7945	52.7549	50.0536	43.9276	42.5286	44.8941	46.1299	52.8402	57.8903	65.9100	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.4793	19.9659	16.2374	12.2927	9.1890	7.7577	8.3825	10.8959	14.6244	18.5690	21.6728	23.1040	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	297.3529	300.4385	292.6629	276.1096	255.2140	235.5751	222.4551	219.3695	227.1451	243.6984	264.5940	284.2329	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	(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)	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	(71)
Water heating gains (Table 5)	89.8400	87.5222	83.0572	73.2707	67.2763	61.0106	57.1621	60.3416	64.0693	71.0217	80.4032	88.5887	(72)
Total internal gains	505.8570	504.1114	488.1422	457.8578	427.8641	400.5282	384.1845	386.7917	402.0236	429.4740	462.8548	492.1105	(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
East	6.3400	19.6403	0.4000	0.0000	0.7700	38.3519 (76)
Southeast	1.1500	36.7938	0.4000	0.0000	0.7700	13.0324 (77)

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energy

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Efficiency of water heater	344.1922	
Water heating fuel used	655.2486	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)		
mechanical ventilation fans (SFP = 0.7500)	162.0236	(230a)
Total electricity for the above, kWh/year	162.0236	(231)
Electricity for lighting (calculated in Appendix L)	158.7964	(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	1707.3514	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	731.2827	16.4900	120.5885	(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)	655.2486	16.4900	108.0505	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	162.0236	16.4900	26.7177	(249)
Energy for lighting	158.7964	16.4900	26.1855	(250)
Additional standing charges			0.0000	(251)
Total energy cost			281.5422	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.8750 (257)
SAP value	85.8157	
SAP rating (Section 12)	86	(258)
SAP band	B	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	731.2827	0.1583	115.7342	(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)	655.2486	0.1412	92.5047	(264)
Space and water heating			208.2388	(265)
Pumps, fans and electric keep-hot	162.0236	0.1387	22.4747	(267)
Energy for lighting	158.7964	0.1443	22.9192	(268)
Total CO2, kg/year			253.6327	(272)
CO2 emissions per m2			3.5800	(273)
EI value			97.0658	
EI rating			97	(274)
EI band			A	

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

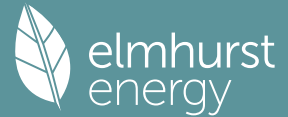
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	70.8300	2.5000	177.0750	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300			
Dwelling volume			177.0750	(5)

2. Ventilation rate

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

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Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												2.6200 (17)
Infiltration rate												0.1310 (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) = 0.1114 (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)
	0.1197	0.1169	0.1169	0.1086	0.1114	0.0946	0.0919	0.0919	0.0946	0.1058	0.1058	0.1086 (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	0.2597	0.2569	0.2569	0.2486	0.2514	0.2346	0.2319	0.2319	0.2346	0.2458	0.2458	0.2486 (25)

