

Full SAP Calculation Printout



Plot Reference	Plot 03			Issued on Date	22/12/2025
Assessment Reference	Plot 03	Plot Type Ref			
Plot Address	Flat 2, 6 Cross Road Manchester, M21 9SA			SAP Version	10.2
SAP Rating	89 B	DER	3.08	TER	11.43
Environmental	98 A	% DER < TER			73.05
CO ₂ Emissions (t/year)	0.18	DFEE	22.35	TFEE	26.41
Compliance Check	See BREL	% DFEE < TFEE			15.36
% DPER < TPER	46.67	DPER	32.26	TPER	60.49
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	70.4200 (1b)	2.5000 (2b)	176.0500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	176.0500 (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	2.7000	(17)
Infiltration rate	0.1350	(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) =	0.1148 (21)

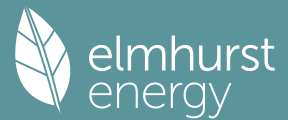
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1463	0.1434	0.1406	0.1262	0.1234	0.1090	0.1090	0.1061	0.1148	0.1234	0.1291	0.1348 (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	0.2863	0.2834	0.2806	0.2662	0.2634	0.2490	0.2490	0.2461	0.2548	0.2634	0.2691	0.2748 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
Ground Floor			70.4200	0.1100	7.7462	110.0000	7746.2000 (28a)
EXT Wall	32.9900	11.2000	21.7900	0.1800	3.9222	110.0000	2396.9002 (29a)
Total net area of external elements Aum(A, m ²)			103.4100				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	26.5169	(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			24.7600	0.0000	0.0000	45.0000	1114.2000 (32)
Party Ceiling			70.4200			30.0000	2112.6000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	16762.7202 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		238.0392 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	12.3100	0.0370	0.4555
P1 Party wall - Ground floor	29.3300	0.0510	1.4958
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.3300	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E5 Ground floor (normal)	12.3100	0.0670	0.8248
E16 Corner (normal)	2.6800	0.0420	0.1126
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5930 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.1099 (37)

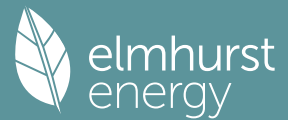
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	16.6334	16.4667	16.3001	15.4667	15.3001	14.4668	14.4668	14.3001	14.8001	15.3001	15.6334	15.9667	(38)
Heat transfer coeff	46.7433	46.5766	46.4099	45.5766	45.4100	44.5766	44.5766	44.4100	44.9100	45.4100	45.7433	46.0766	(39)
Average = Sum(39)m / 12 =												45.5350	
HLP	0.6638	0.6614	0.6590	0.6472	0.6448	0.6330	0.6330	0.6306	0.6377	0.6448	0.6496	0.6543	(40)
HLP (average)												0.6466	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													2.2563 (42)
Hot water usage for mixer showers	62.0500	61.1175	59.7587	57.1588	55.2402	53.1006	51.8844	53.2329	54.7112	57.0085	59.6642	61.8123	(42a)
Hot water usage for baths	26.8068	26.4086	25.8480	24.8143	24.0403	23.1820	22.7184	23.2751	23.8813	24.7997	25.8547	26.7161	(42b)
Hot water usage for other uses	37.7365	36.3643	34.9921	33.6198	32.2476	30.8754	30.8754	32.2476	33.6198	34.9921	36.3643	37.7365	(42c)
Average daily hot water use (litres/day)												116.3681	(43)
Daily hot water use	126.5933	123.8905	120.5988	115.5930	111.5281	107.1579	105.4782	108.7556	112.2123	116.8002	121.8832	126.2650	(44)
Energy conte	200.4929	176.4184	185.3558	158.2410	150.1382	131.7632	127.5667	134.6622	138.3690	158.4968	173.6449	197.7004	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	30.0739	26.4628	27.8034	23.7362	22.5207	19.7645	19.1350	20.1993	20.7553	23.7745	26.0467	29.6551	(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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	(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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	(64)
12Total per year (kWh/year)												2250.1805	(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	66.6639	58.6591	61.6308	52.6151	49.9210	43.8113	42.4159	44.7752	46.0077	52.7002	57.7369	65.7354	(65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.4591	115.6511	104.4591	107.9410	104.4591	107.9410	104.4591	104.4591	107.9410	104.4591	107.9410	104.4591	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.2753	200.3328	195.1480	184.1102	170.1770	157.0818	148.3334	146.2759	151.4607	162.4984	176.4316	189.5269	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	(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)	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	(71)
Water heating gains (Table 5)	89.6020	87.2903	82.8371	73.0766	67.0981	60.8490	57.0106	60.1817	63.8996	70.8336	80.1902	88.3540	(72)
Total internal gains	449.1806	460.1184	439.2884	421.9720	398.5783	382.7160	366.6472	367.7608	380.1454	394.6353	421.4070	439.1841	(73)

6. Solar gains													
[Jan]	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								
North	3.6800	10.6334	0.4000	0.0000	0.7700	12.0523	(74)						
South	7.5200	46.7521	0.4000	0.0000	0.7700	108.2853	(78)						

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Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	569.5181	660.4944	704.3304	740.1582	749.3239	729.4210	701.4615	677.8655	663.1853	613.3340	564.6301	542.8000 (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	99.6146	99.9710	100.3300	102.1645	102.5394	104.4563	104.4563	104.8483	103.6810	102.5394	101.7922	101.0558
alpha	7.6410	7.6647	7.6887	7.8110	7.8360	7.9638	7.9638	7.9899	7.9121	7.8360	7.7861	7.7371
util living area	0.9740	0.9325	0.8637	0.7245	0.5608	0.3910	0.2796	0.3014	0.4667	0.7446	0.9314	0.9799 (86)
MIT	20.6064	20.7664	20.8874	20.9733	20.9964	20.9998	21.0000	21.0000	20.9993	20.9728	20.8079	20.5772 (87)
Th 2	20.3729	20.3750	20.3772	20.3877	20.3898	20.4004	20.4004	20.4025	20.3961	20.3898	20.3856	20.3814 (88)
util rest of house	0.9679	0.9193	0.8416	0.6928	0.5250	0.3544	0.2415	0.2622	0.4261	0.7078	0.9160	0.9751 (89)
MIT 2	19.9257	20.1210	20.2624	20.3635	20.3870	20.4003	20.4004	20.4025	20.3957	20.3664	20.1825	19.8968 (90)
Living area fraction									FLA = Living area / (4) =			0.3989 (91)
MIT	20.1972	20.3784	20.5117	20.6068	20.6301	20.6394	20.6396	20.6408	20.6365	20.6083	20.4320	20.1682 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1972	20.3784	20.5117	20.6068	20.6301	20.6394	20.6396	20.6408	20.6365	20.6083	20.4320	20.1682 (93)

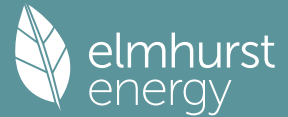
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9660	0.9194	0.8466	0.7043	0.5391	0.3690	0.2567	0.2778	0.4423	0.7213	0.9172	0.9732 (94)
Useful gains	550.1490	607.2643	596.2951	521.3180	403.9949	269.1572	180.0673	188.3301	293.2940	442.3821	517.9043	528.2485 (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	743.0863	720.9334	650.2822	533.5555	405.5155	269.2178	180.0699	188.3350	293.5532	454.4755	609.8493	735.7604 (97)
Space heating kWh	143.5453	76.3856	40.1664	8.8110	1.1313	0.0000	0.0000	0.0000	0.0000	8.9975	66.2004	154.3889 (98a)
Space heating requirement - total per year (kWh/year)												499.6265
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	143.5453	76.3856	40.1664	8.8110	1.1313	0.0000	0.0000	0.0000	0.0000	8.9975	66.2004	154.3889 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												499.6265
Space heating per m2										(98c) / (4) =		7.0950 (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	143.5453	76.3856	40.1664	8.8110	1.1313	0.0000	0.0000	0.0000	0.0000	8.9975	66.2004	154.3889 (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)	143.5453	76.3856	40.1664	8.8110	1.1313	0.0000	0.0000	0.0000	0.0000	8.9975	66.2004	154.3889 (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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518 (64)
Efficiency of water heater (217)m	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901 (216)
Fuel for water heating, kWh/month	66.0618	58.3118	61.6652	53.5371	51.4362	45.8466	44.8802	46.9411	47.7652	53.8639	58.0112	65.2507 (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	13.6813	12.3573	13.6813	13.2399	13.6813	13.2399	13.6813	13.6813	13.2399	13.6813	13.2399	13.6813 (231)
Lighting	19.3244	15.5028	13.9585	10.2266	7.8993	6.4538	7.2060	9.3667	12.1664	15.9629	18.0301	19.8615 (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												499.6265 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.2901
Water heating fuel used												653.5711 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)		
mechanical ventilation fans (SFP = 0.7500)	161.0857	(230a)
Total electricity for the above, kWh/year	161.0857	(231)
Electricity for lighting (calculated in Appendix L)	155.9590	(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	1470.2423	(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	499.6265	0.1592	79.5597 (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)	653.5711	0.1412	92.2672 (264)
Space and water heating			171.8269 (265)
Pumps, fans and electric keep-hot	161.0857	0.1387	22.3446 (267)
Energy for lighting	155.9590	0.1443	22.5097 (268)
Total CO2, kg/year			216.6812 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0800 (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	499.6265	1.5894	794.0983 (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)	653.5711	1.5220	994.7507 (278)
Space and water heating			1788.8490 (279)
Pumps, fans and electric keep-hot	161.0857	1.5128	243.6905 (281)
Energy for lighting	155.9590	1.5338	239.2151 (282)
Total Primary energy kWh/year			2271.7546 (286)
Dwelling Primary energy Rate (DPER)			32.2600 (287)

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

1. Overall dwelling characteristics

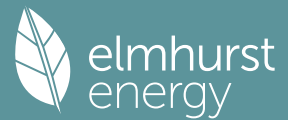
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	70.4200 (1b)	x 2.5000 (2b)	= 176.0500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	176.0500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1704 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4204 (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) = 0.3573 (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	0.4556	0.4467	0.4377	0.3931	0.3841	0.3395	0.3395	0.3305	0.3573	0.3841	0.4020	0.4199 (22b)
Effective ac	0.6038	0.5998	0.5958	0.5773	0.5738	0.5576	0.5576	0.5546	0.5638	0.5738	0.5808	0.5881 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			11.2000	1.1450	12.8244			(27)
Ground Floor			70.4200	0.1300	9.1546			(28a)
EXT Wall	32.9900	11.2000	21.7900	0.1800	3.9222			(29a)
Total net area of external elements Aum(A, m2)			103.4100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.9012			(33)
Main dwelling								
Party Wall			53.8400	0.0000	0.0000			(32)
Corridor			24.7600	0.0000	0.0000			(32)

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

238.0392 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	12.3100	0.0700	0.8617	
P1 Party wall - Ground floor	29.3300	0.0800	2.3464	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.3300	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885	
E3 Sill	2.5000	0.0500	0.1250	
E4 Jamb	10.4800	0.0500	0.5240	
E5 Ground floor (normal)	12.3100	0.1600	1.9696	
E16 Corner (normal)	2.6800	0.0900	0.2412	
E18 Party wall between dwellings	2.6800	0.0600	0.1608	
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824	

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

6.9996 (36)

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 32.9008 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	35.0782	34.8441	34.6146	33.5365	33.3348	32.3959	32.3959	32.2220	32.7576	33.3348	33.7429	34.1694	(38)
Average = Sum(39)m / 12 =	67.9791	67.7449	67.5154	66.4374	66.2357	65.2968	65.2968	65.1229	65.6584	66.2357	66.6437	67.0703	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9653	0.9620	0.9588	0.9434	0.9406	0.9272	0.9272	0.9248	0.9324	0.9406	0.9464	0.9524	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

