

Full SAP Calculation Printout



Plot Reference	Plot 19			Issued on Date	22/12/2025	
Assessment Reference	Plot 19		Plot Type Ref			
Plot Address	Flat 6, 6 Cross Road Manchester, M21 9SA			SAP Version	10.2	
SAP Rating	88 B	DER	3.06	TER	11.55	
Environmental	98 A	% DER < TER				73.51
CO ₂ Emissions (t/year)	0.19	DFEE	20.90	TFEE	26.51	
Compliance Check	See BREL	% DFEE < TFEE				21.16
% DPER < TPER	47.41	DPER	32.15	TPER	61.13	
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	69.9800 (1b)	2.5000 (2b)	174.9500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	174.9500 (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	2.8700	(17)
Infiltration rate	0.1435	(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) =	0.1220 (21)

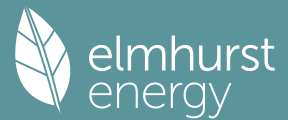
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1555	0.1525	0.1494	0.1342	0.1311	0.1159	0.1159	0.1128	0.1220	0.1311	0.1372	0.1433 (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	0.2955	0.2925	0.2894	0.2742	0.2711	0.2559	0.2559	0.2528	0.2620	0.2711	0.2772	0.2833 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.9800	11.2000	22.7800	0.1800	4.1004	110.0000	2505.7999 (29a)
External Roof	21.8900		21.8900	0.1500	3.2835	9.0000	197.0100 (30)
Total net area of external elements Aum(A, m ²)			55.8700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	22.2324	(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 Floor 1			69.9800			40.0000	2799.2000 (32d)
Party Ceiling			48.0900			30.0000	1442.7000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11451.7300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		163.6429 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5600	0.0370	0.6497
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.9700	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
E15 Flat roof with parapet	15.1400	0.1320	1.9985
E9 Balcony between dwellings, wall insulation continuous	4.8800	0.1500	0.7320
E24 Eaves (insulation at ceiling level - inverted)	4.8100	0.1500	0.7215
P4 Party wall - Roof (insulation at ceiling level)	7.6900	0.0400	0.3076
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.3388 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	27.5712 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	17.0613	16.8852	16.7092	15.8289	15.6529	14.7726	14.7726	14.5966	15.1247	15.6529	16.0050	16.3571	(38)
Heat transfer coeff	44.6325	44.4564	44.2804	43.4001	43.2241	42.3438	42.3438	42.1678	42.6959	43.2241	43.5762	43.9283	(39)
Average = Sum(39)m / 12 =												43.3561	
HLP	0.6378	0.6353	0.6328	0.6202	0.6177	0.6051	0.6051	0.6026	0.6101	0.6177	0.6227	0.6277	(40)
HLP (average)												0.6195	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2456 (42)
Hot water usage for mixer showers	61.8716	60.9418	59.5869	56.9945	55.0814	52.9479	51.7352	53.0799	54.5539	56.8446	59.4927	61.6346	(42a)
Hot water usage for baths	26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397	(42b)
Hot water usage for other uses	37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276	(42c)
Average daily hot water use (litres/day)												116.0334	(43)
Daily hot water use	126.2293	123.5342	120.2520	115.2606	111.2074	106.8498	105.1748	108.4429	111.8896	116.4643	121.5327	125.9019	(44)
Energy conte	199.9163	175.9111	184.8228	157.7860	149.7065	131.3843	127.1999	134.2750	137.9711	158.0410	173.1456	197.1319	(45)
Energy content (annual)										Total = Sum(45)m =		1927.2913	
Distribution loss (46)m = 0.15 x (45)m	29.9874	26.3867	27.7234	23.6679	22.4560	19.7076	19.0800	20.1412	20.6957	23.7062	25.9718	29.5698	(46)
Water storage loss (or HIU loss):												201.0000	(47)
Store volume												1.6100	(48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400	(49)
Temperature factor from Table 2b												0.8694	(55)
Enter (49) or (54) in (55)													
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2244.6223	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Heat gains from water heating, kWh/month	66.4722	58.4904	61.4536	52.4638	49.7774	43.6853	42.2940	44.6464	45.8754	52.5486	57.5709	65.5464	(65)

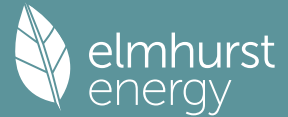
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.7902	114.9106	103.7902	107.2499	103.7902	107.2499	103.7902	103.7902	107.2499	103.7902	107.2499	103.7902	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1393	183.1585	169.2974	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	(71)
Water heating gains (Table 5)	89.3443	87.0393	82.5989	72.8664	66.9051	60.6740	56.8467	60.0086	63.7158	70.6299	79.9596	88.0999	(72)
Total internal gains	447.0695	457.9318	437.2130	419.9595	396.6773	380.8783	364.8881	366.0032	378.3280	392.7632	419.4137	437.1219	(73)

6. Solar gains

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

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South	7.5200			46.7521			0.4000			0.0000			0.7700			108.2853 (78)		
Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158	(83)					
Total gains	567.4071	658.3077	702.2550	738.1457	747.4229	727.5833	699.7024	676.1079	661.3680	611.4619	562.6368	540.7378	(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	71.2718	71.5540	71.8385	73.2956	73.5941	75.1240	75.1240	75.4376	74.5045	73.5941	72.9995	72.4143						
alpha	5.7515	5.7703	5.7892	5.8864	5.9063	6.0083	6.0083	6.0292	5.9670	5.9063	5.8666	5.8276						
util living area	0.9409	0.8855	0.8119	0.6808	0.5314	0.3718	0.2662	0.2868	0.4435	0.6992	0.8839	0.9504	(86)					
MIT	20.4887	20.6786	20.8260	20.9451	20.9883	20.9989	20.9999	20.9998	20.9968	20.9466	20.7368	20.4568	(87)					
Th 2	20.3961	20.3984	20.4006	20.4119	20.4141	20.4254	20.4254	20.4277	20.4209	20.4141	20.4096	20.4051	(88)					
util rest of house	0.9321	0.8710	0.7912	0.6533	0.4995	0.3387	0.2315	0.2512	0.4069	0.6671	0.8670	0.9428	(89)					
MIT 2	19.8081	20.0394	20.2144	20.3576	20.4039	20.4247	20.4254	20.4276	20.4185	20.3633	20.1225	19.7765	(90)					
Living area fraction	fLA = Living area / (4) =												0.4014 (91)					
MIT	20.0813	20.2960	20.4599	20.5934	20.6384	20.6552	20.6560	20.6573	20.6506	20.5974	20.3691	20.0496	(92)					
Temperature adjustment													0.0000					
adjusted MIT	20.0813	20.2960	20.4599	20.5934	20.6384	20.6552	20.6560	20.6573	20.6506	20.5974	20.3691	20.0496	(93)					