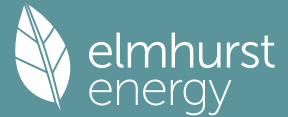
3. Heat losses and heat loss parameter

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			6.3400	1.3258	8.4053			(27)				
Window S/W			4.3500	1.3258	5.7670			(27)				
Ground Floor			12.0700	0.1500	1.8105	110.0000	1327.7000	(28b)				
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999	(29a)				
Total net area of external elements Aum(A, m2)			93.7800					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.7664			(33)				
Main dwelling												
Party Wall			11.3100	0.0000	0.0000	45.0000	508.9500	(32)				
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500	(32)				
Party Floor			58.7600			40.0000	2350.4000	(32d)				
Party Ceiling			70.8300			30.0000	2124.9000	(32b)				
Internal Wall			74.6000			9.0000	671.4000	(32c)				
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 16106.3999 (34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								227.3952 (35)				
List of Thermal Bridges												
K1 Element				Length	Psi-value		Total					
E7 Party floor between dwellings (in blocks of flats)				51.1100	0.0370		1.8911					
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				30.1800	0.0000		0.0000					
E2 Other lintels (including other steel lintels)				6.7500	0.0250		0.1688					
E3 Sill				4.4500	0.0220		0.0979					
E4 Jamb				18.3200	0.0170		0.3114					
E16 Corner (normal)				8.0400	0.0420		0.3377					
E25 Staggered party wall between dwellings				5.3600	0.0300		0.1608					
E24 Eaves (insulation at ceiling level - inverted)				4.8800	0.1500		0.7320					
E14 Flat roof				9.4700	0.1600		1.5152					
E20 Exposed floor (normal)				9.8700	0.0540		0.5330					
E21 Exposed floor (inverted)				4.4800	0.3200		1.4336					
E9 Balcony between dwellings, wall insulation continuous				4.1800	0.1500		0.6270					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								7.8084 (36)				
Point Thermal bridges								0.0000				
Total fabric heat loss						(33a) =						
						(33) + (36) + (36a) =		36.5749 (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	15.1756	15.0129	15.0129	14.5249	14.6876	13.7116	13.5489	13.5489	13.7116	14.3622	14.3622	14.5249 (38)
Average = Sum(39)m / 12 =	51.7504	51.5878	51.5878	51.0998	51.2624	50.2864	50.1238	50.1238	50.2864	50.9371	50.9371	51.0998 (39)
												50.9236
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7306	0.7283	0.7283	0.7214	0.7237	0.7100	0.7077	0.7077	0.7100	0.7191	0.7191	0.7214 (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													2.2661 (42)
Hot water usage for mixer showers	62.2148	61.2798	59.9174	57.3106	55.3869	53.2416	52.0222	53.3743	54.8565	57.1599	59.8227	61.9764 (42a)	
Hot water usage for baths	26.8776	26.4785	25.9163	24.8799	24.1038	23.2433	22.7785	23.3366	23.9444	24.8652	25.9230	26.7868 (42b)	
Hot water usage for other uses	37.8372	36.4613	35.0854	33.7095	32.3336	30.9577	30.9577	32.3336	33.7095	35.0854	36.4613	37.8372 (42c)	
Average daily hot water use (litres/day)												116.6772 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
126.9296	124.2196	120.9191	115.9000	111.8243	107.4426	105.7583	109.0445	112.5104	117.1105	122.2069	126.6004 (44)		
Energy content (annual)	201.0255	176.8870	185.8482	158.6613	150.5370	132.1132	127.9055	135.0199	138.7365	158.9178	174.1062	198.2256 (45)	
Distribution loss (46)m = 0.15 x (45)m	30.1538	26.5331	27.8772	23.7992	22.5806	19.8170	19.1858	20.2530	20.8105	23.8377	26.1159	29.7338 (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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770 (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)	