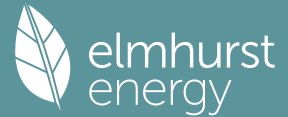
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2563 (42)
Hot water usage for mixer showers													
62.0500	61.1175	59.7587	57.1588	55.2402	53.1006	51.8844	53.2329	54.7112	57.0085	59.6642	61.8123	61.8123	(42a)
Hot water usage for baths													
26.8068	26.4086	25.8480	24.8143	24.0403	23.1820	22.7184	23.2751	23.8813	24.7997	25.8547	26.7161	26.7161	(42b)
Hot water usage for other uses													
37.7365	36.3643	34.9921	33.6198	32.2476	30.8754	30.8754	32.2476	33.6198	34.9921	36.3643	37.7365	37.7365	(42c)
Average daily hot water use (litres/day)													116.3681 (43)
Daily hot water use													
126.5933	123.8905	120.5988	115.5930	111.5281	107.1579	105.4782	108.7556	112.2123	116.8002	121.8832	126.2650	126.2650	(44)
Energy conte	200.4929	176.4184	185.3558	158.2410	150.1382	131.7632	127.5667	134.6622	138.3690	158.4968	173.6449	197.7004	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
30.0739	26.4628	27.8034	23.7362	22.5207	19.7645	19.1350	20.1993	20.7553	23.7745	26.0467	29.6551	29.6551	(46)
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	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	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	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													
247.0878	218.5041	231.9507	203.3328	196.7331	176.8550	174.1616	181.2571	183.4608	205.0917	218.7368	244.2953	244.2953	(62)
WWHRS	-28.3667	-25.0877	-26.2704	-21.7529	-20.2730	-17.3477	-16.2607	-17.2916	-17.9486	-21.1594	-23.9711	-27.8414	(63a)
FV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
218.7211	193.4164	205.6803	181.5799	176.4602	159.5073	157.9009	163.9655	165.5122	183.9323	194.7657	216.4539	216.4539	(64)
12Total per year (kWh/year)													2217.8956 (64)
Electric shower(s)													2218 (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)
Total Energy used by instantaneous electric shower(s) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
103.9398	92.3277	98.9067	88.6886	87.1969	79.8847	79.6918	82.0511	82.0812	89.9761	93.8104	103.0113	103.0113	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
104.4591	115.6511	104.4591	107.9410	104.4591	107.9410	104.4591	104.4591	107.9410	104.4591	107.9410	104.4591	104.4591	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
198.2753	200.3328	195.1480	184.1102	170.1770	157.0818	148.3334	146.2759	151.4607	162.4984	176.4316	189.5269	189.5269	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	(71)
Water heating gains (Table 5)													

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Total internal gains	139.7040	137.3924	132.9392	123.1786	117.2001	110.9510	107.1127	110.2837	114.0016	120.9356	130.2922	138.4561 (72)
	502.2826	513.2205	492.3904	475.0741	451.6804	432.8180	416.7493	417.8629	430.2475	447.7373	474.5091	492.2862 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
North					3.6800	10.6334	0.6300	0.7000			0.7700	11.9589 (74)	
South					7.5200	46.7521	0.6300	0.7000			0.7700	107.4461 (78)	
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)	
Total gains	621.6876	712.0435	755.3783	790.7943	799.7077	776.8360	748.9688	725.5642	711.0938	664.7411	616.6221	595.0990 (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	68.4963	68.7330	68.9667	70.0857	70.2991	71.3100	71.3100	71.5004	70.9172	70.2991	69.8687	69.4244
alpha	5.5664	5.5822	5.5978	5.6724	5.6866	5.7540	5.7540	5.7667	5.7278	5.6866	5.6579	5.6283
util living area	0.9838	0.9658	0.9347	0.8570	0.7217	0.5308	0.3826	0.4114	0.6187	0.8652	0.9642	0.9868 (86)
MIT	20.1416	20.3389	20.5520	20.7923	20.9360	20.9909	20.9988	20.9982	20.9785	20.8126	20.4540	20.1133 (87)
Th 2	20.1123	20.1151	20.1178	20.1307	20.1331	20.1444	20.1444	20.1465	20.1401	20.1331	20.1283	20.1232 (88)
util rest of house	0.9794	0.9570	0.9183	0.8243	0.6684	0.4629	0.3088	0.3358	0.5488	0.8277	0.9534	0.9832 (89)
MIT 2	19.1320	19.3798	19.6423	19.9316	20.0823	20.1393	20.1440	20.1458	20.1267	19.9615	19.5363	19.1048 (90)
Living area fraction	19.5347	19.7624	20.0052	20.2749	20.4228	20.4790	20.4850	20.4859	20.4665	20.3010	19.9024	19.5070 (92)
MIT	19.5347	19.7624	20.0052	20.2749	20.4228	20.4790	20.4850	20.4859	20.4665	20.3010	19.9024	19.5070 (93)
Temperature adjustment												0.0000
adjusted MIT	19.5347	19.7624	20.0052	20.2749	20.4228	20.4790	20.4850	20.4859	20.4665	20.3010	19.9024	19.5070 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9758	0.9528	0.9159	0.8302	0.6868	0.4898	0.3383	0.3660	0.5760	0.8356	0.9501	0.9799 (94)
Useful gains	606.6533	678.4672	691.8335	656.5042	549.2731	380.4867	253.3461	265.5641	409.5592	555.4822	585.8540	583.1566 (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	1035.6420	1006.8510	911.8058	755.7196	577.7608	383.8786	253.6769	266.0827	418.0114	642.5525	853.1972	1026.6480 (97)
Space heating kWh	319.1676	220.6739	163.6594	71.4351	21.1949	0.0000	0.0000	0.0000	0.0000	64.7803	192.4871	329.9576 (98a)
Space heating requirement - total per year (kWh/year)												1383.3558
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	319.1676	220.6739	163.6594	71.4351	21.1949	0.0000	0.0000	0.0000	0.0000	64.7803	192.4871	329.9576 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1383.3558
Space heating per m2										(98c) / (4) =		19.6444 (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	319.1676	220.6739	163.6594	71.4351	21.1949	0.0000	0.0000	0.0000	0.0000	64.7803	192.4871	329.9576 (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)	345.7937	239.0833	177.3124	77.3945	22.9630	0.0000	0.0000	0.0000	0.0000	70.1845	208.5451	357.4838 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	218.7211	193.4164	205.6803	181.5799	176.4602	159.5073	157.9009	163.9655	165.5122	183.9323	194.7657	216.4539 (64)
Efficiency of water heater	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000 (216)
(217)m	84.9062	84.3562	83.5523	82.1507	80.6768	79.8000	79.8000	79.8000	79.8000	81.9637	84.0334	85.0023 (217)
Fuel for water heating, kWh/month	257.6033	229.2853	246.1694	221.0326	218.7248	199.8838	197.8708	205.4705	207.4088	224.4070	231.7718	254.6447 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	21.7045	17.4122	15.6777	11.4862	8.8723	7.2487	8.0936	10.5203	13.6649	17.9290	20.2508	22.3078 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-18.8780	-27.9725	-42.2345	-49.9593	-56.0454	-53.1114	-52.4689	-48.4578	-41.7571	-33.0708	-21.2330	-16.1669 (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)												

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(233b)m	-6.8992	-14.8260	-30.0585	-46.0237	-61.7205	-62.3304	-61.5919	-51.7460	-37.4053	-21.4814	-9.3003	-5.4323	(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												1498.7603	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2694.2728	(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)												175.1680	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-870.1712	(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												3584.0299	(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	1498.7603	0.2100	314.7397 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2694.2728	0.2100	565.7973 (264)
Space and water heating			880.5369 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	175.1680	0.1443	25.2822 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-461.3558	0.1336	-61.6149
PV Unit electricity exported	-408.8154	0.1253	-51.2398
Total			-112.8546 (269)
Total CO2, kg/year			804.8937 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.4300 (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	1498.7603	1.1300	1693.5991 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2694.2728	1.1300	3044.5282 (278)
Space and water heating			4738.1274 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	175.1680	1.5338	268.6785 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-461.3558	1.4935	-689.0468
PV Unit electricity exported	-408.8154	0.4600	-188.0743
Total			-877.1210 (283)
Total Primary energy kWh/year			4259.7856 (286)
Target Primary Energy Rate (TPER)			60.4900 (287)

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Plot Reference	Plot 03			Issued on Date	22/12/2025
Assessment Reference	Plot 03	Plot Type Ref			
Plot Address	Flat 2, 6 Cross Road Manchester, M21 9SA			SAP Version	10.2
SAP Rating	89 B	DER	3.08	TER	11.43
Environmental	98 A	% DER < TER			73.05
CO ₂ Emissions (t/year)	0.18	DFEE	22.35	TFEE	26.41
Compliance Check	See BREL	% DFEE < TFEE			15.36
% DPER < TPER	46.67	DPER	32.26	TPER	60.49
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	70.4200 (1b)	2.5000 (2b)	176.0500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	176.0500 (5)

2. Ventilation rate

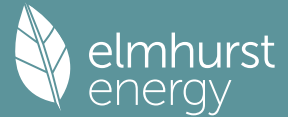
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1704 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.7000 (17)
Infiltration rate	0.3054 (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) = 0.2596 (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)
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	0.3310	0.3245	0.3180	0.2856	0.2791	0.2466	0.2466	0.2401	0.2596	0.2791	0.2920	0.3050 (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	0.5548	0.5526	0.5506	0.5408	0.5389	0.5304	0.5304	0.5288	0.5337	0.5389	0.5426	0.5465 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
Ground Floor			70.4200	0.1100	7.7462	110.0000	7746.2000 (28a)
EXT Wall	32.9900	11.2000	21.7900	0.1800	3.9222	110.0000	2396.9002 (29a)
Total net area of external elements Aum(A, m ²)			103.4100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.5169		(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			24.7600	0.0000	0.0000	45.0000	1114.2000 (32)
Party Ceiling			70.4200			30.0000	2112.6000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16762.7202 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							238.0392 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)				12.3100	0.0370	0.4555	
P1 Party wall - Ground floor				29.3300	0.0510	1.4958	

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P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.3300	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442	
E3 Sill	2.5000	0.0220	0.0550	
E4 Jamb	10.4800	0.0170	0.1782	
E5 Ground floor (normal)	12.3100	0.0670	0.8248	
E16 Corner (normal)	2.6800	0.0420	0.1126	
E18 Party wall between dwellings	2.6800	0.0320	0.0858	
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				3.5930 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		30.1099 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	32.2305	32.1069	31.9858	31.4169	31.3104	30.8149	30.8149	30.7232	31.0058	31.3104	31.5258	31.7509 (38)
Average = Sum(39)m / 12 =	62.3404	62.2168	62.0957	61.5268	61.4203	60.9248	60.9248	60.8331	61.1157	61.4203	61.6357	61.8608 (39)
												61.5263
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8853	0.8835	0.8818	0.8737	0.8722	0.8652	0.8652	0.8639	0.8679	0.8722	0.8753	0.8785 (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												2.2563 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	26.8068	26.4086	25.8480	24.8143	24.0403	23.1820	22.7184	23.2751	23.8813	24.7997	25.8547	26.7161 (42b)
Hot water usage for other uses	37.7365	36.3643	34.9921	33.6198	32.2476	30.8754	30.8754	32.2476	33.6198	34.9921	36.3643	37.7365 (42c)
Average daily hot water use (litres/day)												59.1600 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	64.5433	62.7730	60.8401	58.4341	56.2879	54.0574	53.5938	55.5227	57.5011	59.7917	62.2190	64.4527 (44)
Energy content (annual)	102.2208	89.3878	93.5089	79.9934	75.7743	66.4698	64.8170	68.7487	70.9046	81.1368	88.6423	100.9173 (45)
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	86.8877	75.9797	79.4826	67.9944	64.4081	56.4994	55.0945	58.4364	60.2689	68.9663	75.3460	85.7797 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	86.8877	75.9797	79.4826	67.9944	64.4081	56.4994	55.0945	58.4364	60.2689	68.9663	75.3460	85.7797 (64)
12Total per year (kWh/year)												835 (64)
Electric shower(s)	49.6917	44.2757	48.3474	46.1373	47.0031	44.8364	46.3309	47.0031	46.1373	48.3474	47.4383	49.6917 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												565.2404 (64a)
Heat gains from water heating, kWh/month	34.1449	30.0639	31.9575	28.5329	27.8528	25.3339	25.3563	26.3599	26.6016	29.3284	30.6961	33.8679 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	104.4591	115.6511	104.4591	107.9410	104.4591	107.9410	104.4591	104.4591	107.9410	104.4591	107.9410	104.4591 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	198.2753	200.3328	195.1480	184.1102	170.1770	157.0818	148.3334	146.2759	151.4607	162.4984	176.4316	189.5269 (68)
Pumps, fans	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511 (71)
Total internal gains	45.8936	44.7379	42.9536	39.6291	37.4366	35.1860	34.0811	35.4299	36.9466	39.4199	42.6334	45.5213 (72)
	405.4722	417.5660	399.4049	388.5245	368.9168	357.0530	343.7177	343.0091	353.1925	363.2216	383.8503	396.3515 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
North	3.6800											12.0523 (74)
South	7.5200											108.2853 (78)
Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	525.8098	617.9419	664.4469	706.7107	719.6624	703.7580	678.5320	653.1137	636.2324	581.9203	527.0733	499.9673 (84)

