

Full SAP Calculation Printout



Plot Reference	Plot 24			Issued on Date	22/12/2025
Assessment Reference	Plot 24	Plot Type Ref			
Plot Address	Flat 5, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	82 B	DER	4.76	TER	15.48
Environmental	96 A	% DER < TER			69.25
CO ₂ Emissions (t/year)	0.29	DFEE	33.98	TFEE	45.19
Compliance Check	See BREL	% DFEE < TFEE			24.81
% DPER < TPER	40.13	DPER	49.27	TPER	82.30
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	2.9100	(17)
Infiltration rate	0.1455	(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) =	0.1237 (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	0.1577	0.1546	0.1515	0.1360	0.1330	0.1175	0.1175	0.1144	0.1237	0.1330	0.1391	0.1453 (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	0.2977	0.2946	0.2915	0.2760	0.2730	0.2575	0.2575	0.2544	0.2637	0.2730	0.2791	0.2853 (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)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999 (29a)
Flat Roof	56.2700		56.2700	0.1500	8.4405	9.0000	506.4300 (30)
Total net area of external elements Aum(A, m ²)			137.9800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	35.3964	(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			70.8300			40.0000	2833.2000 (32d)
Party Ceiling			14.5600			30.0000	436.8000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	14079.8299 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		198.7834 (35)

Full SAP Calculation Printout



List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	33.9300	0.0370	1.2554
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	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)	4.2200	0.1500	0.6330
E15 Flat roof with parapet	31.8500	0.1320	4.2042
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270
P4 Party wall - Roof (insulation at ceiling level)	7.4300	0.0400	0.2972
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.0934 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	43.4898 (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	17.3952	17.2145	17.0338	16.1305	15.9498	15.0464	15.0464	14.8658	15.4078	15.9498	16.3111	16.6725	(38)
Heat transfer coeff	60.8850	60.7043	60.5237	59.6203	59.4396	58.5363	58.5363	58.3556	58.8976	59.4396	59.8010	60.1623	(39)
Average = Sum(39)m / 12 =												59.5751	
HLP	0.8596	0.8570	0.8545	0.8417	0.8392	0.8264	0.8264	0.8239	0.8315	0.8392	0.8443	0.8494	(40)
HLP (average)												0.8411	
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):													
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)
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)

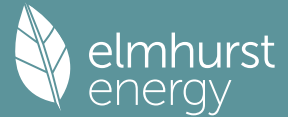
5. Internal gains (see Table 5 and 5a)

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)
Southeast	1.1500	36.7938	0.4000	0.0000	0.7700	13.0324 (77)

Full SAP Calculation Printout



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	64.2369	64.4281	64.6204	65.5995	65.7989	66.8144	66.8144	67.0212	66.4045	65.7989	65.4013	65.0085
alpha	5.2825	5.2952	5.3080	5.3733	5.3866	5.4543	5.4543	5.4681	5.4270	5.3866	5.3601	5.3339
util living area												
	0.9818	0.9615	0.9227	0.8255	0.6740	0.4862	0.3514	0.3846	0.5980	0.8609	0.9623	0.9852 (86)
MIT	20.0802	20.2944	20.5391	20.8041	20.9445	20.9922	20.9989	20.9982	20.9772	20.7903	20.4016	20.0458 (87)
Th 2	20.2020	20.2042	20.2064	20.2173	20.2195	20.2305	20.2305	20.2327	20.2261	20.2195	20.2151	20.2107 (88)
util rest of house												
	0.9776	0.9533	0.9069	0.7945	0.6272	0.4298	0.2903	0.3211	0.5372	0.8282	0.9528	0.9818 (89)
MIT 2	19.1362	19.4053	19.7068	20.0241	20.1729	20.2256	20.2300	20.2319	20.2104	20.0176	19.5509	19.0996 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.5598	19.8042	20.0803	20.3741	20.5191	20.5696	20.5750	20.5758	20.5544	20.3643	19.9326	19.5241 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5598	19.8042	20.0803	20.3741	20.5191	20.5696	20.5750	20.5758	20.5544	20.3643	19.9326	19.5241 (93)

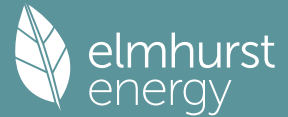
8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9735	0.9485	0.9041	0.8010	0.6456	0.4548	0.3177	0.3496	0.5635	0.8347	0.9487	0.9781 (94)
Useful gains	535.0508	603.1739	625.8978	601.8596	501.9892	346.7335	232.3748	243.1668	371.8297	494.4226	514.5413	513.1148 (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												
	929.0921	904.7514	821.9278	684.0867	524.2037	349.4382	232.6825	243.6784	380.1503	580.3870	767.4023	921.9334 (97)
Space heating kWh												
	293.1668	202.6601	145.8463	59.2035	16.5276	0.0000	0.0000	0.0000	0.0000	63.9575	182.0599	304.1610 (98a)
Space heating requirement - total per year (kWh/year)												1267.5826
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												
	293.1668	202.6601	145.8463	59.2035	16.5276	0.0000	0.0000	0.0000	0.0000	63.9575	182.0599	304.1610 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1267.5826
Space heating per m2										(98c) / (4) =		17.8961 (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												
	293.1668	202.6601	145.8463	59.2035	16.5276	0.0000	0.0000	0.0000	0.0000	63.9575	182.0599	304.1610 (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)												
	293.1668	202.6601	145.8463	59.2035	16.5276	0.0000	0.0000	0.0000	0.0000	63.9575	182.0599	304.1610 (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	13.7609	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												1267.5826 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)

Full SAP Calculation Printout



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	2243.6512	(238)

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year	
Space heating - main system 1	1267.5826	0.1569	198.9415	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO ₂ associated with community systems			0.0000	(373)
Water heating (other fuel)	655.2486	0.1412	92.5047	(264)
Space and water heating			291.4462	(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 CO ₂ , kg/year			336.8401	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.7600	(273)

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

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year	
Space heating - main system 1	1267.5826	1.5810	2004.0511	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO ₂ associated with community systems			0.0000	(473)
Water heating (other fuel)	655.2486	1.5220	997.3062	(278)
Space and water heating			3001.3573	(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			3490.0339	(286)
Dwelling Primary energy Rate (DPER)			49.2700	(287)

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

1. Overall dwelling characteristics

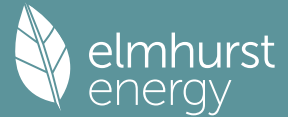
	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling	70.8300	2.5000	177.0750	(1b) - (3b)
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300			(4)
Dwelling volume			177.0750	(5)

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	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
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1750	1.1750
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

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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)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836			(29a)
Flat Roof	56.2700		56.2700	0.1100	6.1897			(30)
Total net area of external elements Aum(A, m2)			137.9800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	31.2138			(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

198.7834 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	33.9300	0.0700	2.3751
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	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)	4.2200	0.2400	1.0128
E15 Flat roof with parapet	31.8500	0.5600	17.8360
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.0200	0.0836
P4 Party wall - Roof (insulation at ceiling level)	7.4300	0.1200	0.8916

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

24.7203 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 55.9341 (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	91.1881	90.9537	90.7239	89.6447	89.4428	88.5028	88.5028	88.3287	88.8649	89.4428	89.8513	90.2783	(39)
Average = Sum(39)m / 12 =												89.6437	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2874	1.2841	1.2809	1.2656	1.2628	1.2495	1.2495	1.2471	1.2546	1.2628	1.2685	1.2746	(40)
HLP (average)												1.2656	
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 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)
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Water storage loss (or HIU loss):

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day):

Temperature factor from Table 2b 1.3938 (48)

Enter (49) or (54) in (55) 0.5400 (49)

Total storage loss 0.7527 (55)

23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 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 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 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 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 -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 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 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)

Total per year (kWh/year) = Sum(64)m = 2222.3299 (64)