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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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770 (64)
	Total per year (kWh/year) = Sum(64)m =										2255.3148 (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	66.8410	58.8149	61.7945	52.7549	50.0536	43.9276	42.5286	44.8941	46.1299	52.8402	57.8903	65.9100 (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	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.4793	19.9659	16.2374	12.2927	9.1890	7.7577	8.3825	10.8959	14.6244	18.5690	21.6728	23.1040	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	297.3529	300.4385	292.6629	276.1096	255.2140	235.5751	222.4551	219.3695	227.1451	243.6984	264.5940	284.2329	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	(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)	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	(71)
Water heating gains (Table 5)	89.8400	87.5222	83.0572	73.2707	67.2763	61.0106	57.1621	60.3416	64.0693	71.0217	80.4032	88.5887	(72)
Total internal gains	505.8570	504.1114	488.1422	457.8578	427.8641	400.5282	384.1845	386.7917	402.0236	429.4740	462.8548	492.1105	(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	
East					6.3400	17.3606	0.4000	0.0000			0.7700	33.9004 (76)	
Southeast					1.1500	32.4665	0.4000	0.0000			0.7700	11.4996 (77)	
South					3.2000	41.2355	0.4000	0.0000			0.7700	40.6417 (78)	
Solar gains	86.0417	156.3909	236.6232	315.1731	354.3046	363.3816	340.6526	302.0879	269.3514	185.7392	107.1002	74.4976 (83)	
Total gains	591.8987	660.5023	724.7655	773.0309	782.1687	763.9099	724.8370	688.8796	671.3750	615.2132	569.9550	566.6081 (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	86.4534	86.7260	86.7260	87.5542	87.2764	88.9703	89.2590	89.2590	88.9703	87.8338	87.8338	87.5542
alpha	6.7636	6.7817	6.7817	6.8369	6.8184	6.9314	6.9506	6.9506	6.9314	6.8556	6.8556	6.8369
util living area	0.9662	0.9332	0.8569	0.7079	0.5275	0.3487	0.2558	0.2837	0.4705	0.7603	0.9303	0.9735 (86)
MIT	20.5635	20.7019	20.8569	20.9645	20.9953	20.9998	21.0000	21.0000	20.9984	20.9531	20.7560	20.5266 (87)
Th 2	20.3139	20.3159	20.3159	20.3219	20.3199	20.3320	20.3341	20.3341	20.3320	20.3240	20.3240	20.3219 (88)
util rest of house	0.9583	0.9192	0.8320	0.6712	0.4845	0.3049	0.2098	0.2353	0.4212	0.7187	0.9135	0.9671 (89)
MIT 2	19.8240	19.9928	20.1716	20.2906	20.3166	20.3319	20.3341	20.3341	20.3311	20.2839	20.0676	19.7854 (90)
Living area fraction	fLA = Living area / (4) = 0.4487 (91)											
MIT	20.1558	20.3110	20.4791	20.5930	20.6212	20.6316	20.6328	20.6328	20.6305	20.5842	20.3765	20.1180 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.1558	20.3110	20.4791	20.5930	20.6212	20.6316	20.6328	20.6328	20.6305	20.5842	20.3765	20.1180 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9562	0.9191	0.8383	0.6861	0.5036	0.3245	0.2305	0.2570	0.4433	0.7352	0.9149	0.9649	(94)
Ext temp.	565.9693	607.0845	607.5503	530.4111	393.9162	247.9235	167.0501	177.0686	297.6240	452.2768	521.4675	546.7172	(95)
Heat loss rate W	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)
Space heating kWh	773.9694	748.5880	674.7211	546.4090	395.8054	247.9923	167.0549	177.0790	298.2229	472.9080	635.5166	772.5239	(97)
Space heating requirement - total per year (kWh/year)	154.7520	95.0903	49.9751	11.5185	1.4056	0.0000	0.0000	0.0000	0.0000	15.3496	82.1154	168.0002	(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)	154.7520	95.0903	49.9751	11.5185	1.4056	0.0000	0.0000	0.0000	0.0000	15.3496	82.1154	168.0002	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												578.2067	
Space heating per m2												(98c) / (4) =	8.1633 (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	154.7520	95.0903	49.9751	11.5185	1.4056	0.0000	0.0000	0.0000	0.0000	15.3496	82.1154	168.0002	(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)	154.7520	95.0903	49.9751	11.5185	1.4056	0.0000	0.0000	0.0000	0.0000	15.3496	82.1154	168.0002	(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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770	(64)
Efficiency of water heater (217)m	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	(216)
Fuel for water heating, kWh/month	66.2353	58.4645	61.8258	53.6745	51.5667	45.9613	44.9914	47.0584	47.8856	54.0016	58.1617	65.4219	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	13.7609	12.4292	13.7609	13.3170	13.7609	13.3170	13.7609	13.7609	13.3170	13.7609	13.3170	13.7609	(231)
Lighting	19.6760	15.7848	14.2125	10.4127	8.0430	6.5712	7.3371	9.5371	12.3877	16.2534	18.3581	20.2228	(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												578.2067	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.1922	
Water heating fuel used												655.2486	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)													
mechanical ventilation fans (SFP = 0.7500)												162.0236	(230a)
Total electricity for the above, kWh/year												162.0236	(231)
Electricity for lighting (calculated in Appendix L)												158.7964	(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												1554.2754	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	578.2067	28.4300	164.3842	(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)	655.2486	28.4300	186.2872	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	162.0236	28.4300	46.0633	(249)
Energy for lighting	158.7964	28.4300	45.1458	(250)
Additional standing charges			0.0000	(251)
Total energy cost			441.8805	(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	578.2067	0.1587	91.7889	(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)	655.2486	0.1412	92.5047	(264)
Space and water heating			184.2936	(265)
Pumps, fans and electric keep-hot	162.0236	0.1387	22.4747	(267)
Energy for lighting	158.7964	0.1443	22.9192	(268)
Total CO2, kg/year			229.6875	(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	578.2067	1.5876	917.9599	(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)	655.2486	1.5220	997.3062	(278)
Space and water heating			1915.2661	(279)
Pumps, fans and electric keep-hot	162.0236	1.5128	245.1093	(281)

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Energy for lighting
Total Primary energy kWh/year

158.7964

1.5338

243.5672 (282)
2403.9427 (286)