7. Mean internal temperature (heating season)

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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	74.6917	74.8401	74.9861	75.6794	75.8106	76.4272	76.4272	76.5424	76.1885	75.8106	75.5457	75.2708
alpha	5.9794	5.9893	5.9991	6.0453	6.0540	6.0951	6.0951	6.1028	6.0792	6.0540	6.0364	6.0181
util living area	0.9916	0.9780	0.9519	0.8794	0.7434	0.5472	0.3942	0.4271	0.6434	0.8950	0.9788	0.9936 (86)
MIT	20.1344	20.3380	20.5535	20.7947	20.9396	20.9919	20.9991	20.9985	20.9794	20.8030	20.4312	20.0952 (87)
Th 2	20.1800	20.1815	20.1830	20.1899	20.1912	20.1972	20.1972	20.1983	20.1949	20.1912	20.1886	20.1859 (88)
util rest of house	0.9892	0.9721	0.9393	0.8506	0.6930	0.4815	0.3228	0.3534	0.5759	0.8634	0.9721	0.9918 (89)
MIT 2	19.3975	19.5983	19.8071	20.0338	20.1531	20.1936	20.1970	20.1979	20.1847	20.0465	19.6973	19.3635 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.6915	19.8934	20.1048	20.3373	20.4668	20.5121	20.5169	20.5172	20.5017	20.3483	19.9900	19.6554 (92)
Temperature adjustment												
adjusted MIT	19.6915	19.8934	20.1048	20.3373	20.4668	20.5121	20.5169	20.5172	20.5017	20.3483	19.9900	19.6554 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9874	0.9696	0.9379	0.8562	0.7108	0.5076	0.3513	0.3828	0.6022	0.8702	0.9701	0.9903 (94)
Useful gains	519.1939	599.1837	623.1744	605.1015	511.5694	357.2004	238.3718	250.0186	383.1460	506.3681	511.2939	495.0951 (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	959.5092	932.8388	844.8005	703.6988	538.4621	360.1918	238.6370	250.4642	391.2437	598.7415	794.4861	956.0836 (97)
Space heating kWh	327.5946	224.2163	164.8898	70.9901	20.0082	0.0000	0.0000	0.0000	0.0000	68.7259	203.8984	342.9755 (98a)
Space heating requirement - total per year (kWh/year)	1423.2987											
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	327.5946	224.2163	164.8898	70.9901	20.0082	0.0000	0.0000	0.0000	0.0000	68.7259	203.8984	342.9755 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1423.2987											
Space heating per m2	(98c) / (4) = 20.2116 (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	572.6934	450.8437	462.3313	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9545	0.9819	0.9757	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	546.6180	442.6724	451.1145	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	779.9353	752.6109	724.9687	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	167.9884	230.5942	203.7475	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	41.9971	57.6486	50.9369	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	150.5825 (107)											
Energy for space heating	20.2116 (99)											
Energy for space cooling	2.1383 (108)											
Total	22.3499 (109)											
Fabric Energy Efficiency (DFEE)	22.3 (109)											

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

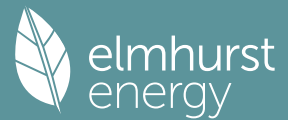
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	70.4200 (1b)	x 2.5000 (2b)	= 176.0500 (1b) - (3b) (4)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.4200		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	176.0500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1704 (8)
Pressure test	Yes

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Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
5.0000 (17)
0.4204 (18)
2 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor
(20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.3573 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infiltr rate	0.4556	0.4467	0.4377	0.3931	0.3841	0.3395	0.3395	0.3305	0.3573	0.3841	0.4020	0.4199	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.6038	0.5998	0.5958	0.5773	0.5738	0.5576	0.5576	0.5546	0.5638	0.5738	0.5808	0.5881	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			11.2000	1.1450	12.8244			(27)
Ground Floor			70.4200	0.1300	9.1546			(28a)
EXT Wall	32.9900	11.2000	21.7900	0.1800	3.9222			(29a)
Total net area of external elements Aum(A, m2)			103.4100					(31)
Fabric heat loss, W/K = Sum (A x U)					25.9012			(33)
(26)...(30) + (32) =								
Main dwelling								
Party Wall			53.8400	0.0000	0.0000			(32)
Corridor			24.7600	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 238.0392 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	12.3100	0.0700	0.8617	
P1 Party wall - Ground floor	29.3300	0.0800	2.3464	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.3300	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885	
E3 Sill	2.5000	0.0500	0.1250	
E4 Jamb	10.4800	0.0500	0.5240	
E5 Ground floor (normal)	12.3100	0.1600	1.9696	
E16 Corner (normal)	2.6800	0.0900	0.2412	
E18 Party wall between dwellings	2.6800	0.0600	0.1608	
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.9996 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 32.9008 (37)

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

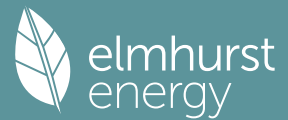
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	35.0782	34.8441	34.6146	33.5365	33.3348	32.3959	32.3959	32.2220	32.7576	33.3348	33.7429	34.1694	(38)
Heat transfer coeff	67.9791	67.7449	67.5154	66.4374	66.2357	65.2968	65.2968	65.1229	65.6584	66.2357	66.6437	67.0703	(39)
Average = Sum(39)m / 12 =												66.4364	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9653	0.9620	0.9588	0.9434	0.9406	0.9272	0.9272	0.9248	0.9324	0.9406	0.9464	0.9524	(40)
HLP (average)												0.9434	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2563 (42)
Hot water usage for mixer showers													
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													(42a)
Hot water usage for baths													
26.8068 26.4086 25.8480 24.8143 24.0403 23.1820 22.7184 23.2751 23.8813 24.7997 25.8547 26.7161													(42b)
Hot water usage for other uses													
37.7365 36.3643 34.9921 33.6198 32.2476 30.8754 30.8754 32.2476 33.6198 34.9921 36.3643 37.7365													(42c)
Average daily hot water use (litres/day)													59.1600 (43)
Daily hot water use													
64.5433 62.7730 60.8401 58.4341 56.2879 54.0574 53.5938 55.5227 57.5011 59.7917 62.2190 64.4527													(44)
Energy conte 102.2208 89.3878 93.5089 79.9934 75.7743 66.4698 64.8170 68.7487 70.9046 81.1368 88.6423 100.9173													(45)
Energy content (annual)													982.5219
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													(59)
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)
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													
Total heat required for water heating calculated for each month													
86.8877 75.9797 79.4826 67.9944 64.4081 56.4994 55.0945 58.4364 60.2689 68.9663 75.3460 85.7797													(62)
WWHRS													(63a)
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)
PV diverter													(63c)
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)
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													
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													
Output from w/h													
86.8877 75.9797 79.4826 67.9944 64.4081 56.4994 55.0945 58.4364 60.2689 68.9663 75.3460 85.7797													(64)
Total per year (kWh/year) = Sum(64)m =													835.1436 (64)
Electric shower(s)													835 (64)
49.6917 44.2757 48.3474 46.1373 47.0031 44.8364 46.3309 47.0031 46.1373 48.3474 47.4383 49.6917													(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													565.2404 (64a)
Heat gains from water heating, kWh/month													
34.1449 30.0639 31.9575 28.5329 27.8528 25.3339 25.3563 26.3599 26.6016 29.3284 30.6961 33.8679													(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	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.4591	115.6511	104.4591	107.9410	104.4591	107.9410	104.4591	104.4591	107.9410	104.4591	107.9410	104.4591 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.2753	200.3328	195.1480	184.1102	170.1770	157.0818	148.3334	146.2759	151.4607	162.4984	176.4316	189.5269 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814 (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)	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511 (71)
Water heating gains (Table 5)	45.8936	44.7379	42.9536	39.6291	37.4366	35.1860	34.0811	35.4299	36.9466	39.4199	42.6334	45.5213 (72)
Total internal gains	405.4722	417.5660	399.4049	388.5245	368.9168	357.0530	343.7177	343.0091	353.1925	363.2216	383.8503	396.3515 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
North	3.6800		10.6334		0.6300		0.7000		0.7700		11.9589 (74)	
South	7.5200		46.7521		0.6300		0.7000		0.7700		107.4461 (78)	
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)
Total gains	524.8771	616.3890	662.3928	704.2448	716.9442	701.0710	675.9372	650.7104	634.0388	580.2254	525.9633	499.1643 (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	68.4963	68.7330	68.9667	70.0857	70.2991	71.3100	71.3100	71.5004	70.9172	70.2991	69.8687	69.4244
alpha	5.5664	5.5822	5.5978	5.6724	5.6866	5.7540	5.7540	5.7667	5.7278	5.6866	5.6579	5.6283
util living area	0.9926	0.9816	0.9607	0.9002	0.7791	0.5834	0.4233	0.4575	0.6813	0.9129	0.9820	0.9943 (86)
MIT	19.9930	20.2033	20.4376	20.7202	20.9054	20.9854	20.9980	20.9969	20.9653	20.7378	20.3256	19.9638 (87)
Th 2	20.1123	20.1151	20.1178	20.1307	20.1331	20.1444	20.1444	20.1465	20.1401	20.1331	20.1283	20.1232 (88)
util rest of house	0.9904	0.9764	0.9496	0.8736	0.7278	0.5108	0.3419	0.3741	0.6088	0.8839	0.9760	0.9926 (89)
MIT 2	19.2024	19.4115	19.6411	19.9151	20.0726	20.1379	20.1439	20.1456	20.1226	19.9378	19.5443	19.1822 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	19.5178	19.7274	19.9588	20.2363	20.4048	20.4759	20.4846	20.4852	20.4588	20.2569	19.8559	19.4940 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5178	19.7274	19.9588	20.2363	20.4048	20.4759	20.4846	20.4852	20.4588	20.2569	19.8559	19.4940 (93)

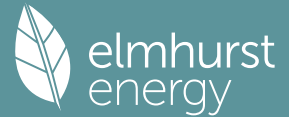
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9886	0.9736	0.9473	0.8771	0.7447	0.5394	0.3744	0.4075	0.6366	0.8886	0.9737	0.9910 (94)
Useful gains	518.8875	600.1428	627.4628	617.7088	533.9426	378.1720	253.0866	265.1327	403.6485	515.5811	512.1408	494.6789 (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	1034.4887	1004.4778	908.6793	753.1530	576.5680	383.6789	253.6506	266.0397	417.5059	639.6344	850.1025	1025.7710 (97)
Space heating kWh	383.6073	271.7131	209.2251	97.5198	31.7133	0.0000	0.0000	0.0000	0.0000	92.2957	243.3324	395.1325 (98a)
Space heating requirement - total per year (kWh/year)	1724.5391											
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	383.6073	271.7131	209.2251	97.5198	31.7133	0.0000	0.0000	0.0000	0.0000	92.2957	243.3324	395.1325 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1724.5391											
Space heating per m ²	(98c) / (4) = 24.4893 (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	613.7895	483.1960	494.9339	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9320	0.9700	0.9614	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	572.0716	468.7237	475.8264	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	776.7947	749.5780	722.1596	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	147.4006	208.9556	183.2719	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	FC = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	36.8502	52.2389	45.8180	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	134.9070 (107)											
Energy for space heating	24.4893 (99)											
Energy for space cooling	1.9157 (108)											
Total	26.4051 (109)											
Fabric Energy Efficiency (TFEE)	26.4 (109)											