12Total per year (kWh/year) 2222 (64)

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

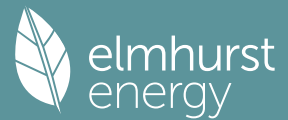
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 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)
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)

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Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-90.6442	-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)	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)
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	495.2063 (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	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)

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	42.8901	43.0006	43.1095	43.6285	43.7270	44.1914	44.1914	44.2785	44.0114	43.7270	43.5282	43.3223
alpha	3.8593	3.8667	3.8740	3.9086	3.9151	3.9461	3.9461	3.9519	3.9341	3.9151	3.9019	3.8882
util living area	0.9830	0.9707	0.9492	0.8964	0.7985	0.6378	0.4834	0.5227	0.7365	0.9128	0.9703	0.9854 (86)
MIT	19.3672	19.6018	19.9292	20.3555	20.6988	20.9114	20.9769	20.9685	20.8378	20.3964	19.8168	19.3331 (87)
Th 2	19.8507	19.8533	19.8559	19.8679	19.8701	19.8806	19.8806	19.8825	19.8766	19.8701	19.8656	19.8608 (88)
util rest of house	0.9786	0.9633	0.9358	0.8685	0.7442	0.5474	0.3681	0.4064	0.6544	0.8833	0.9614	0.9816 (89)
MIT 2	17.9854	18.2825	18.6933	19.2197	19.6105	19.8257	19.8721	19.8699	19.7630	19.2812	18.5656	17.9489 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	18.6054	18.8745	19.2478	19.7293	20.0988	20.3128	20.3678	20.3628	20.2452	19.7815	19.1270	18.5700 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.6054	18.8745	19.2478	19.7293	20.0988	20.3128	20.3678	20.3628	20.2452	19.7815	19.1270	18.5700 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9721	0.9550	0.9271	0.8646	0.7562	0.5840	0.4195	0.4579	0.6835	0.8805	0.9538	0.9757 (94)
Useful gains	585.1758	656.8010	689.2106	693.3249	625.9531	472.7739	326.6447	340.3481	483.8065	567.0039	567.0842	563.0745 (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	1304.4825	1271.0302	1156.5284	970.7925	751.2136	505.6008	333.4616	350.0270	546.0962	821.2228	1080.6385	1297.2970 (97)
Space heating kWh	535.1642	412.7620	347.6844	199.7767	93.1937	0.0000	0.0000	0.0000	0.0000	189.1389	369.7590	546.2615 (98a)
Space heating requirement - total per year (kWh/year)	2693.7404											
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	535.1642	412.7620	347.6844	199.7767	93.1937	0.0000	0.0000	0.0000	0.0000	189.1389	369.7590	546.2615 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2693.7404											
Space heating per m2	(98c) / (4) = 38.0311 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	535.1642	412.7620	347.6844	199.7767	93.1937	0.0000	0.0000	0.0000	0.0000	189.1389	369.7590	546.2615 (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)	579.8095	447.1961	376.6895	216.4428	100.9683	0.0000	0.0000	0.0000	0.0000	204.9175	400.6057	591.8326 (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 (217)m	85.9824	85.7112	85.2229	84.2700	82.6928	79.8000	79.8000	79.8000	79.8000	84.1180	85.4699	79.8000 (216)
Fuel for water heating, kWh/month	254.9107	226.1295	241.8400	215.9043	213.8095	200.2647	198.2413	205.8612	207.8096	219.0935	228.3416	252.0923 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	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)
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)

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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	(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	(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	(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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2918.4620 (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												2664.2983 (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												4971.4221 (238)

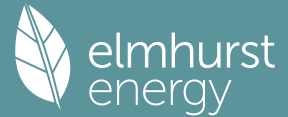
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2918.4620	0.2100	612.8770 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2664.2983	0.2100	559.5026 (264)
Space and water heating			1172.3797 (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			1096.4743 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.4800 (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	2918.4620	1.1300	3297.8621 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2664.2983	1.1300	3010.6571 (278)
Space and water heating			6308.5192 (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			5829.3924 (286)
Target Primary Energy Rate (TPER)			82.3000 (287)

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Plot Reference	Plot 24			Issued on Date	22/12/2025
Assessment Reference	Plot 24	Plot Type Ref			
Plot Address	Flat 5, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	82 B	DER	4.76	TER	15.48
Environmental	96 A	% DER < TER			69.25
CO ₂ Emissions (t/year)	0.29	DFEE	33.98	TFEE	45.19
Compliance Check	See BREL	% DFEE < TFEE			24.81
% DPER < TPER	40.13	DPER	49.27	TPER	82.30
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

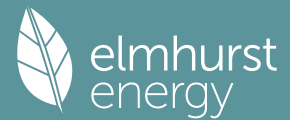
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	2.9100 (17)
Infiltration rate	0.3149 (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) = 0.2677 (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	0.3413	0.3346	0.3279	0.2944	0.2878	0.2543	0.2543	0.2476	0.2677	0.2878	0.3011	0.3145 (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	0.5582	0.5560	0.5538	0.5434	0.5414	0.5323	0.5323	0.5307	0.5358	0.5414	0.5453	0.5495 (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)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999 (29a)
Flat Roof	56.2700		56.2700	0.1500	8.4405	9.0000	506.4300 (30)
Total net area of external elements Aum(A, m ²)			137.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.3964		(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			70.8300			40.0000	2833.2000 (32d)
Party Ceiling			14.5600			30.0000	436.8000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14079.8299 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							198.7834 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)				33.9300	0.0370	1.2554	

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P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	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)	4.2200	0.1500	0.6330										
E15 Flat roof with parapet	31.8500	0.1320	4.2042										
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270										
P4 Party wall - Roof (insulation at ceiling level)	7.4300	0.0400	0.2972										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												8.0934	(36)
Point Thermal bridges												0.0000	
Total fabric heat loss												(33) + (36) + (36a) =	43.4898 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	32.6207	32.4885	32.3590	31.7505	31.6367	31.1068	31.1068	31.0087	31.3109	31.6367	31.8670	32.1078	(38)
Heat transfer coeff	76.1105	75.9783	75.8488	75.2404	75.1265	74.5966	74.5966	74.4985	74.8007	75.1265	75.3568	75.5976	(39)
Average = Sum(39)m / 12 =												75.2398	
HLP	1.0746	1.0727	1.0709	1.0623	1.0607	1.0532	1.0532	1.0518	1.0561	1.0607	1.0639	1.0673	(40)
HLP (average)												1.0623	
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)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	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)													
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)												837.3626	(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)
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	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	Solar flux	g	FF							
			m2	Table 6a	W/m2	Specific data	Specific data	Access					
						or Table 6b	or Table 6c	factor					
								Table 6d					
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	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	51.3867	51.4760	51.5639	51.9809	52.0597	52.4295	52.4295	52.4986	52.2864	52.0597	51.9006	51.7353	
alpha	4.4258	4.4317	4.4376	4.4654	4.4706	4.4953	4.4953	4.4999	4.4858	4.4706	4.4600	4.4490	
util living area	0.9897	0.9787	0.9575	0.8993	0.7884	0.6124	0.4554	0.4984	0.7260	0.9234	0.9797	0.9916 (86)	
MIT	19.5854	19.8197	20.1267	20.5124	20.7991	20.9514	20.9896	20.9846	20.8955	20.5149	19.9822	19.5428 (87)	
Th 2	20.0217	20.0232	20.0247	20.0318	20.0331	20.0393	20.0393	20.0404	20.0369	20.0331	20.0304	20.0276 (88)	
util rest of house	0.9871	0.9734	0.9466	0.8740	0.7381	0.5332	0.3598	0.4002	0.6518	0.8985	0.9736	0.9895 (89)	
MIT 2	18.7414	18.9734	19.2743	19.6448	19.8967	20.0153	20.0361	20.0353	19.9787	19.6560	19.1415	18.7037 (90)	
Living area fraction	fLA = Living area / (4) =												0.4487 (91)
MIT	19.1201	19.3532	19.6568	20.0341	20.3016	20.4353	20.4639	20.4612	20.3901	20.0413	19.5187	19.0802 (92)	
Temperature adjustment													0.0000
adjusted MIT	19.1201	19.3532	19.6568	20.0341	20.3016	20.4353	20.4639	20.4612	20.3901	20.0413	19.5187	19.0802 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9839	0.9689	0.9417	0.8740	0.7530	0.5669	0.4027	0.4441	0.6807	0.8987	0.9696	0.9867 (94)
Useful gains	497.6640	574.8193	614.2849	627.4122	563.1342	417.5764	285.2112	297.8792	430.7534	504.0362	489.3593	475.2772 (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	1127.9639	1098.1264	997.9246	837.7326	646.2061	435.2949	288.2355	302.5540	470.5017	709.2940	935.8353	1124.9067 (97)
Space heating kWh	468.9431	351.6624	285.4279	151.4307	61.8055	0.0000	0.0000	0.0000	0.0000	152.7118	321.4627	483.3243 (98a)
Space heating requirement - total per year (kWh/year)												2276.7684
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	468.9431	351.6624	285.4279	151.4307	61.8055	0.0000	0.0000	0.0000	0.0000	152.7118	321.4627	483.3243 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2276.7684
Space heating per m2												(98c) / (4) = 32.1441 (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	701.2082	552.0149	566.1884	0.0000	0.0000	0.0000	0.0000 (100)	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8745	0.9290	0.9101	0.0000	0.0000	0.0000	0.0000 (101)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	613.1746	512.8350	515.3073	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	146.6257	203.2286	170.3407	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	36.6564	50.8071	42.5852	0.0000	0.0000	0.0000	0.0000 (107)	
Space cooling requirement												130.0487 (107)	
Energy for space heating												32.1441 (99)	
Energy for space cooling												1.8361 (108)	
Total												33.9802 (109)	
Fabric Energy Efficiency (DFEE)												34.0 (109)	