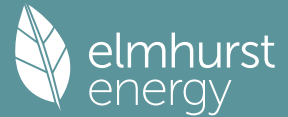
8. Space heating requirement																		

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
Utilisation	0.9270	0.8684	0.7933	0.6619	0.5118	0.3520	0.2454	0.2655	0.4214	0.6774	0.8658	0.9377	(94)					
Useful gains	525.9675	571.6524	557.0961	488.5854	382.5273	256.0830	171.7175	179.4757	278.7334	414.1854	487.1156	507.0563	(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	704.3600	684.4514	618.1501	507.4956	386.3554	256.3985	171.7455	179.5201	279.6856	432.1292	578.2151	696.2445	(97)					
Space heating kWh	132.7240	75.8009	45.4242	13.6153	2.8480	0.0000	0.0000	0.0000	0.0000	13.3502	65.5917	140.7561	(98a)					
Space heating requirement - total per year (kWh/year)													490.1103					
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	132.7240	75.8009	45.4242	13.6153	2.8480	0.0000	0.0000	0.0000	0.0000	13.3502	65.5917	140.7561	(98c)					
Space heating requirement after solar contribution - total per year (kWh/year)													490.1103					
Space heating per m2											(98c) / (4) =			7.0036 (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	132.7240	75.8009	45.4242	13.6153	2.8480	0.0000	0.0000	0.0000	0.0000	13.3502	65.5917	140.7561	(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)	132.7240	75.8009	45.4242	13.6153	2.8480	0.0000	0.0000	0.0000	0.0000	13.3502	65.5917	140.7561	(211)					
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)					
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)					
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)					
Space heating fuel used, main system 2												0.0000 (213)						
Water heating																		
Water heating requirement	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(64)					
Efficiency of water heater	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	(216)					
(217)m	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	(217)					
Fuel for water heating, kWh/month	65.8741	58.1465	61.4915	53.3885	51.2950	45.7224	44.7599	46.8142	47.6350	53.7150	57.8484	65.0656	(219)					
Space cooling fuel requirement	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)					
(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	13.5958	12.2801	13.5958	13.1572	13.5958	13.1572	13.5958	13.5958	13.1572	13.5958	13.1572	13.5958	(231)					
Lighting	19.2007	15.4035	13.8691	10.1611	7.8487	6.4125	7.1599	9.3067	12.0885	15.8607	17.9147	19.7343	(232)					
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)					
(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)	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)					
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)					
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)					
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)					
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)					
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)					
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)					
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)					
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)					
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)					
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)					
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)					
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)					
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)					
Annual totals kWh/year																		
Space heating fuel - main system 1												490.1103 (211)						
Space heating fuel - main system 2												0.0000 (213)						
Space heating fuel - secondary												0.0000 (215)						

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Efficiency of water heater	344.3961	
Water heating fuel used	651.7561	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)		
mechanical ventilation fans (SFP = 0.7500)	160.0793	(230a)
Total electricity for the above, kWh/year	160.0793	(231)
Electricity for lighting (calculated in Appendix L)	154.9604	(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	1456.9060	(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	490.1103	0.1585	77.6982	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	651.7561	0.1412	92.0103	(264)
Space and water heating			169.7085	(265)
Pumps, fans and electric keep-hot	160.0793	0.1387	22.2050	(267)
Energy for lighting	154.9604	0.1443	22.3656	(268)
Total CO2, kg/year			214.2791	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0600	(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	490.1103	1.5868	777.7094	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	651.7561	1.5220	991.9858	(278)
Space and water heating			1769.6952	(279)
Pumps, fans and electric keep-hot	160.0793	1.5128	242.1679	(281)
Energy for lighting	154.9604	1.5338	237.6835	(282)
Total Primary energy kWh/year			2249.5465	(286)
Dwelling Primary energy Rate (DPER)			32.1500	(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	69.9800	x 2.5000	= 174.9500	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 174.9500	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1143 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3643	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3097 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750
Adj infilt rate	0.3948	0.3871	0.3793	0.3406	0.3329	0.2942	0.2942	0.2864	0.3097	0.3329	0.3484	0.3639

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Effective ac 0.5779 0.5749 0.5720 0.5580 0.5554 0.5433 0.5433 0.5410 0.5479 0.5554 0.5607 0.5662 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			11.2000	1.1450	12.8244		(27)
EXT Wall	33.9800	11.2000	22.7800	0.1800	4.1004		(29a)
External Roof	21.8900		21.8900	0.1100	2.4079		(30)
Total net area of external elements Aum(A, m2)			55.8700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		19.3327		(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

163.6429 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5600	0.0700	1.2292
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.9700	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885
E3 Sill	2.5000	0.0500	0.1250
E4 Jamb	10.4800	0.0500	0.5240
E16 Corner (normal)	5.3600	0.0900	0.4824
E18 Party wall between dwellings	2.6800	0.0600	0.1608
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824
E15 Flat roof with parapet	15.1400	0.5600	8.4784
E9 Balcony between dwellings, wall insulation continuous	4.8800	0.0200	0.0976
E24 Eaves (insulation at ceiling level - inverted)	4.8100	0.2400	1.1544
P4 Party wall - Roof (insulation at ceiling level)	7.6900	0.1200	0.9228

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

13.9455 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 33.2782 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	33.3668	33.1921	33.0208	32.2163	32.0658	31.3651	31.3651	31.2353	31.6350	32.0658	32.3703	32.6886
Heat transfer coeff	66.6450	66.4703	66.2990	65.4945	65.3440	64.6433	64.6433	64.5135	64.9132	65.3440	65.6485	65.9668
Average = Sum(39)m / 12 =												65.4938

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9523	0.9498	0.9474	0.9359	0.9338	0.9237	0.9237	0.9219	0.9276	0.9338	0.9381	0.9427
HLP (average)												0.9359
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

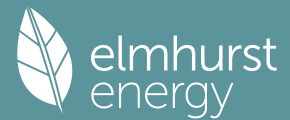
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2456
Hot water usage for mixer showers												(42)
61.8716	60.9418	59.5869	56.9945	55.0814	52.9479	51.7352	53.0799	54.5539	56.8446	59.4927	61.6346	(42a)
Hot water usage for baths												(42b)
26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397	(42b)
Hot water usage for other uses												(42c)
37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276	(42c)
Average daily hot water use (litres/day)												116.0334
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.2293	123.5342	120.2520	115.2606	111.2074	106.8498	105.1748	108.4429	111.8896	116.4643	121.5327	125.9019
Energy conte	199.9163	175.9111	184.8228	157.7860	149.7065	131.3843	127.1999	134.2750	137.9711	158.0410	173.1456	197.1319
Energy content (annual)										Total = Sum(45)m =		1927.2913
Distribution loss (46)m = 0.15 x (45)m												(46)
29.9874	26.3867	27.7234	23.6679	22.4560	19.7076	19.0800	20.1412	20.6957	23.7062	25.9718	29.5698	(46)
Water storage loss (or HIU loss):												(47)
Store volume												150.0000
a) If manufacturer declared loss factor is known (kWh/day):												1.3938
Temperature factor from Table 2b												0.5400
Enter (49) or (54) in (55)												0.7527
Total storage loss												(55)
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage												(57)
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month												(62)
246.5112	217.9968	231.4177	202.8778	196.3014	176.4761	173.7948	180.8699	183.0629	204.6359	218.2374	243.7268	(62)
WWHRS	-28.2851	-25.0156	-26.1949	-21.6904	-20.2147	-17.2978	-16.2140	-17.2419	-17.8970	-21.0986	-23.9022	-27.7613
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h												(64)
218.2261	192.9812	205.2228	181.1874	176.0867	159.1783	157.5808	163.6279	165.1659	183.5373	194.3352	215.9655	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2213.0952
Electric shower(s)												(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)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000
Heat gains from water heating, kWh/month												(65)
103.7481	92.1590	98.7295	88.5373	87.0533	79.7587	79.5699	81.9223	81.9489	89.8246	93.6444	102.8223	(65)