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Plot Reference	Plot 03			Issued on Date	22/12/2025
Assessment Reference	Plot 03	Plot Type Ref			
Plot Address	Flat 2, 6 Cross Road Manchester, M21 9SA			SAP Version	10.2
SAP Rating	89 B	DER	3.08	TER	11.43
Environmental	98 A	% DER < TER			73.05
CO ₂ Emissions (t/year)	0.18	DFEE	22.35	TFEE	26.41
Compliance Check	See BREL	% DFEE < TFEE			15.36
% DPER < TPER	46.67	DPER	32.26	TPER	60.49
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	70.4200 (1b)	2.5000 (2b)	176.0500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	176.0500 (5)

2. Ventilation rate

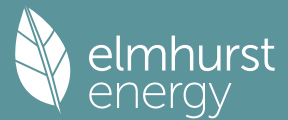
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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	2.7000	(17)
Infiltration rate	0.1350	(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) =	0.1148 (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	0.1463	0.1434	0.1406	0.1262	0.1234	0.1090	0.1090	0.1061	0.1148	0.1234	0.1291	0.1348 (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	0.2863	0.2834	0.2806	0.2662	0.2634	0.2490	0.2490	0.2461	0.2548	0.2634	0.2691	0.2748 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
Ground Floor			70.4200	0.1100	7.7462	110.0000	7746.2000 (28a)
EXT Wall	32.9900	11.2000	21.7900	0.1800	3.9222	110.0000	2396.9002 (29a)
Total net area of external elements Aum(A, m ²)			103.4100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.5169		(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			24.7600	0.0000	0.0000	45.0000	1114.2000 (32)
Party Ceiling			70.4200			30.0000	2112.6000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16762.7202 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							238.0392 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	12.3100	0.0370	0.4555
P1 Party wall - Ground floor	29.3300	0.0510	1.4958
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.3300	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E5 Ground floor (normal)	12.3100	0.0670	0.8248
E16 Corner (normal)	2.6800	0.0420	0.1126
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5930 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.1099 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	16.6334	16.4667	16.3001	15.4667	15.3001	14.4668	14.4668	14.3001	14.8001	15.3001	15.6334	15.9667	(38)
Heat transfer coeff	46.7433	46.5766	46.4099	45.5766	45.4100	44.5766	44.5766	44.4100	44.9100	45.4100	45.7433	46.0766	(39)
Average = Sum(39)m / 12 =												45.5350	
HLP	0.6638	0.6614	0.6590	0.6472	0.6448	0.6330	0.6330	0.6306	0.6377	0.6448	0.6496	0.6543	(40)
HLP (average)												0.6466	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2563 (42)
Hot water usage for mixer showers	62.0500	61.1175	59.7587	57.1588	55.2402	53.1006	51.8844	53.2329	54.7112	57.0085	59.6642	61.8123	(42a)
Hot water usage for baths	26.8068	26.4086	25.8480	24.8143	24.0403	23.1820	22.7184	23.2751	23.8813	24.7997	25.8547	26.7161	(42b)
Hot water usage for other uses	37.7365	36.3643	34.9921	33.6198	32.2476	30.8754	30.8754	32.2476	33.6198	34.9921	36.3643	37.7365	(42c)
Average daily hot water use (litres/day)												116.3681	(43)
Daily hot water use	126.5933	123.8905	120.5988	115.5930	111.5281	107.1579	105.4782	108.7556	112.2123	116.8002	121.8832	126.2650	(44)
Energy conte	200.4929	176.4184	185.3558	158.2410	150.1382	131.7632	127.5667	134.6622	138.3690	158.4968	173.6449	197.7004	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	30.0739	26.4628	27.8034	23.7362	22.5207	19.7645	19.1350	20.1993	20.7553	23.7745	26.0467	29.6551	(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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	(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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	(64)
12Total per year (kWh/year)												2250.1805	(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	66.6639	58.6591	61.6308	52.6151	49.9210	43.8113	42.4159	44.7752	46.0077	52.7002	57.7369	65.7354	(65)

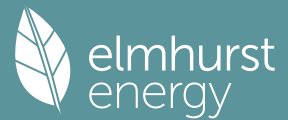
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.4591	115.6511	104.4591	107.9410	104.4591	107.9410	104.4591	104.4591	107.9410	104.4591	107.9410	104.4591	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.2753	200.3328	195.1480	184.1102	170.1770	157.0818	148.3334	146.2759	151.4607	162.4984	176.4316	189.5269	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	(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)	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	(71)
Water heating gains (Table 5)	89.6020	87.2903	82.8371	73.0766	67.0981	60.8490	57.0106	60.1817	63.8996	70.8336	80.1902	88.3540	(72)
Total internal gains	449.1806	460.1184	439.2884	421.9720	398.5783	382.7160	366.6472	367.7608	380.1454	394.6353	421.4070	439.1841	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	3.6800	10.6334	0.4000	0.0000	0.7700	12.0523 (74)
South	7.5200	46.7521	0.4000	0.0000	0.7700	108.2853 (78)

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Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	569.5181	660.4944	704.3304	740.1582	749.3239	729.4210	701.4615	677.8655	663.1853	613.3340	564.6301	542.8000 (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	99.6146	99.9710	100.3300	102.1645	102.5394	104.4563	104.4563	104.8483	103.6810	102.5394	101.7922	101.0558
alpha	7.6410	7.6647	7.6887	7.8110	7.8360	7.9638	7.9638	7.9899	7.9121	7.8360	7.7861	7.7371
util living area	0.9740	0.9325	0.8637	0.7245	0.5608	0.3910	0.2796	0.3014	0.4667	0.7446	0.9314	0.9799 (86)
MIT	20.6064	20.7664	20.8874	20.9733	20.9964	20.9998	21.0000	21.0000	20.9993	20.9728	20.8079	20.5772 (87)
Th 2	20.3729	20.3750	20.3772	20.3877	20.3898	20.4004	20.4004	20.4025	20.3961	20.3898	20.3856	20.3814 (88)
util rest of house	0.9679	0.9193	0.8416	0.6928	0.5250	0.3544	0.2415	0.2622	0.4261	0.7078	0.9160	0.9751 (89)
MIT 2	19.9257	20.1210	20.2624	20.3635	20.3870	20.4003	20.4004	20.4025	20.3957	20.3664	20.1825	19.8968 (90)
Living area fraction										FLA = Living area / (4) =		0.3989 (91)
MIT	20.1972	20.3784	20.5117	20.6068	20.6301	20.6394	20.6396	20.6408	20.6365	20.6083	20.4320	20.1682 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1972	20.3784	20.5117	20.6068	20.6301	20.6394	20.6396	20.6408	20.6365	20.6083	20.4320	20.1682 (93)

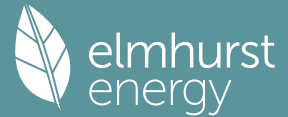
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9660	0.9194	0.8466	0.7043	0.5391	0.3690	0.2567	0.2778	0.4423	0.7213	0.9172	0.9732 (94)
Useful gains	550.1490	607.2643	596.2951	521.3180	403.9949	269.1572	180.0673	188.3301	293.2940	442.3821	517.9043	528.2485 (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	743.0863	720.9334	650.2822	533.5555	405.5155	269.2178	180.0699	188.3350	293.5532	454.4755	609.8493	735.7604 (97)
Space heating kWh	143.5453	76.3856	40.1664	8.8110	1.1313	0.0000	0.0000	0.0000	0.0000	8.9975	66.2004	154.3889 (98a)
Space heating requirement - total per year (kWh/year)												499.6265
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	143.5453	76.3856	40.1664	8.8110	1.1313	0.0000	0.0000	0.0000	0.0000	8.9975	66.2004	154.3889 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												499.6265
Space heating per m2										(98c) / (4) =		7.0950 (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	143.5453	76.3856	40.1664	8.8110	1.1313	0.0000	0.0000	0.0000	0.0000	8.9975	66.2004	154.3889 (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)	143.5453	76.3856	40.1664	8.8110	1.1313	0.0000	0.0000	0.0000	0.0000	8.9975	66.2004	154.3889 (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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518 (64)
Efficiency of water heater (217)m	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901 (216)
Fuel for water heating, kWh/month	66.0618	58.3118	61.6652	53.5371	51.4362	45.8466	44.8802	46.9411	47.7652	53.8639	58.0112	65.2507 (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	13.6813	12.3573	13.6813	13.2399	13.6813	13.2399	13.6813	13.6813	13.2399	13.6813	13.2399	13.6813 (231)
Lighting	19.3244	15.5028	13.9585	10.2266	7.8993	6.4538	7.2060	9.3667	12.1664	15.9629	18.0301	19.8615 (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												499.6265 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.2901
Water heating fuel used												653.5711 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)		
mechanical ventilation fans (SFP = 0.7500)	161.0857	(230a)
Total electricity for the above, kWh/year	161.0857	(231)
Electricity for lighting (calculated in Appendix L)	155.9590	(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	1470.2423	(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	499.6265	0.1592	79.5597 (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)	653.5711	0.1412	92.2672 (264)
Space and water heating			171.8269 (265)
Pumps, fans and electric keep-hot	161.0857	0.1387	22.3446 (267)
Energy for lighting	155.9590	0.1443	22.5097 (268)
Total CO2, kg/year			216.6812 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0800 (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	499.6265	1.5894	794.0983 (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)	653.5711	1.5220	994.7507 (278)
Space and water heating			1788.8490 (279)
Pumps, fans and electric keep-hot	161.0857	1.5128	243.6905 (281)
Energy for lighting	155.9590	1.5338	239.2151 (282)
Total Primary energy kWh/year			2271.7546 (286)
Dwelling Primary energy Rate (DPER)			32.2600 (287)

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

1. Overall dwelling characteristics

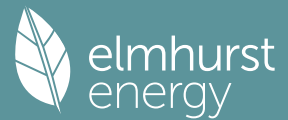
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	70.4200 (1b)	x 2.5000 (2b)	= 176.0500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	176.0500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1704 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4204 (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) = 0.3573 (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	0.4556	0.4467	0.4377	0.3931	0.3841	0.3395	0.3395	0.3305	0.3573	0.3841	0.4020	0.4199 (22b)
Effective ac	0.6038	0.5998	0.5958	0.5773	0.5738	0.5576	0.5576	0.5546	0.5638	0.5738	0.5808	0.5881 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			11.2000	1.1450	12.8244			(27)
Ground Floor			70.4200	0.1300	9.1546			(28a)
EXT Wall	32.9900	11.2000	21.7900	0.1800	3.9222			(29a)
Total net area of external elements Aum(A, m2)			103.4100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.9012			(33)
Main dwelling								
Party Wall			53.8400	0.0000	0.0000			(32)
Corridor			24.7600	0.0000	0.0000			(32)

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

238.0392 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	12.3100	0.0700	0.8617	
P1 Party wall - Ground floor	29.3300	0.0800	2.3464	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.3300	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885	
E3 Sill	2.5000	0.0500	0.1250	
E4 Jamb	10.4800	0.0500	0.5240	
E5 Ground floor (normal)	12.3100	0.1600	1.9696	
E16 Corner (normal)	2.6800	0.0900	0.2412	
E18 Party wall between dwellings	2.6800	0.0600	0.1608	
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824	

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

6.9996 (36)

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 32.9008 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	35.0782	34.8441	34.6146	33.5365	33.3348	32.3959	32.3959	32.2220	32.7576	33.3348	33.7429	34.1694	(38)
Average = Sum(39)m / 12 =	67.9791	67.7449	67.5154	66.4374	66.2357	65.2968	65.2968	65.1229	65.6584	66.2357	66.6437	67.0703	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9653	0.9620	0.9588	0.9434	0.9406	0.9272	0.9272	0.9248	0.9324	0.9406	0.9464	0.9524	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