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

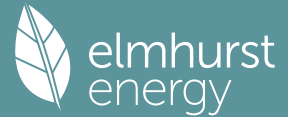
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	70.8300 (1b)	x 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

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

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Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											Air changes per hour	
Pressure test												30.0000 / (5) =	0.1694 (8)
Pressure Test Method													Yes
Measured/design AP50													Blower Door
Infiltration rate													5.0000 (17)
Number of sides sheltered													0.4194 (18)
													2 (19)
Shelter factor												(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.3565 (21)

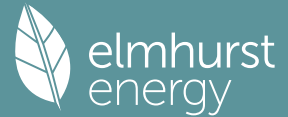
3. Heat losses and heat loss parameter													

Element	Gross		Openings		NetArea		U-value		A x U		K-value		
Main dwelling	m2		m2		m2		W/m2K		W/K		kJ/m2K		
TER Opening Type					10.6900		1.1450		12.2405				
EXT Wall	81.7100		10.6900		71.0200		0.1800		12.7836				
Flat Roof	56.2700				56.2700		0.1100		6.1897				
Total net area of external elements Aum(A, m2)					137.9800								
Fabric heat loss, W/K = Sum (A x U)					(26) ... (30) + (32) =		31.2138						
Main dwelling													
Party Wall					11.3100		0.0000		0.0000				
Corridor					29.1300		0.0000		0.0000				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												198.7834 (35)	
List of Thermal Bridges													
K1 Element	Length		Psi-value		Total								
E7 Party floor between dwellings (in blocks of flats)	33.9300		0.0700		2.3751								
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300		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)	4.2200		0.2400		1.0128								
E15 Flat roof with parapet	31.8500		0.5600		17.8360								
E9 Balcony between dwellings, wall insulation continuous	4.1800		0.0200		0.0836								
P4 Party wall - Roof (insulation at ceiling level)	7.4300		0.1200		0.8916								
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												24.7203 (36)	
Point Thermal bridges												(36a) =	
Total fabric heat loss												(33) + (36) + (36a) =	
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												55.9341 (37)	
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	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)	
Average = Sum(39)m / 12 =	91.1881	90.9537	90.7239	89.6447	89.4428	88.5028	88.5028	88.3287	88.8649	89.4428	89.8513	90.2783 (39)	
												89.6437	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2874	1.2841	1.2809	1.2656	1.2628	1.2495	1.2495	1.2471	1.2546	1.2628	1.2685	1.2746 (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												0.0000 (42a)	
Hot water usage for baths												26.8776 (42b)	
Hot water usage for other uses												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												985.1325	
Water storage loss (or HIU loss):												0.0000 (46)	
Total storage loss												0.0000 (56)	
If cylinder contains dedicated solar storage												0.0000 (57)	
Primary loss												0.0000 (59)	
Combi loss												0.0000 (61)	
Total heat required for water heating calculated for each month												87.1186 (62)	
WWHRS												0.0000 (63a)	
PV diverter												0.0000 (63b)	
Solar input												0.0000 (63c)	
FGHRS												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)												Total per year (kWh/year) = Sum(64)m =	
Electric shower(s)												837.3626 (64)	
	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												566.7414 (64a)	
	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)	

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	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	42.8901	43.0006	43.1095	43.6285	43.7270	44.1914	44.1914	44.2785	44.0114	43.7270	43.5282	43.3223
alpha	3.8593	3.8667	3.8740	3.9086	3.9151	3.9461	3.9461	3.9519	3.9341	3.9151	3.9019	3.8882
util living area	0.9905	0.9818	0.9659	0.9231	0.8380	0.6842	0.5269	0.5715	0.7859	0.9407	0.9825	0.9921 (86)
MIT	19.2068	19.4503	19.7931	20.2524	20.6341	20.8861	20.9688	20.9569	20.7926	20.2878	19.6726	19.1723 (87)
Th 2	19.8507	19.8533	19.8559	19.8679	19.8701	19.8806	19.8806	19.8825	19.8766	19.8701	19.8656	19.8608 (88)
util rest of house	0.9879	0.9770	0.9563	0.9006	0.7888	0.5933	0.4042	0.4485	0.7083	0.9186	0.9770	0.9900 (89)
MIT 2	18.2390	18.4815	18.8203	19.2706	19.6178	19.8239	19.8714	19.8686	19.7589	19.3142	18.7127	18.2122 (90)
Living area fraction	18.6733	18.9162	19.2567	19.7111	20.0738	20.3005	20.3638	20.3569	20.2227	19.7510	19.1434	18.6430 (92)
MIT	18.6733	18.9162	19.2567	19.7111	20.0738	20.3005	20.3638	20.3569	20.2227	19.7510	19.1434	18.6430 (93)
Temperature adjustment												0.0000
adjusted MIT	18.6733	18.9162	19.2567	19.7111	20.0738	20.3005	20.3638	20.3569	20.2227	19.7510	19.1434	18.6430 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9844	0.9717	0.9500	0.8969	0.7987	0.6295	0.4589	0.5029	0.7347	0.9157	0.9723	0.9868 (94)
Useful gains	497.1269	575.2196	617.8446	641.5179	594.9618	461.8666	323.7786	336.0982	463.3520	512.1789	489.8130	474.6915 (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	1310.6694	1274.8215	1157.3411	969.1566	748.9726	504.5099	333.1047	349.5064	544.0935	818.4937	1082.1135	1303.8872 (97)
Space heating kWh	605.2756	470.1325	401.3854	235.8999	114.5841	0.0000	0.0000	0.0000	0.0000	227.8982	426.4564	616.9216 (98a)
Space heating requirement - total per year (kWh/year)												3098.5536
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	605.2756	470.1325	401.3854	235.8999	114.5841	0.0000	0.0000	0.0000	0.0000	227.8982	426.4564	616.9216 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3098.5536
Space heating per m2										(98c) / (4) =		43.7463 (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	831.9265	654.9208	671.2985	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7887	0.8621	0.8356	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	656.1756	564.6005	560.9347	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	113.2070	162.2751	134.2020	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	28.3017	40.5688	33.5505	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												102.4210 (107)
Energy for space heating												43.7463 (99)
Energy for space cooling												1.4460 (108)
Total												45.1924 (109)
Fabric Energy Efficiency (TFEE)												45.2 (109)