SAP 10 EPC IMPROVEMENTS

Plot 16

Current energy efficiency rating: B 86
Current environmental impact rating: A 97

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

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

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

Potential energy efficiency rating: B 86
Potential environmental impact rating: A 97

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 £442	Potential £442	Saving £0
Electricity			
Space heating	£210	£210	£0
Water heating	£186	£186	£0
Lighting	£45	£45	£0
Total cost of fuels	£442	£442	£0
Total cost of uses	£441	£441	£0
Delivered energy	22 kWh/m²	22 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	3 kg/m²	3 kg/m²	0 kg/m²
Primary energy	34 kWh/m²	34 kWh/m²	0 kWh/m²

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 (m2)	Storey height (m)	Volume (m3)
Main dwelling	70.8300 (1b)	x 2.5000 (2b)	= 177.0750 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	177.0750 (5)

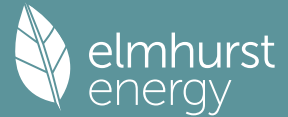
2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 2.6200 (17)
Infiltration rate 0.1310 (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) = 0.1114 (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	0.1420	0.1392	0.1364	0.1225	0.1197	0.1058	0.1058	0.1030	0.1114	0.1197	0.1253	0.1308 (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	0.2820	0.2792	0.2764	0.2625	0.2597	0.2458	0.2458	0.2430	0.2514	0.2597	0.2653	0.2708 (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			6.3400	1.3258	8.4053		(27)
Window S/W			4.3500	1.3258	5.7670		(27)
Ground Floor			12.0700	0.1500	1.8105	110.0000	1327.7000 (28b)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999 (29a)
Total net area of external elements Aum(A, m2)			93.7800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.7664		(33)
Main dwelling							
Party Wall			11.3100	0.0000	0.0000	45.0000	508.9500 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Floor			58.7600			40.0000	2350.4000 (32d)
Party Ceiling			70.8300			30.0000	2124.9000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 16106.3999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 227.3952 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	51.1100	0.0370	1.8911
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	30.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	6.7500	0.0250	0.1688
E3 Sill	4.4500	0.0220	0.0979
E4 Jamb	18.3200	0.0170	0.3114
E16 Corner (normal)	8.0400	0.0420	0.3377
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608
E24 Eaves (insulation at ceiling level - inverted)	4.8800	0.1500	0.7320
E14 Flat roof	9.4700	0.1600	1.5152
E20 Exposed floor (normal)	9.8700	0.0540	0.5330
E21 Exposed floor (inverted)	4.4800	0.3200	1.4336
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.8084 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 36.5749 (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	16.4769	16.3143	16.1516	15.3382	15.1756	14.3622	14.3622	14.1996	14.6876	15.1756	15.5009	15.8262 (38)
Heat transfer coeff	53.0518	52.8891	52.7265	51.9131	51.7504	50.9371	50.9371	50.7744	51.2624	51.7504	52.0758	52.4011 (39)
Average = Sum(39)m / 12 =												51.8724

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.7490	0.7467	0.7444	0.7329	0.7306	0.7191	0.7191	0.7168	0.7237	0.7306	0.7352	0.7398 (40)
HLP (average)												0.7324
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