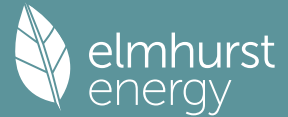
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2563 (42)
Hot water usage for mixer showers													
62.0500	61.1175	59.7587	57.1588	55.2402	53.1006	51.8844	53.2329	54.7112	57.0085	59.6642	61.8123	61.8123	(42a)
Hot water usage for baths													
26.8068	26.4086	25.8480	24.8143	24.0403	23.1820	22.7184	23.2751	23.8813	24.7997	25.8547	26.7161	26.7161	(42b)
Hot water usage for other uses													
37.7365	36.3643	34.9921	33.6198	32.2476	30.8754	30.8754	32.2476	33.6198	34.9921	36.3643	37.7365	37.7365	(42c)
Average daily hot water use (litres/day)													116.3681 (43)
Daily hot water use													
126.5933	123.8905	120.5988	115.5930	111.5281	107.1579	105.4782	108.7556	112.2123	116.8002	121.8832	126.2650	126.2650	(44)
Energy conte	200.4929	176.4184	185.3558	158.2410	150.1382	131.7632	127.5667	134.6622	138.3690	158.4968	173.6449	197.7004	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
30.0739	26.4628	27.8034	23.7362	22.5207	19.7645	19.1350	20.1993	20.7553	23.7745	26.0467	29.6551	29.6551	(46)
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	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	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	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													
247.0878	218.5041	231.9507	203.3328	196.7331	176.8550	174.1616	181.2571	183.4608	205.0917	218.7368	244.2953	244.2953	(62)
WWHRS	-28.3667	-25.0877	-26.2704	-21.7529	-20.2730	-17.3477	-16.2607	-17.2916	-17.9486	-21.1594	-23.9711	-27.8414	(63a)
FV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
218.7211	193.4164	205.6803	181.5799	176.4602	159.5073	157.9009	163.9655	165.5122	183.9323	194.7657	216.4539	216.4539	(64)
12Total per year (kWh/year)													2217.8956 (64)
Electric shower(s)													2218 (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)
Total Energy used by instantaneous electric shower(s) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
103.9398	92.3277	98.9067	88.6886	87.1969	79.8847	79.6918	82.0511	82.0812	89.9761	93.8104	103.0113	103.0113	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	112.8139	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
104.4591	115.6511	104.4591	107.9410	104.4591	107.9410	104.4591	104.4591	107.9410	104.4591	107.9410	104.4591	104.4591	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
198.2753	200.3328	195.1480	184.1102	170.1770	157.0818	148.3334	146.2759	151.4607	162.4984	176.4316	189.5269	189.5269	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	34.2814	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	(71)
Water heating gains (Table 5)													

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Total internal gains	139.7040	137.3924	132.9392	123.1786	117.2001	110.9510	107.1127	110.2837	114.0016	120.9356	130.2922	138.4561 (72)
	502.2826	513.2205	492.3904	475.0741	451.6804	432.8180	416.7493	417.8629	430.2475	447.7373	474.5091	492.2862 (73)

6. Solar gains

[Jan]	Area m2			Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d	Gains W	
North	3.6800			10.6334		0.6300		0.7000		0.7700	11.9589 (74)	
South	7.5200			46.7521		0.6300		0.7000		0.7700	107.4461 (78)	
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)
Total gains	621.6876	712.0435	755.3783	790.7943	799.7077	776.8360	748.9688	725.5642	711.0938	664.7411	616.6221	595.0990 (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	68.4963	68.7330	68.9667	70.0857	70.2991	71.3100	71.3100	71.5004	70.9172	70.2991	69.8687	69.4244
alpha	5.5664	5.5822	5.5978	5.6724	5.6866	5.7540	5.7540	5.7667	5.7278	5.6866	5.6579	5.6283
util living area	0.9838	0.9658	0.9347	0.8570	0.7217	0.5308	0.3826	0.4114	0.6187	0.8652	0.9642	0.9868 (86)
MIT	20.1416	20.3389	20.5520	20.7923	20.9360	20.9909	20.9988	20.9982	20.9785	20.8126	20.4540	20.1133 (87)
Th 2	20.1123	20.1151	20.1178	20.1307	20.1331	20.1444	20.1444	20.1465	20.1401	20.1331	20.1283	20.1232 (88)
util rest of house	0.9794	0.9570	0.9183	0.8243	0.6684	0.4629	0.3088	0.3358	0.5488	0.8277	0.9534	0.9832 (89)
MIT 2	19.1320	19.3798	19.6423	19.9316	20.0823	20.1393	20.1440	20.1458	20.1267	19.9615	19.5363	19.1048 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.5347	19.7624	20.0052	20.2749	20.4228	20.4790	20.4850	20.4859	20.4665	20.3010	19.9024	19.5070 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5347	19.7624	20.0052	20.2749	20.4228	20.4790	20.4850	20.4859	20.4665	20.3010	19.9024	19.5070 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9758	0.9528	0.9159	0.8302	0.6868	0.4898	0.3383	0.3660	0.5760	0.8356	0.9501	0.9799 (94)
Useful gains	606.6533	678.4672	691.8335	656.5042	549.2731	380.4867	253.3461	265.5641	409.5592	555.4822	585.8540	583.1566 (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	1035.6420	1006.8510	911.8058	755.7196	577.7608	383.8786	253.6769	266.0827	418.0114	642.5525	853.1972	1026.6480 (97)
Space heating kWh	319.1676	220.6739	163.6594	71.4351	21.1949	0.0000	0.0000	0.0000	0.0000	64.7803	192.4871	329.9576 (98a)
Space heating requirement - total per year (kWh/year)												1383.3558
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	319.1676	220.6739	163.6594	71.4351	21.1949	0.0000	0.0000	0.0000	0.0000	64.7803	192.4871	329.9576 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1383.3558
Space heating per m2												(98c) / (4) = 19.6444 (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	319.1676	220.6739	163.6594	71.4351	21.1949	0.0000	0.0000	0.0000	0.0000	64.7803	192.4871	329.9576 (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)	345.7937	239.0833	177.3124	77.3945	22.9630	0.0000	0.0000	0.0000	0.0000	70.1845	208.5451	357.4838 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	218.7211	193.4164	205.6803	181.5799	176.4602	159.5073	157.9009	163.9655	165.5122	183.9323	194.7657	216.4539 (64)
Efficiency of water heater	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000	79.8000 (216)
(217)m	84.9062	84.3562	83.5523	82.1507	80.6768	79.8000	79.8000	79.8000	79.8000	81.9637	84.0334	85.0023 (217)
Fuel for water heating, kWh/month	257.6033	229.2853	246.1694	221.0326	218.7248	199.8838	197.8708	205.4705	207.4088	224.4070	231.7718	254.6447 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	21.7045	17.4122	15.6777	11.4862	8.8723	7.2487	8.0936	10.5203	13.6649	17.9290	20.2508	22.3078 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-18.8780	-27.9725	-42.2345	-49.9593	-56.0454	-53.1114	-52.4689	-48.4578	-41.7571	-33.0708	-21.2330	-16.1669 (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)												

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(233b)m	-6.8992	-14.8260	-30.0585	-46.0237	-61.7205	-62.3304	-61.5919	-51.7460	-37.4053	-21.4814	-9.3003	-5.4323	(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												1498.7603	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2694.2728	(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)												175.1680	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-870.1712	(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												3584.0299	(238)

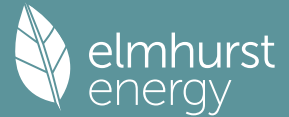
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1498.7603	0.2100	314.7397 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2694.2728	0.2100	565.7973 (264)
Space and water heating			880.5369 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	175.1680	0.1443	25.2822 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-461.3558	0.1336	-61.6149
PV Unit electricity exported	-408.8154	0.1253	-51.2398
Total			-112.8546 (269)
Total CO2, kg/year			804.8937 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.4300 (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	1498.7603	1.1300	1693.5991 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2694.2728	1.1300	3044.5282 (278)
Space and water heating			4738.1274 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	175.1680	1.5338	268.6785 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-461.3558	1.4935	-689.0468
PV Unit electricity exported	-408.8154	0.4600	-188.0743
Total			-877.1210 (283)
Total Primary energy kWh/year			4259.7856 (286)
Target Primary Energy Rate (TPER)			60.4900 (287)

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Plot Reference	Plot 03				Issued on Date	22/12/2025	
Assessment Reference	Plot 03			Plot Type Ref			
Plot Address	Flat 2, 6 Cross Road Manchester, M21 9SA				SAP Version	10.2	
SAP Rating	89 B	DER	3.08	TER	11.43		
Environmental	98 A	% DER < TER				73.05	
CO ₂ Emissions (t/year)	0.18	DFEE	22.35	TFEE	26.41		
Compliance Check	See BREL	% DFEE < TFEE				15.36	
% DPER < TPER	46.67	DPER	32.26	TPER	60.49		
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	70.4200 (1b)	2.5000 (2b)	176.0500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	176.0500 (5)

2. Ventilation rate

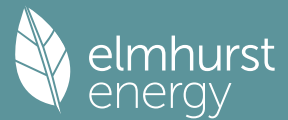
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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	2.7000	(17)
Infiltration rate	0.1350	(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) =	0.1148 (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	0.1463	0.1434	0.1406	0.1262	0.1234	0.1090	0.1090	0.1061	0.1148	0.1234	0.1291	0.1348 (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	0.2863	0.2834	0.2806	0.2662	0.2634	0.2490	0.2490	0.2461	0.2548	0.2634	0.2691	0.2748 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
Ground Floor			70.4200	0.1100	7.7462	110.0000	7746.2000 (28a)
EXT Wall	32.9900	11.2000	21.7900	0.1800	3.9222	110.0000	2396.9002 (29a)
Total net area of external elements Aum(A, m ²)			103.4100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.5169		(33)
Main dwelling							
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000 (32)
Corridor			24.7600	0.0000	0.0000	45.0000	1114.2000 (32)
Party Ceiling			70.4200			30.0000	2112.6000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16762.7202 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							238.0392 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	12.3100	0.0370	0.4555
P1 Party wall - Ground floor	29.3300	0.0510	1.4958
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.3300	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E5 Ground floor (normal)	12.3100	0.0670	0.8248
E16 Corner (normal)	2.6800	0.0420	0.1126
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5930 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.1099 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	16.6334	16.4667	16.3001	15.4667	15.3001	14.4668	14.4668	14.3001	14.8001	15.3001	15.6334	15.9667	(38)
Heat transfer coeff	46.7433	46.5766	46.4099	45.5766	45.4100	44.5766	44.5766	44.4100	44.9100	45.4100	45.7433	46.0766	(39)
Average = Sum(39)m / 12 =												45.5350	
HLP	0.6638	0.6614	0.6590	0.6472	0.6448	0.6330	0.6330	0.6306	0.6377	0.6448	0.6496	0.6543	(40)
HLP (average)												0.6466	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2563 (42)
Hot water usage for mixer showers	62.0500	61.1175	59.7587	57.1588	55.2402	53.1006	51.8844	53.2329	54.7112	57.0085	59.6642	61.8123	(42a)
Hot water usage for baths	26.8068	26.4086	25.8480	24.8143	24.0403	23.1820	22.7184	23.2751	23.8813	24.7997	25.8547	26.7161	(42b)
Hot water usage for other uses	37.7365	36.3643	34.9921	33.6198	32.2476	30.8754	30.8754	32.2476	33.6198	34.9921	36.3643	37.7365	(42c)
Average daily hot water use (litres/day)												116.3681	(43)
Daily hot water use	126.5933	123.8905	120.5988	115.5930	111.5281	107.1579	105.4782	108.7556	112.2123	116.8002	121.8832	126.2650	(44)
Energy conte	200.4929	176.4184	185.3558	158.2410	150.1382	131.7632	127.5667	134.6622	138.3690	158.4968	173.6449	197.7004	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	30.0739	26.4628	27.8034	23.7362	22.5207	19.7645	19.1350	20.1993	20.7553	23.7745	26.0467	29.6551	(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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	(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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	66.6639	58.6591	61.6308	52.6151	49.9210	43.8113	42.4159	44.7752	46.0077	52.7002	57.7369	65.7354	(65)