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Plot Reference	Plot 24			Issued on Date	22/12/2025
Assessment Reference	Plot 24	Plot Type Ref			
Plot Address	Flat 5, 2 Cross Road Manchester, M21 9SU			SAP Version	10.2
SAP Rating	82 B	DER	4.76	TER	15.48
Environmental	96 A	% DER < TER			69.25
CO ₂ Emissions (t/year)	0.29	DFEE	33.98	TFEE	45.19
Compliance Check	See BREL	% DFEE < TFEE			24.81
% DPER < TPER	40.13	DPER	49.27	TPER	82.30
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	2.9100	(17)
Infiltration rate	0.1455	(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) =	0.1237 (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	0.1577	0.1546	0.1515	0.1360	0.1330	0.1175	0.1175	0.1144	0.1237	0.1330	0.1391	0.1453 (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	0.2977	0.2946	0.2915	0.2760	0.2730	0.2575	0.2575	0.2544	0.2637	0.2730	0.2791	0.2853 (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)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999 (29a)
Flat Roof	56.2700		56.2700	0.1500	8.4405	9.0000	506.4300 (30)
Total net area of external elements Aum(A, m ²)			137.9800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	35.3964	(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			70.8300			40.0000	2833.2000 (32d)
Party Ceiling			14.5600			30.0000	436.8000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	14079.8299 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		198.7834 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	33.9300	0.0370	1.2554
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	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)	4.2200	0.1500	0.6330
E15 Flat roof with parapet	31.8500	0.1320	4.2042
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270
P4 Party wall - Roof (insulation at ceiling level)	7.4300	0.0400	0.2972
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.0934 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	43.4898 (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	17.3952	17.2145	17.0338	16.1305	15.9498	15.0464	15.0464	14.8658	15.4078	15.9498	16.3111	16.6725	(38)
Heat transfer coeff	60.8850	60.7043	60.5237	59.6203	59.4396	58.5363	58.5363	58.3556	58.8976	59.4396	59.8010	60.1623	(39)
Average = Sum(39)m / 12 =												59.5751	
HLP	0.8596	0.8570	0.8545	0.8417	0.8392	0.8264	0.8264	0.8239	0.8315	0.8392	0.8443	0.8494	(40)
HLP (average)												0.8411	
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):													
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)
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)

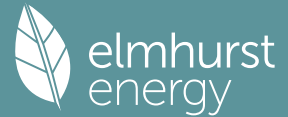
5. Internal gains (see Table 5 and 5a)

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)
Southeast	1.1500	36.7938	0.4000	0.0000	0.7700	13.0324 (77)

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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	64.2369	64.4281	64.6204	65.5995	65.7989	66.8144	66.8144	67.0212	66.4045	65.7989	65.4013	65.0085
alpha	5.2825	5.2952	5.3080	5.3733	5.3866	5.4543	5.4543	5.4681	5.4270	5.3866	5.3601	5.3339
util living area	0.9818	0.9615	0.9227	0.8255	0.6740	0.4862	0.3514	0.3846	0.5980	0.8609	0.9623	0.9852 (86)
MIT	20.0802	20.2944	20.5391	20.8041	20.9445	20.9922	20.9989	20.9982	20.9772	20.7903	20.4016	20.0458 (87)
Th 2	20.2020	20.2042	20.2064	20.2173	20.2195	20.2305	20.2305	20.2327	20.2261	20.2195	20.2151	20.2107 (88)
util rest of house	0.9776	0.9533	0.9069	0.7945	0.6272	0.4298	0.2903	0.3211	0.5372	0.8282	0.9528	0.9818 (89)
MIT 2	19.1362	19.4053	19.7068	20.0241	20.1729	20.2256	20.2300	20.2319	20.2104	20.0176	19.5509	19.0996 (90)
Living area fraction	19.5598	19.8042	20.0803	20.3741	20.5191	20.5696	20.5750	20.5758	20.5544	20.3643	19.9326	19.5241 (91)
MIT	19.5598	19.8042	20.0803	20.3741	20.5191	20.5696	20.5750	20.5758	20.5544	20.3643	19.9326	19.5241 (92)
Temperature adjustment	19.5598	19.8042	20.0803	20.3741	20.5191	20.5696	20.5750	20.5758	20.5544	20.3643	19.9326	0.0000
adjusted MIT	19.5598	19.8042	20.0803	20.3741	20.5191	20.5696	20.5750	20.5758	20.5544	20.3643	19.9326	19.5241 (93)

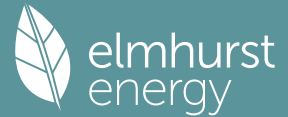
8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9735	0.9485	0.9041	0.8010	0.6456	0.4548	0.3177	0.3496	0.5635	0.8347	0.9487	0.9781 (94)
Useful gains	535.0508	603.1739	625.8978	601.8596	501.9892	346.7335	232.3748	243.1668	371.8297	494.4226	514.5413	513.1148 (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	929.0921	904.7514	821.9278	684.0867	524.2037	349.4382	232.6825	243.6784	380.1503	580.3870	767.4023	921.9334 (97)
Space heating kWh	293.1668	202.6601	145.8463	59.2035	16.5276	0.0000	0.0000	0.0000	0.0000	63.9575	182.0599	304.1610 (98a)
Space heating requirement - total per year (kWh/year)												1267.5826
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	293.1668	202.6601	145.8463	59.2035	16.5276	0.0000	0.0000	0.0000	0.0000	63.9575	182.0599	304.1610 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1267.5826
Space heating per m2										(98c) / (4) =		17.8961 (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	293.1668	202.6601	145.8463	59.2035	16.5276	0.0000	0.0000	0.0000	0.0000	63.9575	182.0599	304.1610 (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)	293.1668	202.6601	145.8463	59.2035	16.5276	0.0000	0.0000	0.0000	0.0000	63.9575	182.0599	304.1610 (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	13.7609	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												1267.5826 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)

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Efficiency of water heater	344.1922	
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	2243.6512	(238)

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year	
Space heating - main system 1	1267.5826	0.1569	198.9415	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO ₂ associated with community systems			0.0000	(373)
Water heating (other fuel)	655.2486	0.1412	92.5047	(264)
Space and water heating			291.4462	(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 CO ₂ , kg/year			336.8401	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.7600	(273)

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

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year	
Space heating - main system 1	1267.5826	1.5810	2004.0511	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO ₂ associated with community systems			0.0000	(473)
Water heating (other fuel)	655.2486	1.5220	997.3062	(278)
Space and water heating			3001.3573	(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			3490.0339	(286)
Dwelling Primary energy Rate (DPER)			49.2700	(287)

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

1. Overall dwelling characteristics

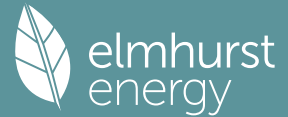
	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling	70.8300	2.5000	177.0750	(1b) - (3b)
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.8300			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	177.0750	(5)

2. Ventilation rate

	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)
Air changes per hour		
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
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1750	1.1750
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

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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)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836		(29a)
Flat Roof	56.2700		56.2700	0.1100	6.1897		(30)
Total net area of external elements Aum(A, m2)			137.9800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		31.2138		(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