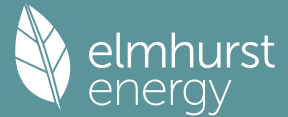
Assumed occupancy												2.2661 (42)
Hot water usage for mixer showers												
62.2148	61.2798	59.9174	57.3106	55.3869	53.2416	52.0222	53.3743	54.8565	57.1599	59.8227	61.9764 (42a)	
Hot water usage for baths												
26.8776	26.4785	25.9163	24.8799	24.1038	23.2433	22.7785	23.3366	23.9444	24.8652	25.9230	26.7868 (42b)	
Hot water usage for other uses												
37.8372	36.4613	35.0854	33.7095	32.3336	30.9577	30.9577	32.3336	33.7095	35.0854	36.4613	37.8372 (42c)	
Average daily hot water use (litres/day)												116.6772 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.9296	124.2196	120.9191	115.9000	111.8243	107.4426	105.7583	109.0445	112.5104	117.1105	122.2069	126.6004 (44)
Energy content (annual)	201.0255	176.8870	185.8482	158.6613	150.5370	132.1132	127.9055	135.0199	138.7365	158.9178	174.1062	198.2256 (45)
Distribution loss (46)m = 0.15 x (45)m	30.1538	26.5331	27.8772	23.7992	22.5806	19.8170	19.1858	20.2530	20.8105	23.8377	26.1159	29.7338 (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 (56)
Primary 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 (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	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)
WWHRS	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	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)
	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770 (64)
Electric shower(s)	Total per year (kWh/year) = Sum(64)m =											2255.3148 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	66.8410	58.8149	61.7945	52.7549	50.0536	43.9276	42.5286	44.8941	46.1299	52.8402	57.8903	65.9100 (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	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.4793	19.9659	16.2374	12.2927	9.1890	7.7577	8.3825	10.8959	14.6244	18.5690	21.6728	23.1040	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	297.3529	300.4385	292.6629	276.1096	255.2140	235.5751	222.4551	219.3695	227.1451	243.6984	264.5940	284.2329	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	(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)	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	(71)
Water heating gains (Table 5)	89.8400	87.5222	83.0572	73.2707	67.2763	61.0106	57.1621	60.3416	64.0693	71.0217	80.4032	88.5887	(72)
Total internal gains	505.8570	504.1114	488.1422	457.8578	427.8641	400.5282	384.1845	386.7917	402.0236	429.4740	462.8548	492.1105	(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	
East				6.3400	19.6403	0.4000	0.0000		0.7700		38.3519 (76)	
Southeast				1.1500	36.7938	0.4000	0.0000		0.7700		13.0324 (77)	
South				3.2000	46.7521	0.4000	0.0000		0.7700		46.0788 (78)	
Solar gains	97.4631	172.6887	250.0576	326.4785	376.2089	376.8720	362.0286	325.2346	277.0059	194.9539	118.0493	82.5081 (83)
Total gains	603.3202	676.8002	738.1999	784.3364	804.0730	777.4003	746.2131	712.0263	679.0295	624.4279	580.9041	574.6186 (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	84.3327	84.5921	84.8530	86.1825	86.4534	87.8338	87.8338	88.1152	87.2764	86.4534	85.9133	85.3799	
alpha	6.6222	6.6395	6.6569	6.7455	6.7636	6.8556	6.8556	6.8743	6.8184	6.7636	6.7276	6.6920	
util living area	0.9735	0.9460	0.8841	0.7574	0.5909	0.4187	0.3003	0.3279	0.5180	0.7983	0.9450	0.9792	(86)
MIT	20.4717	20.6261	20.8019	20.9395	20.9891	20.9991	20.9999	20.9999	20.9964	20.9294	20.6897	20.4369	(87)
Th 2	20.2977	20.2998	20.3018	20.3118	20.3139	20.3240	20.3240	20.3260	20.3199	20.3139	20.3098	20.3058	(88)
util rest of house	0.9674	0.9347	0.8631	0.7239	0.5498	0.3748	0.2542	0.2799	0.4681	0.7606	0.9316	0.9743	(89)
MIT 2	19.6961	19.8867	20.0959	20.2557	20.3054	20.3235	20.3239	20.3259	20.3177	20.2506	19.9757	19.6596	(90)
Living area fraction										FLA = Living area / (4) =		0.4487	(91)
MIT	20.0441	20.2184	20.4127	20.5625	20.6122	20.6266	20.6272	20.6283	20.6222	20.5552	20.2961	20.0084	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0441	20.2184	20.4127	20.5625	20.6122	20.6266	20.6272	20.6283	20.6222	20.5552	20.2961	20.0084	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9648	0.9332	0.8666	0.7364	0.5678	0.3945	0.2749	0.3015	0.4904	0.7743	0.9313	0.9718	(94)
Useful gains	582.1080	631.6149	639.7574	577.6050	456.5653	306.6600	205.1143	214.6505	332.9856	483.5240	541.0010	558.4216	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	11.6000	7.1000	4.2000	(96)
Heat loss rate W	835.2518	810.1778	733.5667	605.4380	461.2090	306.9783	205.1356	214.6900	334.3453	515.1841	687.1955	828.3755	(97)
Space heating kWh	188.3390	119.9943	69.7941	20.0397	3.4549	0.0000	0.0000	0.0000	0.0000	23.5551	105.2600	200.8457	(98a)
Space heating requirement - total per year (kWh/year)												731.2827	
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	188.3390	119.9943	69.7941	20.0397	3.4549	0.0000	0.0000	0.0000	0.0000	23.5551	105.2600	200.8457	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												731.2827	
Space heating per m2										(98c) / (4) =		10.3245	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	188.3390	119.9943	69.7941	20.0397	3.4549	0.0000	0.0000	0.0000	0.0000	23.5551	105.2600	200.8457	(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)	188.3390	119.9943	69.7941	20.0397	3.4549	0.0000	0.0000	0.0000	0.0000	23.5551	105.2600	200.8457	(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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770 (64)
(217)m	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922 (216)
Fuel for water heating, kWh/month	66.2353	58.4645	61.8258	53.6745	51.5667	45.9613	44.9914	47.0584	47.8856	54.0016	58.1617	65.4219 (217)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.7609	12.4292	13.7609	13.3170	13.7609	13.3170	13.7609	13.3170	13.7609	13.3170	13.7609	13.7609 (231)
Lighting	19.6760	15.7848	14.2125	10.4127	8.0430	6.5712	7.3371	9.5371	12.3877	16.2534	18.3581	20.2228 (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												731.2827 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1922
Water heating fuel used												655.2486 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)												
mechanical ventilation fans (SFP = 0.7500)												162.0236 (230a)
Total electricity for the above, kWh/year												162.0236 (231)
Electricity for lighting (calculated in Appendix L)												158.7964 (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												1707.3514 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	731.2827	16.4900	120.5885 (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)	655.2486	16.4900	108.0505 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	162.0236	16.4900	26.7177 (249)
Energy for lighting	158.7964	16.4900	26.1855 (250)
Additional standing charges			0.0000 (251)
Total energy cost			281.5422 (255)