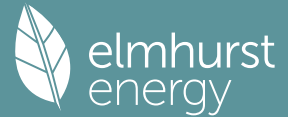
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.0776	19.6091	15.9472	12.0731	9.0248	7.6191	8.2327	10.7012	14.3631	18.2372	21.2855	22.6912	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	295.9333	299.0042	291.2657	274.7914	253.9956	234.4504	221.3931	218.3222	226.0607	242.5350	263.3308	282.8760	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	(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)	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	(71)
Water heating gains (Table 5)	89.6020	87.2903	82.8371	73.0766	67.0981	60.8490	57.0106	60.1817	63.8996	70.8336	80.1902	88.3540	(72)
Total internal gains	503.5324	501.8232	485.9696	455.8606	426.0379	398.8380	382.5559	385.1246	400.2428	427.5253	460.7260	489.8407	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				3.6800	10.6334		0.4000		0.7700				12.0523 (74)
South				7.5200	46.7521		0.4000		0.0000		0.7700		108.2853 (78)
Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158	(83)

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Total gains 623.8700 702.1991 751.0115 774.0468 776.7835 745.5430 717.3702 695.2293 683.2827 646.2240 603.9491 593.4565 (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	99.6146	99.9710	100.3300	102.1645	102.5394	104.4563	104.4563	104.8483	103.6810	102.5394	101.7922	101.0558
alpha	7.6410	7.6647	7.6887	7.8110	7.8360	7.9638	7.9638	7.9899	7.9121	7.8360	7.7861	7.7371
util living area	0.9577	0.9115	0.8309	0.6972	0.5416	0.3825	0.2734	0.2938	0.4530	0.7128	0.9076	0.9669 (86)
MIT	20.6809	20.8085	20.9146	20.9793	20.9971	20.9999	21.0000	21.0000	20.9994	20.9797	20.8468	20.6503 (87)
Th 2	20.3729	20.3750	20.3772	20.3877	20.3898	20.4004	20.4004	20.4025	20.3961	20.3898	20.3856	20.3814 (88)
util rest of house	0.9487	0.8958	0.8067	0.6657	0.5068	0.3468	0.2361	0.2557	0.4136	0.6760	0.8889	0.9596 (89)
MIT 2	20.0165	20.1698	20.2917	20.3692	20.3876	20.4003	20.4004	20.4025	20.3958	20.3726	20.2267	19.9868 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.2815	20.4246	20.5402	20.6126	20.6308	20.6395	20.6396	20.6408	20.6366	20.6147	20.4740	20.2515 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.2815	20.4246	20.5402	20.6126	20.6308	20.6395	20.6396	20.6408	20.6366	20.6147	20.4740	20.2515 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9473	0.8971	0.8132	0.6774	0.5205	0.3610	0.2510	0.2709	0.4293	0.6898	0.8918	0.9579 (94)
Useful gains	590.9703	629.9589	610.7579	524.3668	404.3518	269.1670	180.0677	188.3310	293.3484	445.7803	538.6039	568.4503 (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	747.0277	723.0819	651.6031	533.8189	405.5458	269.2187	180.0700	188.3351	293.5578	454.7689	611.7721	739.5984 (97)
Space heating kWh	116.1067	62.5787	30.3888	6.8055	0.8883	0.0000	0.0000	0.0000	0.0000	6.6875	52.6811	127.3342 (98a)
Space heating requirement - total per year (kWh/year)	403.4709											
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	116.1067	62.5787	30.3888	6.8055	0.8883	0.0000	0.0000	0.0000	0.0000	6.6875	52.6811	127.3342 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	403.4709											
Space heating per m2	(98c) / (4) = 5.7295 (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	116.1067	62.5787	30.3888	6.8055	0.8883	0.0000	0.0000	0.0000	0.0000	6.6875	52.6811	127.3342 (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)	116.1067	62.5787	30.3888	6.8055	0.8883	0.0000	0.0000	0.0000	0.0000	6.6875	52.6811	127.3342 (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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518 (64)
Efficiency of water heater (217)m	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901 (216)
Fuel for water heating, kWh/month	66.0618	58.3118	61.6652	53.5371	51.4362	45.8466	44.8802	46.9411	47.7652	53.8639	58.0112	65.2507 (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	13.6813	12.3573	13.6813	13.2399	13.6813	13.2399	13.6813	13.6813	13.2399	13.6813	13.2399	13.6813 (231)
Lighting	19.3244	15.5028	13.9585	10.2266	7.8993	6.4538	7.2060	9.3667	12.1664	15.9629	18.0301	19.8615 (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	403.4709 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	344.2901											
Water heating fuel used	653.5711 (219)											
Space cooling fuel	0.0000 (221)											

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Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)	
mechanical ventilation fans (SFP = 0.7500)	161.0857 (230a)
Total electricity for the above, kWh/year	161.0857 (231)
Electricity for lighting (calculated in Appendix L)	155.9590 (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	1374.0867 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	403.4709	16.4900	66.5323	(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)	653.5711	16.4900	107.7739	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	161.0857	16.4900	26.5630	(249)
Energy for lighting	155.9590	16.4900	25.7176	(250)
Additional standing charges			0.0000	(251)
Total energy cost			226.5869	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7067 (257)
SAP value		88.5438
SAP rating (Section 12)		89 (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	403.4709	0.1594	64.2977	(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)	653.5711	0.1412	92.2672	(264)
Space and water heating			156.5650	(265)
Pumps, fans and electric keep-hot	161.0857	0.1387	22.3446	(267)
Energy for lighting	155.9590	0.1443	22.5097	(268)
Total CO2, kg/year			201.4193	(272)
CO2 emissions per m2			2.8600	(273)
EI value			97.6616	
EI rating			98	(274)
EI band			A	

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

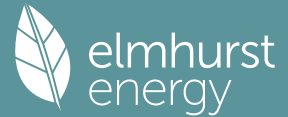
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	70.4200	2.5000	176.0500	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.4200			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	176.0500	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans		Air changes per hour
Pressure test	0.0000 / (5) =	0.0000 (8)
Pressure Test Method		Yes
Measured/design AP50		Blower Door
Infiltration rate		2.7000 (17)
		0.1350 (18)

Full SAP Calculation Printout



Number of sides sheltered

2 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.1148 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1234	0.1205	0.1205	0.1119	0.1148	0.0975	0.0947	0.0947	0.0975	0.1090	0.1090	0.1119	(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	0.2634	0.2605	0.2605	0.2519	0.2548	0.2375	0.2347	0.2347	0.2375	0.2490	0.2490	0.2519	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window N/E			3.6800	1.3258	4.8788			(27)
Window S/W			7.5200	1.3258	9.9697			(27)
Ground Floor			70.4200	0.1100	7.7462	110.0000	7746.2000	(28a)
EXT Wall	32.9900	11.2000	21.7900	0.1800	3.9222	110.0000	2396.9002	(29a)
Total net area of external elements Aum(A, m2)			103.4100					(31)
Fabric heat loss, W/K = Sum(A x U)					(26)...(30) + (32) = 26.5169			(33)
Main dwelling								
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000	(32)
Corridor			24.7600	0.0000	0.0000	45.0000	1114.2000	(32)
Party Ceiling			70.4200			30.0000	2112.6000	(32b)
Internal Wall			107.7800			9.0000	970.0200	(32c)

Heat capacity Cm = Sum(A x k)

$$(28)...(30) + (32) + (32a)...(32e) = 16762.7202 \quad (34)$$

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

$$238.0392 \quad (35)$$

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	12.3100	0.0370	0.4555
P1 Party wall - Ground floor	29.3300	0.0510	1.4958
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	29.3300	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E5 Ground floor (normal)	12.3100	0.0670	0.8248
E16 Corner (normal)	2.6800	0.0420	0.1126
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412

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

$$3.5930 \quad (36)$$

Point Thermal bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 30.1099 \quad (37)$$

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

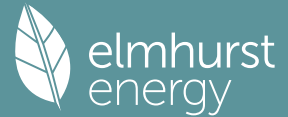
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	15.3001	15.1334	15.1334	14.6334	14.8001	13.8001	13.6334	13.6334	13.8001	14.4668	14.4668	14.6334	(38)
Heat transfer coeff	45.4100	45.2433	45.2433	44.7433	44.9100	43.9100	43.7433	43.7433	43.9100	44.5766	44.5766	44.7433	(39)
Average = Sum(39)m / 12 =													44.5628

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6448	0.6425	0.6425	0.6354	0.6377	0.6235	0.6212	0.6212	0.6235	0.6330	0.6330	0.6354	(40)
HLP (average)													0.6328
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2563 (42)
Hot water usage for mixer showers													
62.0500	61.1175	59.7587	57.1588	55.2402	53.1006	51.8844	53.2329	54.7112	57.0085	59.6642	61.8123	61.8123	(42a)
Hot water usage for baths													
26.8068	26.4086	25.8480	24.8143	24.0403	23.1820	22.7184	23.2751	23.8813	24.7997	25.8547	26.7161	26.7161	(42b)
Hot water usage for other uses													
37.7365	36.3643	34.9921	33.6198	32.2476	30.8754	30.8754	32.2476	33.6198	34.9921	36.3643	37.7365	37.7365	(42c)
Average daily hot water use (litres/day)													116.3681 (43)
Daily hot water use													
126.5933	123.8905	120.5988	115.5930	111.5281	107.1579	105.4782	108.7556	112.2123	116.8002	121.8832	126.2650	126.2650	(44)
Energy conte	200.4929	176.4184	185.3558	158.2410	150.1382	131.7632	127.5667	134.6622	138.3690	158.4968	173.6449	197.7004	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
30.0739	26.4628	27.8034	23.7362	22.5207	19.7645	19.1350	20.1993	20.7553	23.7745	26.0467	29.6551	29.6551	(46)
Water storage loss (or HIU loss):													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	224.6518	(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													
227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	224.6518	(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)

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Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	66.6639	58.6591	61.6308	52.6151	49.9210	43.8113	42.4159	44.7752	46.0077	52.7002	57.7369	65.7354 (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	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.0776	19.6091	15.9472	12.0731	9.0248	7.6191	8.2327	10.7012	14.3631	18.2372	21.2855	22.6912 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	295.9333	299.0042	291.2657	274.7914	253.9956	234.4504	221.3931	218.3222	226.0607	242.5350	263.3308	282.8760 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939 (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)	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511 (71)
Water heating gains (Table 5)	89.6020	87.2903	82.8371	73.0766	67.0981	60.8490	57.0106	60.1817	63.8996	70.8336	80.1902	88.3540 (72)
Total internal gains	503.5324	501.8232	485.9696	455.8606	426.0379	398.8380	382.5559	385.1246	400.2428	427.5253	460.7260	489.8407 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
North	3.6800		9.3942		0.4000		0.0000		0.7700		10.6478 (74)	
South	7.5200		41.2355		0.4000		0.0000		0.7700		95.5081 (78)	
Solar gains	106.1559	181.3171	250.6009	306.9806	330.2024	334.2102	314.9500	287.8882	275.0128	208.1891	129.8386	93.4882 (83)
Total gains	609.6883	683.1403	736.5704	762.8412	756.2403	733.0482	697.5059	673.0127	675.2556	635.7144	590.5647	583.3289 (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	102.5394	102.9172	102.9172	104.0672	103.6810	106.0422	106.4462	106.4462	106.0422	104.4563	104.4563	104.0672
alpha	7.8360	7.8611	7.8611	7.9378	7.9121	8.0695	8.0964	8.0964	8.0695	7.9638	7.9638	7.9378
util living area	0.9450	0.8901	0.7934	0.6434	0.4803	0.3175	0.2320	0.2535	0.4095	0.6697	0.8834	0.9566 (86)
MIT	20.7528	20.8606	20.9459	20.9897	20.9990	21.0000	21.0000	21.0000	20.9998	20.9884	20.8908	20.7233 (87)
Th 2	20.3898	20.3919	20.3919	20.3983	20.3961	20.4089	20.4110	20.4110	20.4089	20.4004	20.4004	20.3983 (88)
util rest of house	0.9335	0.8714	0.7664	0.6107	0.4448	0.2821	0.1951	0.2152	0.3712	0.6316	0.8610	0.9472 (89)
MIT 2	20.1191	20.2462	20.3396	20.3895	20.3955	20.4088	20.4110	20.4110	20.4087	20.3910	20.2906	20.0913 (90)
Living area fraction									fLA = Living area / (4) =			0.3989 (91)
MIT	20.3718	20.4913	20.5814	20.6289	20.6362	20.6446	20.6459	20.6459	20.6445	20.6293	20.5300	20.3434 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3718	20.4913	20.5814	20.6289	20.6362	20.6446	20.6459	20.6459	20.6445	20.6293	20.5300	20.3434 (93)