198.7834 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	33.9300	0.0700	2.3751
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	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)	4.2200	0.2400	1.0128
E15 Flat roof with parapet	31.8500	0.5600	17.8360
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.0200	0.0836
P4 Party wall - Roof (insulation at ceiling level)	7.4300	0.1200	0.8916

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

24.7203 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 55.9341 (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
Heat transfer coeff	91.1881	90.9537	90.7239	89.6447	89.4428	88.5028	88.5028	88.3287	88.8649	89.4428	89.8513	90.2783
Average = Sum(39)m / 12 =												89.6437

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2874	1.2841	1.2809	1.2656	1.2628	1.2495	1.2495	1.2471	1.2546	1.2628	1.2685	1.2746
HLP (average)												1.2656
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	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	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	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 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

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	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	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	244.8205	(62)
WWHRS	-28.4420	-25.1543	-26.3402	-21.8107	-20.3268	-17.3938	-17.3376	-17.9963	-21.2156	-24.0347	-27.9153	-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)

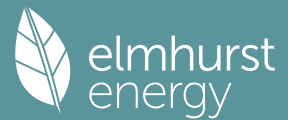
Output from w/h													
219.1784	193.8184	206.1029	181.9425	176.8051	159.8112	158.1965	164.2772	165.8321	184.2971	195.1633	216.9052	216.9052	(64)
Total per year (kWh/year)													2222.3299 (64)
Electric shower(s)													2222 (64)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month													
104.1169	92.4835	99.0704	88.8284	87.3295	80.0011	79.8045	82.1700	82.2034	90.1161	93.9638	103.1859	103.1859	(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	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	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	34.3305	(69)

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Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-90.6442	-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)	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)
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	495.2063 (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	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)

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	42.8901	43.0006	43.1095	43.6285	43.7270	44.1914	44.1914	44.2785	44.0114	43.7270	43.5282	43.3223
alpha	3.8593	3.8667	3.8740	3.9086	3.9151	3.9461	3.9461	3.9519	3.9341	3.9151	3.9019	3.8882
util living area	0.9830	0.9707	0.9492	0.8964	0.7985	0.6378	0.4834	0.5227	0.7365	0.9128	0.9703	0.9854 (86)
MIT	19.3672	19.6018	19.9292	20.3555	20.6988	20.9114	20.9769	20.9685	20.8378	20.3964	19.8168	19.3331 (87)
Th 2	19.8507	19.8533	19.8559	19.8679	19.8701	19.8806	19.8806	19.8825	19.8766	19.8701	19.8656	19.8608 (88)
util rest of house	0.9786	0.9633	0.9358	0.8685	0.7442	0.5474	0.3681	0.4064	0.6544	0.8833	0.9614	0.9816 (89)
MIT 2	17.9854	18.2825	18.6933	19.2197	19.6105	19.8257	19.8721	19.8699	19.7630	19.2812	18.5656	17.9489 (90)
Living area fraction	18.6054	18.8745	19.2478	19.7293	20.0988	20.3128	20.3678	20.3628	20.2452	19.7815	19.1270	18.5700 (92)
MIT	18.6054	18.8745	19.2478	19.7293	20.0988	20.3128	20.3678	20.3628	20.2452	19.7815	19.1270	18.5700 (93)
Temperature adjustment												0.0000
adjusted MIT	18.6054	18.8745	19.2478	19.7293	20.0988	20.3128	20.3678	20.3628	20.2452	19.7815	19.1270	18.5700 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9721	0.9550	0.9271	0.8646	0.7562	0.5840	0.4195	0.4579	0.6835	0.8805	0.9538	0.9757 (94)
Useful gains	585.1758	656.8010	689.2106	693.3249	625.9531	472.7739	326.6447	340.3481	483.8065	567.0039	567.0842	563.0745 (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	1304.4825	1271.0302	1156.5284	970.7925	751.2136	505.6008	333.4616	350.0270	546.0962	821.2228	1080.6385	1297.2970 (97)
Space heating kWh	535.1642	412.7620	347.6844	199.7767	93.1937	0.0000	0.0000	0.0000	0.0000	189.1389	369.7590	546.2615 (98a)
Space heating requirement - total per year (kWh/year)												2693.7404
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	535.1642	412.7620	347.6844	199.7767	93.1937	0.0000	0.0000	0.0000	0.0000	189.1389	369.7590	546.2615 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2693.7404
Space heating per m2										(98c) / (4) =		38.0311 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	535.1642	412.7620	347.6844	199.7767	93.1937	0.0000	0.0000	0.0000	0.0000	189.1389	369.7590	546.2615 (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)	579.8095	447.1961	376.6895	216.4428	100.9683	0.0000	0.0000	0.0000	0.0000	204.9175	400.6057	591.8326 (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 (217)m	85.9824	85.7112	85.2229	84.2700	82.6928	79.8000	79.8000	79.8000	79.8000	84.1180	85.4699	79.8000 (216)
Fuel for water heating, kWh/month	254.9107	226.1295	241.8400	215.9043	213.8095	200.2647	198.2413	205.8612	207.8096	219.0935	228.3416	252.0923 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	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)
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)

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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												2918.4620	(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												2664.2983	(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												4971.4221	(238)

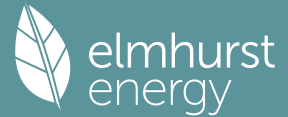
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2918.4620	0.2100	612.8770	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2664.2983	0.2100	559.5026	(264)
Space and water heating			1172.3797	(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			1096.4743	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.4800	(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	2918.4620	1.1300	3297.8621	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2664.2983	1.1300	3010.6571	(278)
Space and water heating			6308.5192	(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			5829.3924	(286)
Target Primary Energy Rate (TPER)			82.3000	(287)

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Plot Reference	Plot 24				Issued on Date	22/12/2025	
Assessment Reference	Plot 24			Plot Type Ref			
Plot Address	Flat 5, 2 Cross Road Manchester, M21 9SU				SAP Version	10.2	
SAP Rating	82 B	DER	4.76	TER	15.48		
Environmental	96 A	% DER < TER				69.25	
CO ₂ Emissions (t/year)	0.29	DFEE	33.98	TFEE	45.19		
Compliance Check	See BREL	% DFEE < TFEE				24.81	
% DPER < TPER	40.13	DPER	49.27	TPER	82.30		
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

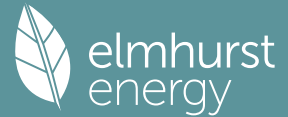
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	2.9100 (17)
Infiltration rate	0.1455 (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) = 0.1237 (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	0.1577	0.1546	0.1515	0.1360	0.1330	0.1175	0.1175	0.1144	0.1237	0.1330	0.1391	0.1453 (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	0.2977	0.2946	0.2915	0.2760	0.2730	0.2575	0.2575	0.2544	0.2637	0.2730	0.2791	0.2853 (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)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999 (29a)
Flat Roof	56.2700		56.2700	0.1500	8.4405	9.0000	506.4300 (30)
Total net area of external elements Aum(A, m ²)			137.9800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 35.3964		(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			70.8300			40.0000	2833.2000 (32d)
Party Ceiling			14.5600			30.0000	436.8000 (32b)
Internal Wall			74.6000			9.0000	671.4000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14079.8299 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							198.7834 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	33.9300	0.0370	1.2554
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	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)	4.2200	0.1500	0.6330
E15 Flat roof with parapet	31.8500	0.1320	4.2042
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270
P4 Party wall - Roof (insulation at ceiling level)	7.4300	0.0400	0.2972
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.0934 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	43.4898 (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	17.3952	17.2145	17.0338	16.1305	15.9498	15.0464	15.0464	14.8658	15.4078	15.9498	16.3111	16.6725	(38)
Heat transfer coeff	60.8850	60.7043	60.5237	59.6203	59.4396	58.5363	58.5363	58.3556	58.8976	59.4396	59.8010	60.1623	(39)
Average = Sum(39)m / 12 =												59.5751	
HLP	0.8596	0.8570	0.8545	0.8417	0.8392	0.8264	0.8264	0.8239	0.8315	0.8392	0.8443	0.8494	(40)
HLP (average)												0.8411	
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):													
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)
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)