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

Metabolic gains (Table 5), Watts												
(66)m	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												(67)
103.7902	114.9106	103.7902	107.2499	103.7902	107.2499	103.7902	103.7902	107.2499	103.7902	107.2499	103.7902	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												(68)
197.2504	199.2972	194.1393	183.1585	169.2974	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												

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Pumps, fans	34.2282 3.0000	34.2282 3.0000	34.2282 3.0000	34.2282 3.0000	34.2282 3.0000	34.2282 0.0000	34.2282 0.0000	34.2282 0.0000	34.2282 0.0000	34.2282 3.0000	34.2282 3.0000	34.2282 3.0000	(69) (70)
Losses e.g. evaporation	(negative values) (Table 5)												
	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	(71)
Water heating gains	(Table 5)												
	139.4464	137.1414	132.7010	122.9685	117.0072	110.7760	106.9488	110.1107	113.8178	120.7319	130.0616	138.2020	(72)
Total internal gains	500.1716	511.0338	490.3150	473.0615	449.7794	430.9803	414.9902	416.1053	428.4301	445.8652	472.5158	490.2240	(73)

6. Solar gains

[Jan]												
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W
North					3.6800	10.6334	0.6300		0.7000		0.7700	11.9589 (74)
South					7.5200	46.7521	0.6300		0.7000		0.7700	107.4461 (78)
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)
Total gains	619.5765	709.8569	753.3029	788.7818	797.8067	774.9984	747.2097	723.8066	709.2764	662.8690	614.6288	593.0368 (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	47.7310	47.8565	47.9801	48.5695	48.6814	49.2091	49.2091	49.3081	49.0045	48.6814	48.4556	48.2218
alpha	4.1821	4.1904	4.1987	4.2380	4.2454	4.2806	4.2806	4.2872	4.2670	4.2454	4.2304	4.2148
util living area	0.9598	0.9316	0.8918	0.8110	0.6865	0.5162	0.3769	0.4047	0.5956	0.8193	0.9298	0.9653 (86)
MIT	19.8509	20.0929	20.3573	20.6598	20.8664	20.9696	20.9937	20.9914	20.9431	20.6959	20.2410	19.8091 (87)
Th 2	20.1232	20.1253	20.1274	20.1371	20.1389	20.1474	20.1474	20.1489	20.1441	20.1389	20.1352	20.1314 (88)
util rest of house	0.9524	0.9197	0.8733	0.7801	0.6392	0.4534	0.3055	0.3321	0.5325	0.7837	0.9156	0.9588 (89)
MIT 2	18.8018	19.1029	19.4276	19.7923	20.0203	20.1266	20.1445	20.1447	20.1021	19.8420	19.2985	18.7558 (90)
Living area fraction	19.2229	19.5003	19.8008	20.1405	20.3599	20.4650	20.4853	20.4846	20.4397	20.1848	19.6768	19.1786 (92)
MIT	19.2229	19.5003	19.8008	20.1405	20.3599	20.4650	20.4853	20.4846	20.4397	20.1848	19.6768	19.1786 (93)
Temperature adjustment												0.0000
adjusted MIT	19.2229	19.5003	19.8008	20.1405	20.3599	20.4650	20.4853	20.4846	20.4397	20.1848	19.6768	19.1786 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9430	0.9098	0.8655	0.7802	0.6518	0.4772	0.3340	0.3610	0.5549	0.7857	0.9068	0.9500 (94)
Useful gains	584.2558	645.8104	651.9511	615.3940	520.0414	369.8430	249.5880	261.2967	393.5794	520.8298	557.3196	563.3966 (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	994.5388	970.4838	881.8286	736.1901	565.8742	379.1312	251.1605	263.5096	411.5304	626.3069	825.6500	988.0897 (97)
Space heating kWh	305.2506	218.1805	171.0288	86.9731	34.0997	0.0000	0.0000	0.0000	0.0000	78.4750	193.1979	315.9717 (98a)
Space heating requirement - total per year (kWh/year)												1403.1773
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	305.2506	218.1805	171.0288	86.9731	34.0997	0.0000	0.0000	0.0000	0.0000	78.4750	193.1979	315.9717 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1403.1773
Space heating per m ²										(98c) / (4) =		20.0511 (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	305.2506	218.1805	171.0288	86.9731	34.0997	0.0000	0.0000	0.0000	0.0000	78.4750	193.1979	315.9717 (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)	330.7157	236.3819	185.2967	94.2288	36.9444	0.0000	0.0000	0.0000	0.0000	85.0217	209.3152	342.3312 (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	218.2261	192.9812	205.2228	181.1874	176.0867	159.1783	157.5808	163.6279	165.1659	183.5373	194.3352	215.9655 (64)
Efficiency of water heater (217)m	84.8124	84.3357	83.6540	82.5123	81.1341	79.8000	79.8000	79.8000	79.8000	82.2982	84.0466	79.8000 (216)
Fuel for water heating, kWh/month	257.3044	228.8250	245.3235	219.5883	217.0318	199.4715	197.4697	205.0475	206.9748	223.0149	231.2232	254.3405 (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	21.5656	17.3007	15.5774	11.4126	8.8155	7.2023	8.0417	10.4530	13.5774	17.8143	20.1212	22.1649 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-18.7641	-27.8061	-41.9868	-49.6710	-55.7267	-52.8116	-52.1731	-48.1825	-41.5164	-32.8763	-21.1058	-16.0692 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)

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Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-6.8520	-14.7251	-29.8545	-45.7122	-61.3034	-61.9089	-61.1750	-51.3952	-37.1513	-21.3350	-9.2367	-5.3951	(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												1520.2354	(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												2685.6152	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												174.0464	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-864.7342	(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												3601.1628	(238)

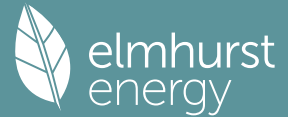
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1520.2354	0.2100	319.2494	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2685.6152	0.2100	563.9792	(264)
Space and water heating			883.2286	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	174.0464	0.1443	25.1203	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-458.6897	0.1335	-61.2579	
PV Unit electricity exported	-406.0446	0.1253	-50.8923	
Total			-112.1502	(269)
Total CO2, kg/year			808.1280	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.5500	(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	1520.2354	1.1300	1717.8660	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2685.6152	1.1300	3034.7452	(278)
Space and water heating			4752.6112	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	174.0464	1.5338	266.9582	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-458.6897	1.4935	-685.0614	
PV Unit electricity exported	-406.0446	0.4600	-186.7990	
Total			-871.8604	(283)
Total Primary energy kWh/year			4277.8098	(286)
Target Primary Energy Rate (TPER)			61.1300	(287)