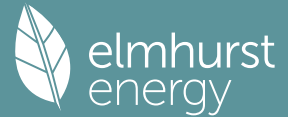
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		0.8750 (257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	85.8157
SAP rating (Section 12)		86 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	731.2827	0.1583	115.7342 (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)	655.2486	0.1412	92.5047 (264)
Space and water heating			208.2388 (265)
Pumps, fans and electric keep-hot	162.0236	0.1387	22.4747 (267)
Energy for lighting	158.7964	0.1443	22.9192 (268)
Total CO2, kg/year			253.6327 (272)
CO2 emissions per m2			3.5800 (273)
EI value			97.0658
EI rating			97 (274)
EI band			A

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1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	70.8300	2.5000	177.0750
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300		
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	2.6200 (17)
Infiltration rate	0.1310 (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) = 0.1114 (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	0.1197	0.1169	0.1169	0.1086	0.1114	0.0946	0.0919	0.0919	0.0946	0.1058	0.1058	0.1086 (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	0.2597	0.2569	0.2569	0.2486	0.2514	0.2346	0.2319	0.2319	0.2346	0.2458	0.2458	0.2486 (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			6.3400	1.3258	8.4053		(27)
Window S/W			4.3500	1.3258	5.7670		(27)
Ground Floor			12.0700	0.1500	1.8105	110.0000	1327.7000 (28b)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999 (29a)
Total net area of external elements Aum(A, m ²)			93.7800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 28.7664		(33)
Main dwelling							
Party Wall			11.3100	0.0000	0.0000	45.0000	508.9500 (32)
Corridor			29.1300	0.0000	0.0000	45.0000	1310.8500 (32)
Party Floor			58.7600			40.0000	2350.4000 (32d)
Party Ceiling			70.8300			30.0000	2124.9000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
(28)...(30) + (32) + (32a)...(32e) = 16106.3999 (34)
List of Thermal Bridges
227.3952 (35)

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	51.1100	0.0370	1.8911
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	30.1800	0.0000	0.0000
E2 Other lintels (including other steel lintels)	6.7500	0.0250	0.1698
E3 Sill	4.4500	0.0220	0.0979
E4 Jamb	18.3200	0.0170	0.3114
E16 Corner (normal)	8.0400	0.0420	0.3377
E25 Staggered party wall between dwellings	5.3600	0.0300	0.1608
E24 Eaves (insulation at ceiling level - inverted)	4.8800	0.1500	0.7320
E14 Flat roof	9.4700	0.1600	1.5152
E20 Exposed floor (normal)	9.8700	0.0540	0.5330
E21 Exposed floor (inverted)	4.4800	0.3200	1.4336
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
Total fabric heat loss
(33) + (36) + (36a) = 36.5749 (37)