8. Space heating requirement

Utilisation	0.9331	0.8746	0.7750	0.6233	0.4589	0.2962	0.2098	0.2305	0.3864	0.6463	0.8661	0.9462 (94)
Useful gains	568.9270	597.4901	570.8552	475.4701	347.0329	217.1108	146.3618	155.1100	260.9482	410.8578	511.4694	551.9437 (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	688.9525	664.6811	596.3716	480.0473	347.4324	217.1191	146.3622	155.1108	261.0230	415.8677	563.0042	686.5140 (97)
Space heating kWh	89.2990	45.1524	18.9842	3.2956	0.2972	0.0000	0.0000	0.0000	0.0000	3.7273	37.1050	100.1203 (98a)
Space heating requirement - total per year (kWh/year)												297.9810
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	89.2990	45.1524	18.9842	3.2956	0.2972	0.0000	0.0000	0.0000	0.0000	3.7273	37.1050	100.1203 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												297.9810
Space heating per m ²										(98c) / (4) =		4.2315 (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	89.2990	45.1524	18.9842	3.2956	0.2972	0.0000	0.0000	0.0000	0.0000	3.7273	37.1050	100.1203 (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)	89.2990	45.1524	18.9842	3.2956	0.2972	0.0000	0.0000	0.0000	0.0000	3.7273	37.1050	100.1203 (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)

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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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	(64)
Efficiency of water heater	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	(216)
Fuel for water heating, kWh/month	66.0618	58.3118	61.6652	53.5371	51.4362	45.8466	44.8802	46.9411	47.7652	53.8639	58.0112	65.2507	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	13.6813	12.3573	13.6813	13.2399	13.6813	13.2399	13.6813	13.6813	13.2399	13.6813	13.2399	13.6813	(231)
Lighting	19.3244	15.5028	13.9585	10.2266	7.8993	6.4538	7.2060	9.3667	12.1664	15.9629	18.0301	19.8615	(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												297.9810	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.2901	
Water heating fuel used												653.5711	(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)												161.0857	(230a)
Total electricity for the above, kWh/year												161.0857	(231)
Electricity for lighting (calculated in Appendix L)												155.9590	(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												1268.5968	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	297.9810	28.4300	84.7160	(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)	653.5711	28.4300	185.8103	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	161.0857	28.4300	45.7967	(249)
Energy for lighting	155.9590	28.4300	44.3391	(250)
Additional standing charges			0.0000	(251)
Total energy cost			360.6621	(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	297.9810	0.1598	47.6246	(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)	653.5711	0.1412	92.2672	(264)
Space and water heating			139.8918	(265)
Pumps, fans and electric keep-hot	161.0857	0.1387	22.3446	(267)
Energy for lighting	155.9590	0.1443	22.5097	(268)
Total CO2, kg/year			184.7461	(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	297.9810	1.5915	474.2446	(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)	653.5711	1.5220	994.7507	(278)
Space and water heating			1468.9953	(279)
Pumps, fans and electric keep-hot	161.0857	1.5128	243.6905	(281)
Energy for lighting	155.9590	1.5338	239.2151	(282)
Total Primary energy kWh/year			1951.9009	(286)

SAP 10 EPC IMPROVEMENTS

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Plot 03

Current energy efficiency rating: B 89
Current environmental impact rating: A 98

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

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

Recommended measures
(none)

Typical annual savings	Energy efficiency	Environmental impact
Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating: B 89
Potential environmental impact rating: A 98

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

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

	Current £361	Potential £361	Saving £0
Electricity			
Space heating	£131	£131	£0
Water heating	£186	£186	£0
Lighting	£44	£44	£0
Total cost of fuels	£361	£361	£0
Total cost of uses	£361	£361	£0
Delivered energy	18 kWh/m²	18 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	3 kg/m²	3 kg/m²	0 kg/m²
Primary energy	28 kWh/m²	28 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	70.4200 (1b)	x 2.5000 (2b)	= 176.0500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 176.0500 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	2.7000	(17)
Infiltration rate	0.1350	(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) =	0.1148 (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	0.1463	0.1434	0.1406	0.1262	0.1234	0.1090	0.1090	0.1061	0.1148	0.1234	0.1291	0.1348 (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	0.2863	0.2834	0.2806	0.2662	0.2634	0.2490	0.2490	0.2461	0.2548	0.2634	0.2691	0.2748 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window N/E			3.6800	1.3258	4.8788			(27)
Window S/W			7.5200	1.3258	9.9697			(27)
Ground Floor			70.4200	0.1100	7.7462	110.0000	7746.2000	(28a)
EXT Wall	32.9900	11.2000	21.7900	0.1800	3.9222	110.0000	2396.9002	(29a)
Total net area of external elements Aum(A, m2)			103.4100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.5169			(33)
Main dwelling								
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000	(32)
Corridor			24.7600	0.0000	0.0000	45.0000	1114.2000	(32)
Party Ceiling			70.4200			30.0000	2112.6000	(32b)
Internal Wall			107.7800			9.0000	970.0200	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 16762.7202 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 238.0392 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	12.3100	0.0370	0.4555	
E7 Party floor between dwellings (in blocks of flats)	29.3300	0.0510	1.4958	
P1 Party wall - Ground floor	29.3300	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.7700	0.0250	0.1442	
E2 Other lintels (including other steel lintels)	2.5000	0.0220	0.0550	
E3 Sill	10.4800	0.0170	0.1782	
E4 Jamb	12.3100	0.0670	0.8248	
E5 Ground floor (normal)	2.6800	0.0420	0.1126	
E16 Corner (normal)	2.6800	0.0320	0.0858	
E18 Party wall between dwellings	8.0400	0.0300	0.2412	
E25 Staggered party wall between dwellings				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				3.5930 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 30.1099 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	16.6334	16.4667	16.3001	15.4667	15.3001	14.4668	14.4668	14.3001	14.8001	15.3001	15.6334	15.9667	(38)
Heat transfer coeff	46.7433	46.5766	46.4099	45.5766	45.4100	44.5766	44.5766	44.4100	44.9100	45.4100	45.7433	46.0766	(39)
Average = Sum(39)m / 12 =												45.5350	
HLP	0.6638	0.6614	0.6590	0.6472	0.6448	0.6330	0.6330	0.6306	0.6377	0.6448	0.6496	0.6543	(40)
HLP (average)												0.6466	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

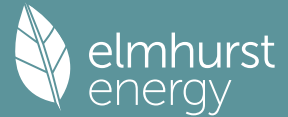
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2563 (42)
Hot water usage for mixer showers	62.0500	61.1175	59.7587	57.1588	55.2402	53.1006	51.8844	53.2329	54.7112	57.0085	59.6642	61.8123	(42a)
Hot water usage for baths	26.8068	26.4086	25.8480	24.8143	24.0403	23.1820	22.7184	23.2751	23.8813	24.7997	25.8547	26.7161	(42b)
Hot water usage for other uses	37.7365	36.3643	34.9921	33.6198	32.2476	30.8754	30.8754	32.2476	33.6198	34.9921	36.3643	37.7365	(42c)
Average daily hot water use (litres/day)												116.3681	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.5933	123.8905	120.5988	115.5930	111.5281	107.1579	105.4782	108.7556	112.2123	116.8002	121.8832	126.2650	(44)
Energy conte	200.4929	176.4184	185.3558	158.2410	150.1382	131.7632	127.5667	134.6622	138.3690	158.4968	173.6449	197.7004	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	30.0739	26.4628	27.8034	23.7362	22.5207	19.7645	19.1350	20.1993	20.7553	23.7745	26.0467	29.6551	(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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	(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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	66.6639	58.6591	61.6308	52.6151	49.9210	43.8113	42.4159	44.7752	46.0077	52.7002	57.7369	65.7354	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.0776	19.6091	15.9472	12.0731	9.0248	7.6191	8.2327	10.7012	14.3631	18.2372	21.2855	22.6912	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	295.9333	299.0042	291.2657	274.7914	253.9956	234.4504	221.3931	218.3222	226.0607	242.5350	263.3308	282.8760	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	(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)													

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	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	(71)
Water heating gains (Table 5)	89.6020	87.2903	82.8371	73.0766	67.0981	60.8490	57.0106	60.1817	63.8996	70.8336	80.1902	88.3540 (72)
Total internal gains	503.5324	501.8232	485.9696	455.8606	426.0379	398.8380	382.5559	385.1246	400.2428	427.5253	460.7260	489.8407 (73)

6. Solar gains

[Jan]												Gains
												W

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	99.6146	99.9710	100.3300	102.1645	102.5394	104.4563	104.4563	104.8483	103.6810	102.5394	101.7922	101.0558
alpha	7.6410	7.6647	7.6887	7.8110	7.8360	7.9638	7.9638	7.9899	7.9121	7.8360	7.7861	7.7371
util living area	0.9577	0.9115	0.8309	0.6972	0.5416	0.3825	0.2734	0.2938	0.4530	0.7128	0.9076	0.9669 (86)
MIT	20.6809	20.8085	20.9146	20.9793	20.9971	20.9999	21.0000	21.0000	20.9994	20.9797	20.8468	20.6503 (87)
Th 2	20.3729	20.3750	20.3772	20.3877	20.3898	20.4004	20.4004	20.4025	20.3961	20.3898	20.3856	20.3814 (88)
util rest of house	0.9487	0.8958	0.8067	0.6657	0.5068	0.3468	0.2361	0.2557	0.4136	0.6760	0.8889	0.9596 (89)
MIT 2	20.0165	20.1698	20.2917	20.3692	20.3876	20.4003	20.4004	20.4025	20.3958	20.3726	20.2267	19.9868 (90)
Living area fraction									fLA = Living area / (4) =			0.3989 (91)
MIT	20.2815	20.4246	20.5402	20.6126	20.6308	20.6395	20.6396	20.6408	20.6366	20.6147	20.4740	20.2515 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2815	20.4246	20.5402	20.6126	20.6308	20.6395	20.6396	20.6408	20.6366	20.6147	20.4740	20.2515 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9473	0.8971	0.8132	0.6774	0.5205	0.3610	0.2510	0.2709	0.4293	0.6898	0.8918	0.9579 (94)
Useful gains	590.9703	629.9589	610.7579	524.3668	404.3518	269.1670	180.0677	188.3310	293.3484	445.7803	538.6039	568.4503 (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	747.0277	723.0819	651.6031	533.8189	405.5458	269.2187	180.0700	188.3351	293.5578	454.7689	611.7721	739.5984 (97)
Space heating kWh	116.1067	62.5787	30.3888	6.8055	0.8883	0.0000	0.0000	0.0000	0.0000	6.6875	52.6811	127.3342 (98a)
Space heating requirement - total per year (kWh/year)												403.4709
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	116.1067	62.5787	30.3888	6.8055	0.8883	0.0000	0.0000	0.0000	0.0000	6.6875	52.6811	127.3342 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												403.4709
Space heating per m2										(98c) / (4) =		5.7295 (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	116.1067	62.5787	30.3888	6.8055	0.8883	0.0000	0.0000	0.0000	0.0000	6.6875	52.6811	127.3342 (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)	116.1067	62.5787	30.3888	6.8055	0.8883	0.0000	0.0000	0.0000	0.0000	6.6875	52.6811	127.3342 (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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518 (64)
Efficiency of water heater												344.2901 (216)
(217)m	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901 (217)
Fuel for water heating, kWh/month	66.0618	58.3118	61.6652	53.5371	51.4362	45.8466	44.8802	46.9411	47.7652	53.8639	58.0112	65.2507 (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	13.6813	12.3573	13.6813	13.2399	13.6813	13.2399	13.6813	13.6813	13.2399	13.6813	13.2399	13.6813 (231)
Lighting	19.3244	15.5028	13.9585	10.2266	7.8993	6.4538	7.2060	9.3667	12.1664	15.9629	18.0301	19.8615 (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)												

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(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												403.4709	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												344.2901	
Water heating fuel used												653.5711	(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)												161.0857	(230a)
Total electricity for the above, kWh/year												161.0857	(231)
Electricity for lighting (calculated in Appendix L)												155.9590	(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												1374.0867	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price £/kWh	Fuel cost £/year
Space heating - main system 1	403.4709	16.4900	66.5323 (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)	653.5711	16.4900	107.7739 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	161.0857	16.4900	26.5630 (249)
Energy for lighting	155.9590	16.4900	25.7176 (250)
Additional standing charges			0.0000 (251)
Total energy cost			226.5869 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 0.7067 (257)
SAP value	88.5438
SAP rating (Section 12)	89 (258)
SAP band	B