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Plot Reference	Plot 19				Issued on Date	22/12/2025	
Assessment Reference	Plot 19			Plot Type Ref			
Plot Address	Flat 6, 6 Cross Road Manchester, M21 9SA				SAP Version	10.2	
SAP Rating	88 B	DER	3.06	TER	11.55		
Environmental	98 A	% DER < TER				73.51	
CO ₂ Emissions (t/year)	0.19	DFEE	20.90	TFEE	26.51		
Compliance Check	See BREL	% DFEE < TFEE				21.16	
% DPER < TPER	47.41	DPER	32.15	TPER	61.13		
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	69.9800 (1b)	2.5000 (2b)	174.9500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		174.9500 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	174.9500 (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	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1143 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	2.8700 (17)
Infiltration rate	0.2578 (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) = 0.2191 (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	0.2794	0.2739	0.2685	0.2411	0.2356	0.2082	0.2082	0.2027	0.2191	0.2356	0.2465	0.2575 (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	0.5390	0.5375	0.5360	0.5291	0.5277	0.5217	0.5217	0.5205	0.5240	0.5277	0.5304	0.5332 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.9800	11.2000	22.7800	0.1800	4.1004	110.0000	2505.7999 (29a)
External Roof	21.8900		21.8900	0.1500	3.2835	9.0000	197.0100 (30)
Total net area of external elements Aum(A, m ²)			55.8700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		22.2324		(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 Floor 1			69.9800			40.0000	2799.2000 (32d)
Party Ceiling			48.0900			30.0000	1442.7000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11451.7300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							163.6429 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)				17.5600	0.0370	0.6497	

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P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.9700	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
E15 Flat roof with parapet	15.1400	0.1320	1.9985
E9 Balcony between dwellings, wall insulation continuous	4.8800	0.1500	0.7320
E24 Eaves (insulation at ceiling level - inverted)	4.8100	0.1500	0.7215
P4 Party wall - Roof (insulation at ceiling level)	7.6900	0.0400	0.3076
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.3388 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	27.5712 (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	31.1204	31.0329	30.9471	30.5442	30.4688	30.1179	30.1179	30.0529	30.2531	30.4688	30.6213	30.7807 (38)
Average = Sum(39)m / 12 =	58.6916	58.6041	58.5183	58.1154	58.0400	57.6891	57.6891	57.6241	57.8242	58.0400	58.1925	58.3519 (39)
												58.1150
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8387	0.8374	0.8362	0.8305	0.8294	0.8244	0.8244	0.8234	0.8263	0.8294	0.8316	0.8338 (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												2.2456 (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	26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397 (42b)
Hot water usage for other uses	37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276 (42c)
Average daily hot water use (litres/day)												58.9899 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	64.3576	62.5924	60.6651	58.2661	56.1260	53.9019	53.4396	55.3630	57.3357	59.6197	62.0400	64.2673 (44)
Energy conte	101.9268	89.1307	93.2400	79.7633	75.5563	66.2786	64.6306	68.5510	70.7007	80.9034	88.3873	100.6270 (45)
Energy content (annual)										Total = Sum(45)m =		979.6957
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	86.6378	75.7611	79.2540	67.7988	64.2229	56.3368	54.9360	58.2683	60.0956	68.7679	75.1292	85.5330 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	86.6378	75.7611	79.2540	67.7988	64.2229	56.3368	54.9360	58.2683	60.0956	68.7679	75.1292	85.5330 (64)
								Total per year (kWh/year) = Sum(64)m =				832.7414 (64)
12Total per year (kWh/year)												833 (64)
Electric shower(s)												
	49.5489	44.1484	48.2084	46.0047	46.8680	44.7075	46.1977	46.8680	46.0047	48.2084	47.3019	49.5489 (64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				563.6155 (64a)
Heat gains from water heating, kWh/month												
	34.0467	29.9774	31.8656	28.4509	27.7727	25.2611	25.2834	26.2841	26.5251	29.2441	30.6078	33.7705 (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	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820 (66)
	103.7902	114.9106	103.7902	107.2499	103.7902	107.2499	103.7902	103.7902	107.2499	103.7902	107.2499	103.7902 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1393	183.1585	169.2974	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256 (71)
Water heating gains (Table 5)	45.7616	44.6092	42.8301	39.5151	37.3289	35.0848	33.9831	35.3281	36.8404	39.3066	42.5108	45.3904 (72)
Total internal gains	403.4869	415.5017	397.4442	386.6082	367.1011	355.2891	342.0245	341.3226	351.4526	361.4398	381.9649	394.4124 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	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	523.8244	615.8776	662.4862	704.7943	717.8467	701.9941	676.8388	651.4273	634.4925	580.1386	525.1880	498.0283 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	54.1992	54.2801	54.3597	54.7366	54.8077	55.1410	55.1410	55.2032	55.0121	54.8077	54.6640	54.5147	
alpha	4.6133	4.6187	4.6240	4.6491	4.6538	4.6761	4.6761	4.6802	4.6675	4.6538	4.6443	4.6343	
util living area	0.9733	0.9467	0.9071	0.8220	0.6901	0.5133	0.3726	0.4033	0.6000	0.8391	0.9483	0.9782 (86)	
MIT	19.9251	20.1759	20.4338	20.7164	20.8983	20.9796	20.9963	20.9946	20.9580	20.7323	20.2882	19.8714 (87)	
Th 2	20.2199	20.2210	20.2221	20.2270	20.2279	20.2323	20.2323	20.2331	20.2306	20.2279	20.2261	20.2241 (88)	
util rest of house	0.9683	0.9374	0.8912	0.7938	0.6463	0.4560	0.3087	0.3376	0.5418	0.8074	0.9376	0.9740 (89)	
MIT 2	19.2437	19.4881	19.7359	20.0006	20.1568	20.2212	20.2309	20.2309	20.2060	20.0208	19.6045	19.1944 (90)	
Living area fraction									fLA = Living area / (4) =				0.4014 (91)
MIT	19.5172	19.7642	20.0160	20.2879	20.4545	20.5256	20.5381	20.5375	20.5079	20.3064	19.8789	19.4661 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.5172	19.7642	20.0160	20.2879	20.4545	20.5256	20.5381	20.5375	20.5079	20.3064	19.8789	19.4661 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9629	0.9311	0.8866	0.7961	0.6596	0.4782	0.3343	0.3639	0.5633	0.8108	0.9320	0.9690 (94)
Useful gains	504.3740	573.4466	587.3353	561.1154	473.4706	335.6766	226.2684	237.0447	357.3859	470.3974	489.5002	482.6099 (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	893.1233	871.1025	790.9344	661.8135	508.1091	341.8432	227.1861	238.4182	370.5291	563.3567	743.6387	890.8085 (97)
Space heating kWh	289.2294	200.0248	151.4777	72.5026	25.7711	0.0000	0.0000	0.0000	0.0000	69.1617	182.9797	303.6997 (98a)
Space heating requirement - total per year (kWh/year)												1294.8467
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	289.2294	200.0248	151.4777	72.5026	25.7711	0.0000	0.0000	0.0000	0.0000	69.1617	182.9797	303.6997 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1294.8467
Space heating per m2										(98c) / (4) =		18.5031 (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	542.2774	426.8992	437.9431	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9358	0.9679	0.9600	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	507.4385	413.2162	420.4286	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	778.2764	751.0180	723.3688	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000		0.0000	0.0000	0.0000	195.0033	251.3245	225.3875	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	48.7508	62.8311	56.3469	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												167.9288 (107)
Energy for space heating												18.5031 (99)
Energy for space cooling												2.3997 (108)
Total												20.9028 (109)
Fabric Energy Efficiency (DFEE)												20.9 (109)