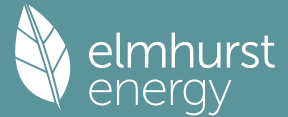
5. Internal gains (see Table 5 and 5a)

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)
South	3.2000	46.7521	0.4000	0.0000	0.7700	46.0788 (78)

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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	64.2369	64.4281	64.6204	65.5995	65.7989	66.8144	66.8144	67.0212	66.4045	65.7989	65.4013	65.0085
alpha	5.2825	5.2952	5.3080	5.3733	5.3866	5.4543	5.4543	5.4681	5.4270	5.3866	5.3601	5.3339
util living area	0.9732	0.9512	0.9045	0.8058	0.6561	0.4772	0.3445	0.3759	0.5831	0.8391	0.9508	0.9782 (86)
MIT	20.1718	20.3567	20.5950	20.8270	20.9511	20.9929	20.9990	20.9984	20.9797	20.8176	20.4605	20.1331 (87)
Th 2	20.2020	20.2042	20.2064	20.2173	20.2195	20.2305	20.2305	20.2327	20.2261	20.2195	20.2151	20.2107 (88)
util rest of house	0.9673	0.9413	0.8862	0.7735	0.6094	0.4217	0.2846	0.3137	0.5232	0.8040	0.9391	0.9733 (89)
MIT 2	19.2508	19.4815	19.7721	20.0482	20.1788	20.2261	20.2301	20.2320	20.2122	20.0462	19.6224	19.2092 (90)
Living area fraction									FLA = Living area / (4) =			0.4487 (91)
MIT	19.6640	19.8742	20.1413	20.3976	20.5253	20.5701	20.5751	20.5759	20.5566	20.3923	19.9985	19.6238 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6640	19.8742	20.1413	20.3976	20.5253	20.5701	20.5751	20.5759	20.5566	20.3923	19.9985	19.6238 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9626	0.9365	0.8846	0.7813	0.6281	0.4464	0.3115	0.3416	0.5492	0.8123	0.9353	0.9690 (94)
Useful gains	580.7662	633.8303	652.9839	612.7911	505.0245	346.9994	232.4084	243.2300	372.9045	507.2450	543.3429	556.7852 (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	935.4391	908.9994	825.6214	685.4925	524.5719	349.4695	232.6866	243.6861	380.2779	582.0519	771.3400	927.9294 (97)
Space heating kWh	263.8766	184.9137	128.4423	52.3450	14.5433	0.0000	0.0000	0.0000	0.0000	55.6563	164.1579	276.1313 (98a)
Space heating requirement - total per year (kWh/year)												1140.0664
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	263.8766	184.9137	128.4423	52.3450	14.5433	0.0000	0.0000	0.0000	0.0000	55.6563	164.1579	276.1313 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1140.0664
Space heating per m2										(98c) / (4) =		16.0958 (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	263.8766	184.9137	128.4423	52.3450	14.5433	0.0000	0.0000	0.0000	0.0000	55.6563	164.1579	276.1313 (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)	263.8766	184.9137	128.4423	52.3450	14.5433	0.0000	0.0000	0.0000	0.0000	55.6563	164.1579	276.1313 (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	13.7609	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												1140.0664 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.1922

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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	2116.1350 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1140.0664	16.4900	187.9969 (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			348.9507 (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] = 1.0845 (257)
SAP value	82.4196
SAP rating (Section 12)	82 (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	1140.0664	0.1570	179.0213 (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			271.5260 (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			316.9199 (272)
CO2 emissions per m2			4.4700 (273)
EI value			96.3337
EI rating			96 (274)
EI band			A

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

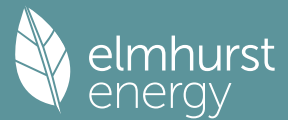
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	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	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

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Pressure Test Method													Blower Door
Measured/design AP50													2.9100 (17)
Infiltration rate													0.1455 (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) = 0.1237 (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)
	0.1330	0.1299	0.1299	0.1206	0.1237	0.1051	0.1020	0.1020	0.1051	0.1175	0.1175	0.1206	(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	0.2730	0.2699	0.2699	0.2606	0.2637	0.2451	0.2420	0.2420	0.2451	0.2575	0.2575	0.2606	(25)

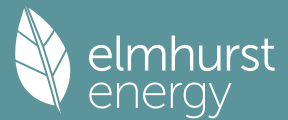
3. Heat losses and heat loss parameter

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)					
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999	(29a)					
Flat Roof	56.2700		56.2700	0.1500	8.4405	9.0000	506.4300	(30)					
Total net area of external elements Aum(A, m2)			137.9800					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		35.3964			(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			70.8300			40.0000	2833.2000	(32d)					
Party Ceiling			14.5600			30.0000	436.8000	(32b)					
Internal Wall			74.6000			9.0000	671.4000	(32c)					
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		14079.8299	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							198.7834	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E7 Party floor between dwellings (in blocks of flats)				33.9300	0.0370		1.2554						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				18.5300	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)				4.2200	0.1500		0.6330						
E15 Flat roof with parapet				31.8500	0.1320		4.2042						
E9 Balcony between dwellings, wall insulation continuous				4.1800	0.1500		0.6270						
P4 Party wall - Roof (insulation at ceiling level)				7.4300	0.0400		0.2972						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								8.0934 (36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =		43.4898 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 15.9498	Feb 15.7691	Mar 15.7691	Apr 15.2271	May 15.4078	Jun 14.3237	Jul 14.1431	Aug 14.1431	Sep 14.3237	Oct 15.0464	Nov 15.0464	Dec 15.2271	(38)
Heat transfer coeff	59.4396	59.2590	59.2590	58.7169	58.8976	57.8136	57.6329	57.6329	57.8136	58.5363	58.5363	58.7169	(39)
Average = Sum(39)m / 12 =													58.5212
HLP	Jan 0.8392	Feb 0.8366	Mar 0.8366	Apr 0.8290	May 0.8315	Jun 0.8162	Jul 0.8137	Aug 0.8137	Sep 0.8162	Oct 0.8264	Nov 0.8264	Dec 0.8290	(40)
HLP (average)													0.8262
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													Total = Sum(45)m = 1937.9838
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)
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)

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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	65.7989	65.9995	65.9995	66.6088	66.4045	67.6496	67.8617	67.8617	67.6496	66.8144	66.8144	66.6088
alpha	5.3866	5.4000	5.4000	5.4406	5.4270	5.5100	5.5241	5.5241	5.5100	5.4543	5.4543	5.4406
util living area	0.9675	0.9421	0.8849	0.7647	0.5930	0.3995	0.2940	0.3258	0.5338	0.8093	0.9403	0.9736 (86)
MIT	20.2903	20.4603	20.6810	20.8824	20.9742	20.9977	20.9997	20.9994	20.9886	20.8642	20.5515	20.2471 (87)
Th 2	20.2195	20.2217	20.2217	20.2283	20.2261	20.2393	20.2415	20.2415	20.2393	20.2305	20.2305	20.2283 (88)
util rest of house	0.9603	0.9301	0.8630	0.7274	0.5416	0.3429	0.2338	0.2627	0.4727	0.7690	0.9258	0.9677 (89)
MIT 2	19.4134	19.6241	19.8876	20.1183	20.2066	20.2381	20.2414	20.2413	20.2321	20.1066	19.7467	19.3667 (90)
Living area fraction	19.8068	19.9993	20.2436	20.4611	20.5510	20.5789	20.5816	20.5814	20.5716	20.4465	20.1078	19.7617 (92)
MIT	19.8068	19.9993	20.2436	20.4611	20.5510	20.5789	20.5816	20.5814	20.5716	20.4465	20.1078	19.7617 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8068	19.9993	20.2436	20.4611	20.5510	20.5789	20.5816	20.5814	20.5716	20.4465	20.1078	19.7617 (93)