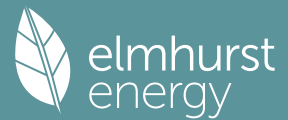
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.1756	15.0129	15.0129	14.5249	14.6876	13.7116	13.5489	13.5489	13.7116	14.3622	14.3622	14.5249 (38)
Average = Sum(39)m / 12 =	51.7504	51.5878	51.5878	51.0998	51.2624	50.2864	50.1238	50.1238	50.2864	50.9371	50.9371	51.0998 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7306	0.7283	0.7283	0.7214	0.7237	0.7100	0.7077	0.7077	0.7100	0.7191	0.7191	0.7214 (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
Hot water usage for mixer showers
2.2661 (42)

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Hot water usage for baths	62.2148	61.2798	59.9174	57.3106	55.3869	53.2416	52.0222	53.3743	54.8565	57.1599	59.8227	61.9764 (42a)
Hot water usage for other uses	26.8776	26.4785	25.9163	24.8799	24.1038	23.2433	22.7785	23.3366	23.9444	24.8652	25.9230	26.7868 (42b)
Average daily hot water use (litres/day)	37.8372	36.4613	35.0854	33.7095	32.3336	30.9577	30.9577	32.3336	33.7095	35.0854	36.4613	37.8372 (42c)
												116.6772 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	126.9296	124.2196	120.9191	115.9000	111.8243	107.4426	105.7583	109.0445	112.5104	117.1105	122.2069	126.6004 (44)
Distribution loss (46)m = 0.15 x (45)m	201.0255	176.8870	185.8482	158.6613	150.5370	132.1132	127.9055	135.0199	138.7365	158.9178	174.1062	198.2256 (45)
Water storage loss (or HIU loss):	30.1538	26.5331	27.8772	23.7992	22.5806	19.8170	19.1858	20.2530	20.8105	23.8377	26.1159	29.7338 (46)
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770 (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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770 (64)
												Total per year (kWh/year) = Sum(64)m = 2255.3148 (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	66.8410	58.8149	61.7945	52.7549	50.0536	43.9276	42.5286	44.8941	46.1299	52.8402	57.8903	65.9100 (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	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663	135.9663 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.4793	19.9659	16.2374	12.2927	9.1890	7.7577	8.3825	10.8959	14.6244	18.5690	21.6728	23.1040 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	297.3529	300.4385	292.6629	276.1096	255.2140	235.5751	222.4551	219.3695	227.1451	243.6984	264.5940	284.2329 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627	50.8627 (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)	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442	-90.6442 (71)
Water heating gains (Table 5)	89.8400	87.5222	83.0572	73.2707	67.2763	61.0106	57.1621	60.3416	64.0693	71.0217	80.4032	88.5887 (72)
Total internal gains	505.8570	504.1114	488.1422	457.8578	427.8641	400.5282	384.1845	386.7917	402.0236	429.4740	462.8548	492.1105 (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

East	6.3400	17.3606	0.4000	0.0000	0.7700	33.9004 (76)
Southeast	1.1500	32.4665	0.4000	0.0000	0.7700	11.4996 (77)
South	3.2000	41.2355	0.4000	0.0000	0.7700	40.6417 (78)

Solar gains	86.0417	156.3909	236.6232	315.1731	354.3046	363.3816	340.6526	302.0879	269.3514	185.7392	107.1002	74.4976 (83)
Total gains	591.8987	660.5023	724.7655	773.0309	782.1687	763.9099	724.8370	688.8796	671.3750	615.2132	569.9550	566.6081 (84)

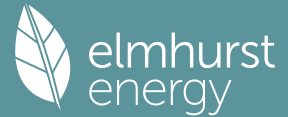
7. Mean internal temperature (heating season)