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

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	69.9800 (1b)	x 2.5000 (2b)	= 174.9500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	174.9500 (5)

2. Ventilation rate

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

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Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											Air changes per hour	
Pressure test												20.0000 / (5) =	0.1143 (8)
Pressure Test Method												Yes	
Measured/design AP50												Blower Door	
Infiltration rate												5.0000	(17)
Number of sides sheltered												0.3643	(18)
												2	(19)
Shelter factor												(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.3097 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.3948	0.3871	0.3793	0.3406	0.3329	0.2942	0.2942	0.2864	0.3097	0.3329	0.3484	0.3639	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5779	0.5749	0.5720	0.5580	0.5554	0.5433	0.5433	0.5410	0.5479	0.5554	0.5607	0.5662	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			11.2000	1.1450	12.8244			(27)
EXT Wall	33.9800	11.2000	22.7800	0.1800	4.1004			(29a)
External Roof	21.8900		21.8900	0.1100	2.4079			(30)
Total net area of external elements Aum(A, m2)			55.8700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =			19.3327		(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								163.6429 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	17.5600	0.0700	1.2292	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.9700	0.0000	0.0000	
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885	
E3 Sill	2.5000	0.0500	0.1250	
E4 Jamb	10.4800	0.0500	0.5240	
E16 Corner (normal)	5.3600	0.0900	0.4824	
E18 Party wall between dwellings	2.6800	0.0600	0.1608	
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824	
E15 Flat roof with parapet	15.1400	0.5600	8.4784	
E9 Balcony between dwellings, wall insulation continuous	4.8800	0.0200	0.0976	
E24 Eaves (insulation at ceiling level - inverted)	4.8100	0.2400	1.1544	
P4 Party wall - Roof (insulation at ceiling level)	7.6900	0.1200	0.9228	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				13.9455 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 33.2782 (37)

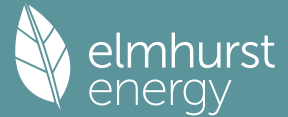
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	33.3668	33.1921	33.0208	32.2163	32.0658	31.3651	31.3651	31.2353	31.6350	32.0658	32.3703	32.6886	(38)
Average = Sum(39)m / 12 =	66.6450	66.4703	66.2990	65.4945	65.3440	64.6433	64.6433	64.5135	64.9132	65.3440	65.6485	65.9668	(39)
													65.4938
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9523	0.9498	0.9474	0.9359	0.9338	0.9237	0.9237	0.9219	0.9276	0.9338	0.9381	0.9427	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
													0.9359
													31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2456	(42)
Hot water usage for mixer showers												0.0000	(42a)
Hot water usage for baths	26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397	(42b)
Hot water usage for other uses	37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276	(42c)
Average daily hot water use (litres/day)												58.9899	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	64.3576	62.5924	60.6651	58.2661	56.1260	53.9019	53.4396	55.3630	57.3357	59.6197	62.0400	64.2673	(44)
Energy content (annual)	101.9268	89.1307	93.2400	79.7633	75.5563	66.2786	64.6306	68.5510	70.7007	80.9034	88.3873	100.6270	(45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m =	979.6957
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	(59)
Total heat required for water heating calculated for each month	86.6378	75.7611	79.2540	67.7988	64.2229	56.3368	54.9360	58.2683	60.0956	68.7679	75.1292	85.5330	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	86.6378	75.7611	79.2540	67.7988	64.2229	56.3368	54.9360	58.2683	60.0956	68.7679	75.1292	85.5330	(64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m =	832.7414 (64)
Electric shower(s)												833	(64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	49.5489	44.1484	48.2084	46.0047	46.8680	44.7075	46.1977	46.8680	46.0047	48.2084	47.3019	49.5489	(64a)
Heat gains from water heating, kWh/month												563.6155	(64a)

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34.0467 29.9774 31.8656 28.4509 27.7727 25.2611 25.2834 26.2841 26.5251 29.2441 30.6078 33.7705 (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	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.7902	114.9106	103.7902	107.2499	103.7902	107.2499	103.7902	103.7902	107.2499	103.7902	107.2499	103.7902	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1393	183.1585	169.2974	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	(71)
Water heating gains (Table 5)	45.7616	44.6092	42.8301	39.5151	37.3289	35.0848	33.9831	35.3281	36.8404	39.3066	42.5108	45.3904	(72)
Total internal gains	403.4869	415.5017	397.4442	386.6082	367.1011	355.2891	342.0245	341.3226	351.4526	361.4398	381.9649	394.4124	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
North					3.6800	10.6334	0.6300	0.7000	0.7700		11.9589 (74)	
South					7.5200	46.7521	0.6300	0.7000	0.7700		107.4461 (78)	
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)
Total gains	522.8918	614.3247	660.4321	702.3284	715.1284	699.3072	674.2440	649.0240	632.2990	578.4436	524.0780	497.2252 (84)

7. Mean internal temperature (heating season)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
tau	47.7310	47.8565	47.9801	48.5695	48.6814	49.2091	49.2091	49.3081	49.0045	48.6814	48.4556	48.2218	
alpha	4.1821	4.1904	4.1987	4.2380	4.2454	4.2806	4.2806	4.2872	4.2670	4.2454	4.2304	4.2148	
util living area	0.9770	0.9559	0.9246	0.8545	0.7384	0.5644	0.4157	0.4484	0.6517	0.8684	0.9569	0.9809	(86)
MIT	19.6651	19.9286	20.2214	20.5718	20.8225	20.9574	20.9908	20.9872	20.9201	20.6051	20.0853	19.6208	(87)
Th 2	20.1232	20.1253	20.1274	20.1371	20.1389	20.1474	20.1474	20.1489	20.1441	20.1389	20.1352	20.1314	(88)
util rest of house	0.9725	0.9476	0.9102	0.8275	0.6924	0.4980	0.3379	0.3692	0.5871	0.8383	0.9472	0.9771	(89)
MIT 2	18.9126	19.1715	19.4562	19.7924	20.0136	20.1243	20.1440	20.1440	20.0969	19.8306	19.3356	18.8753	(90)
Living area fraction	19.2147	19.4754	19.7634	20.1053	20.3383	20.4587	20.4839	20.4825	20.4273	20.1414	19.6365	19.1745	(91)
MIT	19.2147	19.4754	19.7634	20.1053	20.3383	20.4587	20.4839	20.4825	20.4273	20.1414	19.6365	19.1745	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2147	19.4754	19.7634	20.1053	20.3383	20.4587	20.4839	20.4825	20.4273	20.1414	19.6365	19.1745	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9665	0.9401	0.9033	0.8264	0.7036	0.5229	0.3689	0.4007	0.6093	0.8384	0.9406	0.9717	(94)
Useful gains	505.3804	577.5490	596.6009	580.4269	503.1921	365.6395	248.7596	260.0707	385.2651	484.9732	492.9302	483.1535	(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	993.9884	968.8326	879.3481	733.8834	564.4602	378.7275	251.0683	263.3741	410.7269	623.4762	823.0036	987.8206	(97)
Space heating kWh	363.5243	262.9425	210.3639	110.4887	45.5834	0.0000	0.0000	0.0000	0.0000	103.0462	237.6528	375.4724	(98a)
Space heating requirement - total per year (kWh/year)												1709.0743	
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	363.5243	262.9425	210.3639	110.4887	45.5834	0.0000	0.0000	0.0000	0.0000	103.0462	237.6528	375.4724	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1709.0743	
Space heating per m ²										(98c) / (4) =		24.4223	(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	607.6468	478.3603	490.3028	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8947	0.9413	0.9295	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	543.6366	450.2643	455.7133	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	775.1358	747.9851	720.5597	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	166.6794	221.5043	197.0457	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	41.6699	55.3761	49.2614	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												146.3073	(107)
Energy for space heating												24.4223	(99)
Energy for space cooling												2.0907	(108)
Total												26.5130	(109)
Fabric Energy Efficiency (TFEE)												26.5	(109)