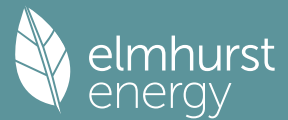
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9558	0.9261	0.8636	0.7391	0.5635	0.3683	0.2608	0.2910	0.4997	0.7809	0.9232	0.9634 (94)
Useful gains	565.7100	611.7211	625.9245	571.3464	440.7609	281.3307	189.0450	200.4889	335.4928	480.4295	526.1868	545.8422 (95)
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	868.2246	841.4362	761.0969	620.1172	450.6264	282.0665	189.1286	200.6451	339.4561	535.4033	714.5979	866.7634 (97)
Space heating kWh	225.0708	154.3686	100.5682	35.1150	7.3399	0.0000	0.0000	0.0000	0.0000	40.9005	135.6559	238.7654 (98a)
Space heating requirement - total per year (kWh/year)												937.7844
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	225.0708	154.3686	100.5682	35.1150	7.3399	0.0000	0.0000	0.0000	0.0000	40.9005	135.6559	238.7654 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												937.7844
Space heating per m2										(98c) / (4) =		13.2399 (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	225.0708	154.3686	100.5682	35.1150	7.3399	0.0000	0.0000	0.0000	0.0000	40.9005	135.6559	238.7654 (98)

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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)	225.0708	154.3686	100.5682	35.1150	7.3399	0.0000	0.0000	0.0000	0.0000	40.9005	135.6559	238.7654	(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	(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	13.7609	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												937.7844	(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												1913.8531	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	937.7844	28.4300	266.6121	(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			544.1084	(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	937.7844	0.1575	147.7280	(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			240.2327	(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			285.6266	(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	937.7844	1.5831	1484.6500	(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			2481.9562	(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			2970.6328	(286)

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SAP 10 EPC IMPROVEMENTS

Plot 24

Current energy efficiency rating: B 82
Current environmental impact rating: A 96

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

Recommended measures: 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 82
Potential environmental impact rating: A 96

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 £544	Potential £544	Saving £0
Electricity			
Space heating	£313	£313	£0
Water heating	£186	£186	£0
Lighting	£45	£45	£0
Total cost of fuels	£544	£544	£0
Total cost of uses	£544	£544	£0
Delivered energy	27 kWh/m²	27 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	4 kg/m²	4 kg/m²	0 kg/m²
Primary energy	42 kWh/m²	42 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

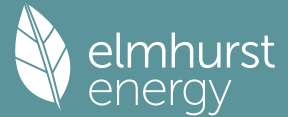
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Shelter factor
Infiltration rate adjusted to include shelter factor

Air changes per hour
Yes
Blower Door
2.9100 (17)
0.1455 (18)
2 (19)
(20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.1237 (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	0.1577	0.1546	0.1515	0.1360	0.1330	0.1175	0.1175	0.1144	0.1237	0.1330	0.1391	0.1453 (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)

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If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 72.0000 (23c)

Effective ac 0.2977 0.2946 0.2915 0.2760 0.2730 0.2575 0.2575 0.2544 0.2637 0.2730 0.2791 0.2853 (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)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999	(29a)
Flat Roof	56.2700		56.2700	0.1500	8.4405	9.0000	506.4300	(30)
Total net area of external elements Aum(A, m2)			137.9800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		35.3964			(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			70.8300			40.0000	2833.2000	(32d)
Party Ceiling			14.5600			30.0000	436.8000	(32b)
Internal Wall			74.6000			9.0000	671.4000	(32c)

Heat capacity Cm = Sum(A x k) (28) ... (30) + (32) + (32a) ... (32e) = 14079.8299 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 198.7834 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	33.9300	0.0370	1.2554	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	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)	4.2200	0.1500	0.6330	
E15 Flat roof with parapet	31.8500	0.1320	4.2042	
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270	
P4 Party wall - Roof (insulation at ceiling level)	7.4300	0.0400	0.2972	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.0934 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 43.4898 (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	
	17.3952	17.2145	17.0338	16.1305	15.9498	15.0464	15.0464	14.8658	15.4078	15.9498	16.3111	16.6725	(38)
Heat transfer coeff	60.8850	60.7043	60.5237	59.6203	59.4396	58.5363	58.5363	58.3556	58.8976	59.4396	59.8010	60.1623	(39)
Average = Sum(39)m / 12 =												59.5751	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8596	0.8570	0.8545	0.8417	0.8392	0.8264	0.8264	0.8239	0.8315	0.8392	0.8443	0.8494	(40)
HLP (average)												0.8411	
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 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):

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		(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(61)

Total heat required for water heating calculated for each month

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		(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)

Output from w/h

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)													
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)

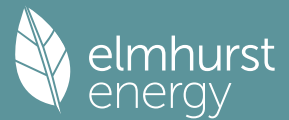
Heat gains from water heating, kWh/month

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)
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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		(66)

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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	64.2369	64.4281	64.6204	65.5995	65.7989	66.8144	66.8144	67.0212	66.4045	65.7989	65.4013	65.0085
alpha	5.2825	5.2952	5.3080	5.3733	5.3866	5.4543	5.4543	5.4681	5.4270	5.3866	5.3601	5.3339
util living area	0.9732	0.9512	0.9045	0.8058	0.6561	0.4772	0.3445	0.3759	0.5831	0.8391	0.9508	0.9782 (86)
MIT	20.1718	20.3567	20.5950	20.8270	20.9511	20.9929	20.9990	20.9984	20.9797	20.8176	20.4605	20.1331 (87)
Th 2	20.2020	20.2042	20.2064	20.2173	20.2195	20.2305	20.2305	20.2327	20.2261	20.2195	20.2151	20.2107 (88)
util rest of house	0.9673	0.9413	0.8862	0.7735	0.6094	0.4217	0.2846	0.3137	0.5232	0.8040	0.9391	0.9733 (89)
MIT 2	19.2508	19.4815	19.7721	20.0482	20.1788	20.2261	20.2301	20.2320	20.2122	20.0462	19.6224	19.2092 (90)
Living area fraction	19.6640	19.8742	20.1413	20.3976	20.5253	20.5701	20.5751	20.5759	20.5566	fLA = Living area / (4) = 20.3923	19.9985	19.6238 (92)
Temperature adjustment	19.6640	19.8742	20.1413	20.3976	20.5253	20.5701	20.5751	20.5759	20.5566	20.3923	19.9985	19.6238 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9626	0.9365	0.8846	0.7813	0.6281	0.4464	0.3115	0.3416	0.5492	0.8123	0.9353	0.9690 (94)
Ext temp.	580.7662	633.8303	652.9839	612.7911	505.0245	346.9994	232.4084	243.2300	372.9045	507.2450	543.3429	556.7852 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	935.4391	908.9994	825.6214	685.4925	524.5719	349.4695	232.6866	243.6861	380.2779	582.0519	771.3400	927.9294 (97)
Space heating requirement - total per year (kWh/year)	263.8766	184.9137	128.4423	52.3450	14.5433	0.0000	0.0000	0.0000	0.0000	55.6563	164.1579	276.1313 (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)	263.8766	184.9137	128.4423	52.3450	14.5433	0.0000	0.0000	0.0000	0.0000	55.6563	164.1579	276.1313 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98c) / (4) =
Space heating per m2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
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
Space heating efficiency (main heating system 1)	263.8766	184.9137	128.4423	52.3450	14.5433	0.0000	0.0000	0.0000	0.0000	55.6563	164.1579	276.1313 (98)
Space heating fuel (main heating system)	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 efficiency (main heating system 2)	263.8766	184.9137	128.4423	52.3450	14.5433	0.0000	0.0000	0.0000	0.0000	55.6563	164.1579	276.1313 (211)
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 (212)
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 (213)
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 (215)
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)