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

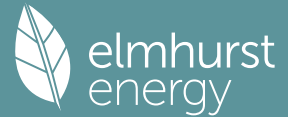
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	403.4709	0.1594	64.2977 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	653.5711	0.1412	92.2672 (264)
Space and water heating			156.5650 (265)
Pumps, fans and electric keep-hot	161.0857	0.1387	22.3446 (267)
Energy for lighting	155.9590	0.1443	22.5097 (268)
Total CO2, kg/year			201.4193 (272)
CO2 emissions per m2			2.8600 (273)
EI value			97.6616
EI rating			98 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	70.4200 (1b)	x 2.5000 (2b)	= 176.0500 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.4200		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	176.0500 (5)

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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											2.7000 (17)		
Infiltration rate											0.1350 (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) =	0.1148 (21)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000 (22)	
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750 (22a)	
Adj infilt rate													
	0.1234	0.1205	0.1205	0.1119	0.1148	0.0975	0.0947	0.0947	0.0975	0.1090	0.1090	0.1119 (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	0.2634	0.2605	0.2605	0.2519	0.2548	0.2375	0.2347	0.2347	0.2375	0.2490	0.2490	0.2519 (25)	

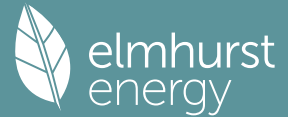
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
Window N/E			3.6800	1.3258	4.8788			(27)					
Window S/W			7.5200	1.3258	9.9697			(27)					
Ground Floor			70.4200	0.1100	7.7462	110.0000	7746.2000	(28a)					
EXT Wall	32.9900	11.2000	21.7900	0.1800	3.9222	110.0000	2396.9002	(29a)					
Total net area of external elements Aum(A, m2)			103.4100					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		26.5169			(33)					
Main dwelling													
Party Wall			53.8400	0.0000	0.0000	45.0000	2422.8000	(32)					
Corridor			24.7600	0.0000	0.0000	45.0000	1114.2000	(32)					
Party Ceiling			70.4200			30.0000	2112.6000	(32b)					
Internal Wall			107.7800			9.0000	970.0200	(32c)					
Heat capacity Cm = Sum(A x k)						(28) ... (30) + (32) + (32a) ... (32e) =	16762.7202	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							238.0392	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E7 Party floor between dwellings (in blocks of flats)				12.3100	0.0370	0.4555							
P1 Party wall - Ground floor				29.3300	0.0510	1.4958							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				29.3300	0.0000	0.0000							
E2 Other lintels (including other steel lintels)				5.7700	0.0250	0.1442							
E3 Sill				2.5000	0.0220	0.0550							
E4 Jamb				10.4800	0.0170	0.1782							
E5 Ground floor (normal)				12.3100	0.0670	0.8248							
E16 Corner (normal)				2.6800	0.0420	0.1126							
E18 Party wall between dwellings				2.6800	0.0320	0.0858							
E25 Staggered party wall between dwellings				8.0400	0.0300	0.2412							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.5930	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	30.1099	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 15.3001	Feb 15.1334	Mar 15.1334	Apr 14.6334	May 14.8001	Jun 13.8001	Jul 13.6334	Aug 13.6334	Sep 13.8001	Oct 14.4668	Nov 14.4668	Dec 14.6334	(38)
Heat transfer coeff	45.4100	45.2433	45.2433	44.7433	44.9100	43.9100	43.7433	43.7433	43.9100	44.5766	44.5766	44.7433	(39)
Average = Sum(39)m / 12 =												44.5628	
HLP	Jan 0.6448	Feb 0.6425	Mar 0.6425	Apr 0.6354	May 0.6377	Jun 0.6235	Jul 0.6212	Aug 0.6212	Sep 0.6235	Oct 0.6330	Nov 0.6330	Dec 0.6354	(40)
HLP (average)												0.6328	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.2563 (42)											
Hot water usage for mixer showers												
62.0500	61.1175	59.7587	57.1588	55.2402	53.1006	51.8844	53.2329	54.7112	57.0085	59.6642	61.8123	(42a)
Hot water usage for baths												
26.8068	26.4086	25.8480	24.8143	24.0403	23.1820	22.7184	23.2751	23.8813	24.7997	25.8547	26.7161	(42b)
Hot water usage for other uses												
37.7365	36.3643	34.9921	33.6198	32.2476	30.8754	30.8754	32.2476	33.6198	34.9921	36.3643	37.7365	(42c)
Average daily hot water use (litres/day)	116.3681 (43)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.5933	123.8905	120.5988	115.5930	111.5281	107.1579	105.4782	108.7556	112.2123	116.8002	121.8832	126.2650 (44)
Energy conte	200.4929	176.4184	185.3558	158.2410	150.1382	131.7632	127.5667	134.6622	138.3690	158.4968	173.6449	197.7004 (45)
Energy content (annual)	Total = Sum(45)m = 1932.8495											
Distribution loss (46)m = 0.15 x (45)m												
30.0739	26.4628	27.8034	23.7362	22.5207	19.7645	19.1350	20.1993	20.7553	23.7745	26.0467	29.6551	(46)
Water storage loss (or HIU loss):												

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store volume													201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8694	(55)
Total storage loss														
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)
If cylinder contains dedicated solar storage														
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month														
	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	224.6518	(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	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	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														
	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	224.6518	(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)
													0.0000	(64a)
Heat gains from water heating, kWh/month														
	66.6639	58.6591	61.6308	52.6151	49.9210	43.8113	42.4159	44.7752	46.0077	52.7002	57.7369	65.7354	65.7354	(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	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	135.3767	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
22.0776	19.6091	15.9472	12.0731	9.0248	7.6191	8.2327	10.7012	14.3631	18.2372	21.2855	22.6912		(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
295.9333	299.0042	291.2657	274.7914	253.9956	234.4504	221.3931	218.3222	226.0607	242.5350	263.3308	282.8760		(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	50.7939	(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	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)														
-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	-90.2511	(71)	
Water heating gains (Table 5)														
89.6020	87.2903	82.8371	73.0766	67.0981	60.8490	57.0106	60.1817	63.8996	70.8336	80.1902	88.3540		(72)	
Total internal gains	503.5324	501.8232	485.9696	455.8606	426.0379	398.8380	382.5559	385.1246	400.2428	427.5253	460.7260	489.8407	(73)	

6. Solar gains

[Jan]													Gains
					Area	Solar flux	g		FF		Access		W
					m2	Table 6a	Specific data		Specific data		factor		
						W/m2	or Table 6b		or Table 6c		Table 6d		
North					3.6800	9.3942	0.4000		0.0000		0.7700		10.6478 (74)
South					7.5200	41.2355	0.4000		0.0000		0.7700		95.5081 (78)
Solar gains	106.1559	181.3171	250.6009	306.9806	330.2024	334.2102	314.9500	287.8882	275.0128	208.1891	129.8386	93.4882	(83)
Total gains	609.6883	683.1403	736.5704	762.8412	756.2403	733.0482	697.5059	673.0127	675.2556	635.7144	590.5647	583.3289	(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	102.5394	102.9172	102.9172	104.0672	103.6810	106.0422	106.4462	106.4462	106.0422	104.4563	104.4563	104.0672			
alpha	7.8360	7.8611	7.8611	7.9378	7.9121	8.0695	8.0964	8.0964	8.0695	7.9638	7.9638	7.9378			
util living area	0.9450	0.8901	0.7934	0.6434	0.4803	0.3175	0.2320	0.2535	0.4095	0.6697	0.8834	0.9566	(86)		
MIT	20.7528	20.8606	20.9459	20.9897	20.9990	21.0000	21.0000	21.0000	20.9998	20.9884	20.8908	20.7233	(87)		
Th 2	20.3898	20.3919	20.3919	20.3983	20.3961	20.4089	20.4110	20.4110	20.4089	20.4004	20.4004	20.3983	(88)		
util rest of house	0.9335	0.8714	0.7664	0.6107	0.4448	0.2821	0.1951	0.2152	0.3712	0.6316	0.8610	0.9472	(89)		
MIT 2	20.1191	20.2462	20.3396	20.3895	20.3955	20.4088	20.4110	20.4110	20.4087	20.3910	20.2906	20.0913	(90)		
Living area fraction									FLA = Living area / (4) =			0.3989	(91)		
MIT	20.3718	20.4913	20.5814	20.6289	20.6362	20.6446	20.6459	20.6459	20.6445	20.6293	20.5300	20.3434	(92)		
Temperature adjustment												0.0000			
adjusted MIT	20.3718	20.4913	20.5814	20.6289	20.6362	20.6446	20.6459	20.6459	20.6445	20.6293	20.5300	20.3434	(93)		

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	0.9331	0.8746	0.7750	0.6233	0.4589	0.2962	0.2098	0.2305	0.3864	0.6463	0.8661	0.9462	(94)	
Useful gains	568.9270	597.4901	570.8552	475.4701	347.0329	217.1108	146.3618	155.1100	260.9482	410.8578	511.4694	551.9437	(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	688.9525	664.6811	596.3716	480.0473	347.4324	217.1191	146.3622	155.1108	261.0230	415.8677	563.0042	686.5140	(97)	
Space heating kWh	89.2990	45.1524	18.9842	3.2956	0.2972	0.0000	0.0000	0.0000	0.0000	3.7273	37.1050	100.1203	(98a)	
Space heating requirement - total per year (kWh/year)												297.9810		
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	89.2990	45.1524	18.9842	3.2956	0.2972	0.0000	0.0000	0.0000	0.0000	3.7273	37.1050	100.1203	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												297.9810		
Space heating per m ²												(98c) / (4) =	4.2315	(99)

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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	89.2990	45.1524	18.9842	3.2956	0.2972	0.0000	0.0000	0.0000	0.0000	3.7273	37.1050	100.1203	(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)	89.2990	45.1524	18.9842	3.2956	0.2972	0.0000	0.0000	0.0000	0.0000	3.7273	37.1050	100.1203	(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	227.4443	200.7616	212.3072	184.3230	177.0896	157.8452	154.5181	161.6136	164.4510	185.4482	199.7269	224.6518	(64)	
Efficiency of water heater (217)m	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	344.2901	(216)	
Fuel for water heating, kWh/month	66.0618	58.3118	61.6652	53.5371	51.4362	45.8466	44.8802	46.9411	47.7652	53.8639	58.0112	65.2507	(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	13.6813	12.3573	13.6813	13.2399	13.6813	13.2399	13.6813	13.6813	13.2399	13.6813	13.2399	13.6813	(231)	
Lighting	19.3244	15.5028	13.9585	10.2266	7.8993	6.4538	7.2060	9.3667	12.1664	15.9629	18.0301	19.8615	(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													297.9810	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													344.2901	
Water heating fuel used													653.5711	(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)													161.0857	(230a)
Total electricity for the above, kWh/year													161.0857	(231)
Electricity for lighting (calculated in Appendix L)													155.9590	(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													1268.5968	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	297.9810	28.4300	84.7160	(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)	653.5711	28.4300	185.8103	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	161.0857	28.4300	45.7967	(249)
Energy for lighting	155.9590	28.4300	44.3391	(250)
Additional standing charges			0.0000	(251)
Total energy cost			360.6621	(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	297.9810	0.1598	47.6246	(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)	653.5711	0.1412	92.2672	(264)
Space and water heating			139.8918	(265)
Pumps, fans and electric keep-hot	161.0857	0.1387	22.3446	(267)
Energy for lighting	155.9590	0.1443	22.5097	(268)
Total CO2, kg/year			184.7461	(272)

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----- 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	297.9810	1.5915	474.2446 (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)	653.5711	1.5220	994.7507 (278)
Space and water heating			1468.9953 (279)
Pumps, fans and electric keep-hot	161.0857	1.5128	243.6905 (281)
Energy for lighting	155.9590	1.5338	239.2151 (282)
Total Primary energy kWh/year			1951.9009 (286)