Full SAP Calculation Printout



Plot Reference	Plot 19			Issued on Date	22/12/2025
Assessment Reference	Plot 19	Plot Type Ref			
Plot Address	Flat 6, 6 Cross Road Manchester, M21 9SA			SAP Version	10.2
SAP Rating	88 B	DER	3.06	TER	11.55
Environmental	98 A	% DER < TER			73.51
CO ₂ Emissions (t/year)	0.19	DFEE	20.90	TFEE	26.51
Compliance Check	See BREL	% DFEE < TFEE			21.16
% DPER < TPER	47.41	DPER	32.15	TPER	61.13
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	69.9800 (1b)	2.5000 (2b)	174.9500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		174.9500 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 174.9500 (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	2.8700	(17)
Infiltration rate	0.1435	(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) =	0.1220 (21)

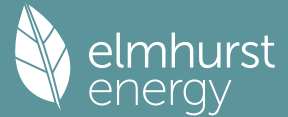
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1555	0.1525	0.1494	0.1342	0.1311	0.1159	0.1159	0.1128	0.1220	0.1311	0.1372	0.1433 (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	0.2955	0.2925	0.2894	0.2742	0.2711	0.2559	0.2559	0.2528	0.2620	0.2711	0.2772	0.2833 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.9800	11.2000	22.7800	0.1800	4.1004	110.0000	2505.7999 (29a)
External Roof	21.8900		21.8900	0.1500	3.2835	9.0000	197.0100 (30)
Total net area of external elements Aum(A, m ²)			55.8700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	22.2324	(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 Floor 1			69.9800			40.0000	2799.2000 (32d)
Party Ceiling			48.0900			30.0000	1442.7000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11451.7300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		163.6429 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5600	0.0370	0.6497
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.9700	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
E15 Flat roof with parapet	15.1400	0.1320	1.9985
E9 Balcony between dwellings, wall insulation continuous	4.8800	0.1500	0.7320
E24 Eaves (insulation at ceiling level - inverted)	4.8100	0.1500	0.7215
P4 Party wall - Roof (insulation at ceiling level)	7.6900	0.0400	0.3076
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.3388 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	27.5712 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	17.0613	16.8852	16.7092	15.8289	15.6529	14.7726	14.7726	14.5966	15.1247	15.6529	16.0050	16.3571	(38)
Heat transfer coeff	44.6325	44.4564	44.2804	43.4001	43.2241	42.3438	42.3438	42.1678	42.6959	43.2241	43.5762	43.9283	(39)
Average = Sum(39)m / 12 =												43.3561	
HLP	0.6378	0.6353	0.6328	0.6202	0.6177	0.6051	0.6051	0.6026	0.6101	0.6177	0.6227	0.6277	(40)
HLP (average)												0.6195	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2456 (42)
Hot water usage for mixer showers	61.8716	60.9418	59.5869	56.9945	55.0814	52.9479	51.7352	53.0799	54.5539	56.8446	59.4927	61.6346	(42a)
Hot water usage for baths	26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397	(42b)
Hot water usage for other uses	37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276	(42c)
Average daily hot water use (litres/day)												116.0334	(43)
Daily hot water use	126.2293	123.5342	120.2520	115.2606	111.2074	106.8498	105.1748	108.4429	111.8896	116.4643	121.5327	125.9019	(44)
Energy conte	199.9163	175.9111	184.8228	157.7860	149.7065	131.3843	127.1999	134.2750	137.9711	158.0410	173.1456	197.1319	(45)
Energy content (annual)										Total = Sum(45)m =		1927.2913	
Distribution loss (46)m = 0.15 x (45)m	29.9874	26.3867	27.7234	23.6679	22.4560	19.7076	19.0800	20.1412	20.6957	23.7062	25.9718	29.5698	(46)
Water storage loss (or HIU loss):												201.0000	(47)
Store volume												1.6100	(48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400	(49)
Temperature factor from Table 2b												0.8694	(55)
Enter (49) or (54) in (55)													
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2244.6223	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Heat gains from water heating, kWh/month	66.4722	58.4904	61.4536	52.4638	49.7774	43.6853	42.2940	44.6464	45.8754	52.5486	57.5709	65.5464	(65)

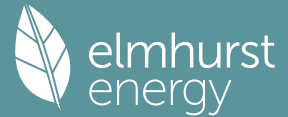
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.7902	114.9106	103.7902	107.2499	103.7902	107.2499	103.7902	103.7902	107.2499	103.7902	107.2499	103.7902	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1393	183.1585	169.2974	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	(71)
Water heating gains (Table 5)	89.3443	87.0393	82.5989	72.8664	66.9051	60.6740	56.8467	60.0086	63.7158	70.6299	79.9596	88.0999	(72)
Total internal gains	447.0695	457.9318	437.2130	419.9595	396.6773	380.8783	364.8881	366.0032	378.3280	392.7632	419.4137	437.1219	(73)

6. Solar gains

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

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South	7.5200			46.7521			0.4000			0.0000			0.7700			108.2853 (78)		
Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158	(83)					
Total gains	567.4071	658.3077	702.2550	738.1457	747.4229	727.5833	699.7024	676.1079	661.3680	611.4619	562.6368	540.7378	(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	71.2718	71.5540	71.8385	73.2956	73.5941	75.1240	75.1240	75.4376	74.5045	73.5941	72.9995	72.4143						
alpha	5.7515	5.7703	5.7892	5.8864	5.9063	6.0083	6.0083	6.0292	5.9670	5.9063	5.8666	5.8276						
util living area	0.9409	0.8855	0.8119	0.6808	0.5314	0.3718	0.2662	0.2868	0.4435	0.6992	0.8839	0.9504	(86)					
MIT	20.4887	20.6786	20.8260	20.9451	20.9883	20.9989	20.9999	20.9998	20.9968	20.9466	20.7368	20.4568	(87)					
Th 2	20.3961	20.3984	20.4006	20.4119	20.4141	20.4254	20.4254	20.4277	20.4209	20.4141	20.4096	20.4051	(88)					
util rest of house	0.9321	0.8710	0.7912	0.6533	0.4995	0.3387	0.2315	0.2512	0.4069	0.6671	0.8670	0.9428	(89)					
MIT 2	19.8081	20.0394	20.2144	20.3576	20.4039	20.4247	20.4254	20.4276	20.4185	20.3633	20.1225	19.7765	(90)					
Living area fraction	fLA = Living area / (4) =												0.4014 (91)					
MIT	20.0813	20.2960	20.4599	20.5934	20.6384	20.6552	20.6560	20.6573	20.6506	20.5974	20.3691	20.0496	(92)					
Temperature adjustment													0.0000					
adjusted MIT	20.0813	20.2960	20.4599	20.5934	20.6384	20.6552	20.6560	20.6573	20.6506	20.5974	20.3691	20.0496	(93)					