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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	13.7609	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												1140.0664	(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												2116.1350	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1140.0664	16.4900	187.9969	(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			348.9507	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.0845	(257)
SAP value		82.4196	
SAP rating (Section 12)		82	(258)
SAP band		B	

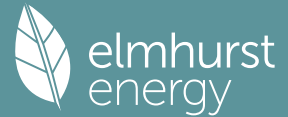
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1140.0664	0.1570	179.0213	(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			271.5260	(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			316.9199	(272)
CO2 emissions per m2			4.4700	(273)
EI value			96.3337	
EI rating			96	(274)
EI band			A	

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

1. Overall dwelling characteristics

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Main dwelling		Area (m2)	Storey height (m)	Volume (m3)	
Ground floor		70.8300 (1b)	x 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

m3 per hour											
Number of open chimneys									0 * 80 =	0.0000	(6a)
Number of open flues									0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire									0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler									0 * 20 =	0.0000	(6d)
Number of flues attached to other heater									0 * 35 =	0.0000	(6e)
Number of blocked chimneys									0 * 20 =	0.0000	(6f)
Number of intermittent extract fans									0 * 10 =	0.0000	(7a)
Number of passive vents									0 * 10 =	0.0000	(7b)
Number of flueless gas fires									0 * 40 =	0.0000	(7c)
Air changes per hour											
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =									0.0000 / (5) =	0.0000	(8)
Pressure test										Yes	
Pressure Test Method										Blower Door	
Measured/design AP50										2.9100	(17)
Infiltration rate										0.1455	(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) =	0.1237	(21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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	0.1330	0.1299	0.1299	0.1206	0.1237	0.1051	0.1020	0.1020	0.1051	0.1175	0.1175	0.1206	(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	0.2730	0.2699	0.2699	0.2606	0.2637	0.2451	0.2420	0.2420	0.2451	0.2575	0.2575	0.2606	(25)

3. Heat losses and heat loss parameter

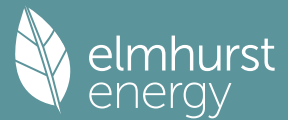
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window N/E			6.3400	1.3258	8.4053			(27)
Window S/W			4.3500	1.3258	5.7670			(27)
EXT Wall	81.7100	10.6900	71.0200	0.1800	12.7836	110.0000	7812.1999	(29a)
Flat Roof	56.2700		56.2700	0.1500	8.4405	9.0000	506.4300	(30)
Total net area of external elements Aum(A, m2)			137.9800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.3964			(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			70.8300			40.0000	2833.2000	(32d)
Party Ceiling			14.5600			30.0000	436.8000	(32b)
Internal Wall			74.6000			9.0000	671.4000	(32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14079.8299	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							198.7834	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E7 Party floor between dwellings (in blocks of flats)				33.9300	0.0370	1.2554		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				18.5300	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)				4.2200	0.1500	0.6330		
E15 Flat roof with parapet				31.8500	0.1320	4.2042		
E9 Balcony between dwellings, wall insulation continuous				4.1800	0.1500	0.6270		
P4 Party wall - Roof (insulation at ceiling level)				7.4300	0.0400	0.2972		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.0934	(36)
Point Thermal bridges							0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	43.4898	(37)

P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.5300	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)	4.2200	0.1500	0.6330										
E15 Flat roof with parapet	31.8500	0.1320	4.2042										
E9 Balcony between dwellings, wall insulation continuous	4.1800	0.1500	0.6270										
P4 Party wall - Roof (insulation at ceiling level)	7.4300	0.0400	0.2972										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												8.0934	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	43.4898	(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	
	15.9498	15.7691	15.7691	15.2271	15.4078	14.3237	14.1431	14.1431	14.3237	15.0464	15.0464	15.2271	(38)
Heat transfer coeff	59.4396	59.2590	59.2590	58.7169	58.8976	57.8136	57.6329	57.6329	57.8136	58.5363	58.5363	58.7169	(39)
Average = Sum(39)m / 12 =												58.5212	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8392	0.8366	0.8366	0.8290	0.8315	0.8162	0.8137	0.8137	0.8162	0.8264	0.8264	0.8290	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2661 (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													

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	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 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):												
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	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)

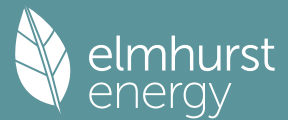
7. Mean internal temperature (heating season)

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	65.7989	65.9995	65.9995	66.6088	66.4045	67.6496	67.8617	67.8617	67.6496	66.8144	66.8144	66.6088
alpha	5.3866	5.4000	5.4000	5.4406	5.4270	5.5100	5.5241	5.5241	5.5100	5.4543	5.4543	5.4406
util living area	0.9675	0.9421	0.8849	0.7647	0.5930	0.3995	0.2940	0.3258	0.5338	0.8093	0.9403	0.9736 (86)
MIT	20.2903	20.4603	20.6810	20.8824	20.9742	20.9977	20.9997	20.9994	20.9886	20.8642	20.5515	20.2471 (87)
Th 2	20.2195	20.2217	20.2217	20.2283	20.2261	20.2393	20.2415	20.2415	20.2393	20.2305	20.2305	20.2283 (88)
util rest of house	0.9603	0.9301	0.8630	0.7274	0.5416	0.3429	0.2338	0.2627	0.4727	0.7690	0.9258	0.9677 (89)
MIT 2	19.4134	19.6241	19.8876	20.1183	20.2066	20.2381	20.2414	20.2413	20.2321	20.1066	19.7467	19.3667 (90)
Living area fraction	19.8068	19.9993	20.2436	20.4611	20.5510	20.5789	20.5816	20.5814	20.5716	20.4465	20.1078	19.7617 (92)
MIT	19.8068	19.9993	20.2436	20.4611	20.5510	20.5789	20.5816	20.5814	20.5716	20.4465	20.1078	19.7617 (93)
Temperature adjustment												0.0000
adjusted MIT	19.8068	19.9993	20.2436	20.4611	20.5510	20.5789	20.5816	20.5814	20.5716	20.4465	20.1078	19.7617 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9558	0.9261	0.8636	0.7391	0.5635	0.3683	0.2608	0.2910	0.4997	0.7809	0.9232	0.9634 (94)
Ext temp.	565.7100	611.7211	625.9245	571.3464	440.7609	281.3307	189.0450	200.4889	335.4928	480.4295	526.1868	545.8422 (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	868.2246	841.4362	761.0969	620.1172	450.6264	282.0665	189.1286	200.6451	339.4561	535.4033	714.5979	866.7634 (97)

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225.0708	154.3686	100.5682	35.1150	7.3399	0.0000	0.0000	0.0000	0.0000	40.9005	135.6559	238.7654 (98a)
Space heating requirement - total per year (kWh/year)											937.7844
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 (98b)
Solar heating contribution - total per year (kWh/year)											0.0000
225.0708	154.3686	100.5682	35.1150	7.3399	0.0000	0.0000	0.0000	0.0000	40.9005	135.6559	238.7654 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)											937.7844
Space heating per m2										(98c) / (4) =	13.2399 (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	225.0708	154.3686	100.5682	35.1150	7.3399	0.0000	0.0000	0.0000	0.0000	40.9005	135.6559	238.7654 (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)	225.0708	154.3686	100.5682	35.1150	7.3399	0.0000	0.0000	0.0000	0.0000	40.9005	135.6559	238.7654 (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												344.1922 (216)
(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 (217)
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	13.7609	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												937.7844 (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											1913.8531 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	937.7844	28.4300	266.6121 (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			544.1084 (255)

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

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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	937.7844	0.1575	147.7280 (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			240.2327 (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			285.6266 (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	937.7844	1.5831	1484.6500 (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			2481.9562 (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			2970.6328 (286)