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	86.4534	86.7260	86.7260	87.5542	87.2764	88.9703	89.2590	89.2590	88.9703	87.8338	87.8338	87.5542
alpha	6.7636	6.7817	6.7817	6.8369	6.8184	6.9314	6.9506	6.9506	6.9314	6.8556	6.8556	6.8369
util living area	0.9662	0.9332	0.8569	0.7079	0.5275	0.3487	0.2558	0.2837	0.4705	0.7603	0.9303	0.9735 (86)
MIT	20.5635	20.7019	20.8569	20.9645	20.9953	20.9998	21.0000	21.0000	20.9984	20.9531	20.7560	20.5266 (87)
Th 2	20.3139	20.3159	20.3159	20.3219	20.3199	20.3320	20.3341	20.3341	20.3320	20.3240	20.3240	20.3219 (88)
util rest of house	0.9583	0.9192	0.8320	0.6712	0.4845	0.3049	0.2098	0.2353	0.4212	0.7187	0.9135	0.9671 (89)
MIT 2	19.8240	19.9928	20.1716	20.2906	20.3166	20.3319	20.3341	20.3341	20.3311	20.2839	20.0676	19.7854 (90)
Living area fraction									fLA = Living area / (4) =			0.4487 (91)
MIT	20.1558	20.3110	20.4791	20.5930	20.6212	20.6316	20.6328	20.6328	20.6305	20.5842	20.3765	20.1180 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1558	20.3110	20.4791	20.5930	20.6212	20.6316	20.6328	20.6328	20.6305	20.5842	20.3765	20.1180 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9562	0.9191	0.8383	0.6861	0.5036	0.3245	0.2305	0.2570	0.4433	0.7352	0.9149	0.9649 (94)
	565.9693	607.0845	607.5503	530.4111	393.9162	247.9235	167.0501	177.0686	297.6240	452.2768	521.4675	546.7172 (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	773.9694	748.5880	674.7211	546.4090	395.8054	247.9923	167.0549	177.0790	298.2229	472.9080	635.5166	772.5239 (97)
Space heating kWh	154.7520	95.0903	49.9751	11.5185	1.4056	0.0000	0.0000	0.0000	0.0000	15.3496	82.1154	168.0002 (98a)
Space heating requirement - total per year (kWh/year)												578.2067
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	154.7520	95.0903	49.9751	11.5185	1.4056	0.0000	0.0000	0.0000	0.0000	15.3496	82.1154	168.0002 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												578.2067
Space heating per m2										(98c) / (4) =		8.1633 (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	154.7520	95.0903	49.9751	11.5185	1.4056	0.0000	0.0000	0.0000	0.0000	15.3496	82.1154	168.0002 (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)	154.7520	95.0903	49.9751	11.5185	1.4056	0.0000	0.0000	0.0000	0.0000	15.3496	82.1154	168.0002 (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	227.9769	201.2302	212.7996	184.7433	177.4884	158.1952	154.8569	161.9713	164.8185	185.8692	200.1882	225.1770 (64)
Efficiency of water heater (217)m	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922	344.1922 (216)
Fuel for water heating, kWh/month	66.2353	58.4645	61.8258	53.6745	51.5667	45.9613	44.9914	47.0584	47.8856	54.0016	58.1617	65.4219 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.7609	12.4292	13.7609	13.3170	13.7609	13.3170	13.7609	13.3170	13.7609	13.3170	13.7609	13.7609 (231)
Lighting	19.6760	15.7848	14.2125	10.4127	8.0430	6.5712	7.3371	9.5371	12.3877	16.2534	18.3581	20.2228 (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												578.2067 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1922
Water heating fuel used												655.2486 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)												
Mechanical ventilation fans (SFP = 0.7500)												162.0236 (230a)
Total electricity for the above, kWh/year												162.0236 (231)
Electricity for lighting (calculated in Appendix L)												158.7964 (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												1554.2754 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	578.2067	28.4300	164.3842 (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)	655.2486	28.4300	186.2872 (247)	
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)	
Pumps, fans and electric keep-hot	162.0236	28.4300	46.0633 (249)	
Energy for lighting	158.7964	28.4300	45.1458 (250)	
Additional standing charges			0.0000 (251)	
Total energy cost			441.8805 (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	578.2067	0.1587	91.7889 (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)	655.2486	0.1412	92.5047 (264)
Space and water heating			184.2936 (265)
Pumps, fans and electric keep-hot	162.0236	0.1387	22.4747 (267)
Energy for lighting	158.7964	0.1443	22.9192 (268)
Total CO2, kg/year			229.6875 (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	578.2067	1.5876	917.9599 (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)	655.2486	1.5220	997.3062 (278)
Space and water heating			1915.2661 (279)
Pumps, fans and electric keep-hot	162.0236	1.5128	245.1093 (281)
Energy for lighting	158.7964	1.5338	243.5672 (282)
Total Primary energy kWh/year			2403.9427 (286)