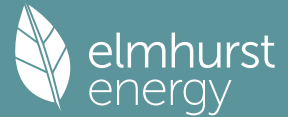
8. Space heating requirement																		

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
Utilisation	0.9270	0.8684	0.7933	0.6619	0.5118	0.3520	0.2454	0.2655	0.4214	0.6774	0.8658	0.9377	(94)					
Useful gains	525.9675	571.6524	557.0961	488.5854	382.5273	256.0830	171.7175	179.4757	278.7334	414.1854	487.1156	507.0563	(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	704.3600	684.4514	618.1501	507.4956	386.3554	256.3985	171.7455	179.5201	279.6856	432.1292	578.2151	696.2445	(97)					
Space heating kWh	132.7240	75.8009	45.4242	13.6153	2.8480	0.0000	0.0000	0.0000	0.0000	13.3502	65.5917	140.7561	(98a)					
Space heating requirement - total per year (kWh/year)													490.1103					
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	132.7240	75.8009	45.4242	13.6153	2.8480	0.0000	0.0000	0.0000	0.0000	13.3502	65.5917	140.7561	(98c)					
Space heating requirement after solar contribution - total per year (kWh/year)													490.1103					
Space heating per m2											(98c) / (4) =			7.0036 (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	132.7240	75.8009	45.4242	13.6153	2.8480	0.0000	0.0000	0.0000	0.0000	13.3502	65.5917	140.7561	(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)	132.7240	75.8009	45.4242	13.6153	2.8480	0.0000	0.0000	0.0000	0.0000	13.3502	65.5917	140.7561	(211)					
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)					
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)					
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)					
Space heating fuel used, main system 2												0.0000 (213)						
Water heating																		
Water heating requirement	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(64)					
Efficiency of water heater	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	(216)					
(217)m	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	(217)					
Fuel for water heating, kWh/month	65.8741	58.1465	61.4915	53.3885	51.2950	45.7224	44.7599	46.8142	47.6350	53.7150	57.8484	65.0656	(219)					
Space cooling fuel requirement	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)					
(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	13.5958	12.2801	13.5958	13.1572	13.5958	13.1572	13.5958	13.5958	13.1572	13.5958	13.1572	13.5958	(231)					
Lighting	19.2007	15.4035	13.8691	10.1611	7.8487	6.4125	7.1599	9.3067	12.0885	15.8607	17.9147	19.7343	(232)					
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)					
(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)	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)					
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)					
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)					
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)					
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)					
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)					
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)					
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)					
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)					
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)					
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)					
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)					
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)					
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)					
Annual totals kWh/year																		
Space heating fuel - main system 1												490.1103 (211)						
Space heating fuel - main system 2												0.0000 (213)						
Space heating fuel - secondary												0.0000 (215)						

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Efficiency of water heater	344.3961	
Water heating fuel used	651.7561	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)		
mechanical ventilation fans (SFP = 0.7500)	160.0793	(230a)
Total electricity for the above, kWh/year	160.0793	(231)
Electricity for lighting (calculated in Appendix L)	154.9604	(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	1456.9060	(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	490.1103	0.1585	77.6982 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	651.7561	0.1412	92.0103 (264)
Space and water heating			169.7085 (265)
Pumps, fans and electric keep-hot	160.0793	0.1387	22.2050 (267)
Energy for lighting	154.9604	0.1443	22.3656 (268)
Total CO2, kg/year			214.2791 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0600 (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	490.1103	1.5868	777.7094 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	651.7561	1.5220	991.9858 (278)
Space and water heating			1769.6952 (279)
Pumps, fans and electric keep-hot	160.0793	1.5128	242.1679 (281)
Energy for lighting	154.9604	1.5338	237.6835 (282)
Total Primary energy kWh/year			2249.5465 (286)
Dwelling Primary energy Rate (DPER)			32.1500 (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	69.9800 (1b)	x 2.5000 (2b)	= 174.9500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	174.9500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1143 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3643 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3097 (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	0.3948	0.3871	0.3793	0.3406	0.3329	0.2942	0.2942	0.2864	0.3097	0.3329	0.3484	0.3639 (22b)

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Effective ac 0.5779 0.5749 0.5720 0.5580 0.5554 0.5433 0.5433 0.5410 0.5479 0.5554 0.5607 0.5662 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			11.2000	1.1450	12.8244		(27)
EXT Wall	33.9800	11.2000	22.7800	0.1800	4.1004		(29a)
External Roof	21.8900		21.8900	0.1100	2.4079		(30)
Total net area of external elements Aum(A, m2)			55.8700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		19.3327		(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 163.6429 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5600	0.0700	1.2292
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.9700	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0500	0.2885
E3 Sill	2.5000	0.0500	0.1250
E4 Jamb	10.4800	0.0500	0.5240
E16 Corner (normal)	5.3600	0.0900	0.4824
E18 Party wall between dwellings	2.6800	0.0600	0.1608
E25 Staggered party wall between dwellings	8.0400	0.0600	0.4824
E15 Flat roof with parapet	15.1400	0.5600	8.4784
E9 Balcony between dwellings, wall insulation continuous	4.8800	0.0200	0.0976
E24 Eaves (insulation at ceiling level - inverted)	4.8100	0.2400	1.1544
P4 Party wall - Roof (insulation at ceiling level)	7.6900	0.1200	0.9228

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 13.9455 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 33.2782 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	33.3668	33.1921	33.0208	32.2163	32.0658	31.3651	31.3651	31.2353	31.6350	32.0658	32.3703	32.6886
Heat transfer coeff	66.6450	66.4703	66.2990	65.4945	65.3440	64.6433	64.6433	64.5135	64.9132	65.3440	65.6485	65.9668
Average = Sum(39)m / 12 =												65.4938

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9523	0.9498	0.9474	0.9359	0.9338	0.9237	0.9237	0.9219	0.9276	0.9338	0.9381	0.9427
HLP (average)												0.9359
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

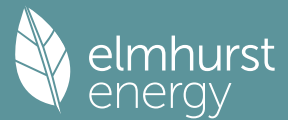
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2456
Hot water usage for mixer showers			59.5869	56.9945	55.0814	52.9479	51.7352	53.0799	54.5539	56.8446	59.4927	61.6346
Hot water usage for baths	61.8716	60.9418										
Hot water usage for other uses	26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397
Average daily hot water use (litres/day)	37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276
Daily hot water use												116.0334
Energy conte	126.2293	123.5342	120.2520	115.2606	111.2074	106.8498	105.1748	108.4429	111.8896	116.4643	121.5327	125.9019
Energy content (annual)	199.9163	175.9111	184.8228	157.7860	149.7065	131.3843	127.1999	134.2750	137.9711	158.0410	173.1456	197.1319
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss (or HIU loss):	29.9874	26.3867	27.7234	23.6679	22.4560	19.7076	19.0800	20.1412	20.6957	23.7062	25.9718	29.5698
Store volume												150.0000
a) If manufacturer declared loss factor is known (kWh/day):												1.3938
Temperature factor from Table 2b												0.5400
Enter (49) or (54) in (55)												0.7527
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
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
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624
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	246.5112	217.9968	231.4177	202.8778	196.3014	176.4761	173.7948	180.8699	183.0629	204.6359	218.2374	243.7268
WWHRS	-28.2851	-25.0156	-26.1949	-21.6904	-20.2147	-17.2978	-16.2140	-17.2419	-17.8970	-21.0986	-23.9022	-27.7613
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
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	218.2261	192.9812	205.2228	181.1874	176.0867	159.1783	157.5808	163.6279	165.1659	183.5373	194.3352	215.9655
Total per year (kWh/year)												2213.0952
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
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000
Heat gains from water heating, kWh/month	103.7481	92.1590	98.7295	88.5373	87.0533	79.7587	79.5699	81.9223	81.9489	89.8246	93.6444	102.8223

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	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.7902	104.9106	103.7902	107.2499	103.7902	107.2499	103.7902	103.7902	107.2499	103.7902	107.2499	103.7902
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1393	183.1585	169.2974	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												

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Pumps, fans	34.2282 3.0000	34.2282 3.0000	34.2282 3.0000	34.2282 3.0000	34.2282 3.0000	34.2282 0.0000	34.2282 0.0000	34.2282 0.0000	34.2282 0.0000	34.2282 3.0000	34.2282 3.0000	34.2282 (69) 3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256 (71)
Water heating gains (Table 5)	139.4464	137.1414	132.7010	122.9685	117.0072	110.7760	106.9488	110.1107	113.8178	120.7319	130.0616	138.2020 (72)
Total internal gains	500.1716	511.0338	490.3150	473.0615	449.7794	430.9803	414.9902	416.1053	428.4301	445.8652	472.5158	490.2240 (73)

6. Solar gains

[Jan]												Gains W
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	
North					3.6800	10.6334	0.6300		0.7000		0.7700	11.9589 (74)
South					7.5200	46.7521	0.6300		0.7000		0.7700	107.4461 (78)
Solar gains	119.4050	198.8230	262.9879	315.7202	348.0273	344.0180	332.2195	307.7014	280.8464	217.0038	142.1131	102.8128 (83)
Total gains	619.5765	709.8569	753.3029	788.7818	797.8067	774.9984	747.2097	723.8066	709.2764	662.8690	614.6288	593.0368 (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	47.7310	47.8565	47.9801	48.5695	48.6814	49.2091	49.2091	49.3081	49.0045	48.6814	48.4556	48.2218
alpha	4.1821	4.1904	4.1987	4.2380	4.2454	4.2806	4.2806	4.2872	4.2670	4.2454	4.2304	4.2148
util living area	0.9598	0.9316	0.8918	0.8110	0.6865	0.5162	0.3769	0.4047	0.5956	0.8193	0.9298	0.9653 (86)
MIT	19.8509	20.0929	20.3573	20.6598	20.8664	20.9696	20.9937	20.9914	20.9431	20.6959	20.2410	19.8091 (87)
Th 2	20.1232	20.1253	20.1274	20.1371	20.1389	20.1474	20.1474	20.1489	20.1441	20.1389	20.1352	20.1314 (88)
util rest of house	0.9524	0.9197	0.8733	0.7801	0.6392	0.4534	0.3055	0.3321	0.5325	0.7837	0.9156	0.9588 (89)
MIT 2	18.8018	19.1029	19.4276	19.7923	20.0203	20.1266	20.1445	20.1447	20.1021	19.8420	19.2985	18.7558 (90)
Living area fraction	19.2229	19.5003	19.8008	20.1405	20.3599	20.4650	20.4853	20.4846	20.4397	20.1848	19.6768	19.1786 (92)
MIT	19.2229	19.5003	19.8008	20.1405	20.3599	20.4650	20.4853	20.4846	20.4397	20.1848	19.6768	19.1786 (93)
Temperature adjustment												0.0000
adjusted MIT	19.2229	19.5003	19.8008	20.1405	20.3599	20.4650	20.4853	20.4846	20.4397	20.1848	19.6768	19.1786 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9430	0.9098	0.8655	0.7802	0.6518	0.4772	0.3340	0.3610	0.5549	0.7857	0.9068	0.9500 (94)
Useful gains	584.2558	645.8104	651.9511	615.3940	520.0414	369.8430	249.5880	261.2967	393.5794	520.8298	557.3196	563.3966 (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	994.5388	970.4838	881.8286	736.1901	565.8742	379.1312	251.1605	263.5096	411.5304	626.3069	825.6500	988.0897 (97)
Space heating kWh	305.2506	218.1805	171.0288	86.9731	34.0997	0.0000	0.0000	0.0000	0.0000	78.4750	193.1979	315.9717 (98a)
Space heating requirement - total per year (kWh/year)												1403.1773
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	305.2506	218.1805	171.0288	86.9731	34.0997	0.0000	0.0000	0.0000	0.0000	78.4750	193.1979	315.9717 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1403.1773
Space heating per m ²										(98c) / (4) =		20.0511 (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	305.2506	218.1805	171.0288	86.9731	34.0997	0.0000	0.0000	0.0000	0.0000	78.4750	193.1979	315.9717 (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)	330.7157	236.3819	185.2967	94.2288	36.9444	0.0000	0.0000	0.0000	0.0000	85.0217	209.3152	342.3312 (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	218.2261	192.9812	205.2228	181.1874	176.0867	159.1783	157.5808	163.6279	165.1659	183.5373	194.3352	215.9655 (64)
Efficiency of water heater (217)m	84.8124	84.3357	83.6540	82.5123	81.1341	79.8000	79.8000	79.8000	79.8000	82.2982	84.0466	79.8000 (216)
Fuel for water heating, kWh/month	257.3044	228.8250	245.3235	219.5883	217.0318	199.4715	197.4697	205.0475	206.9748	223.0149	231.2232	254.3405 (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	21.5656	17.3007	15.5774	11.4126	8.8155	7.2023	8.0417	10.4530	13.5774	17.8143	20.1212	22.1649 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-18.7641	-27.8061	-41.9868	-49.6710	-55.7267	-52.8116	-52.1731	-48.1825	-41.5164	-32.8763	-21.1058	-16.0692 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)

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Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-6.8520	-14.7251	-29.8545	-45.7122	-61.3034	-61.9089	-61.1750	-51.3952	-37.1513	-21.3350	-9.2367	-5.3951	(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												1520.2354	(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												2685.6152	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												174.0464	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-864.7342	(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												3601.1628	(238)

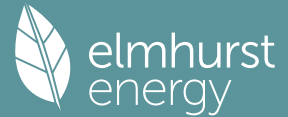
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1520.2354	0.2100	319.2494	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2685.6152	0.2100	563.9792	(264)
Space and water heating			883.2286	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	174.0464	0.1443	25.1203	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-458.6897	0.1335	-61.2579	
PV Unit electricity exported	-406.0446	0.1253	-50.8923	
Total			-112.1502	(269)
Total CO2, kg/year			808.1280	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.5500	(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	1520.2354	1.1300	1717.8660	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2685.6152	1.1300	3034.7452	(278)
Space and water heating			4752.6112	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	174.0464	1.5338	266.9582	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-458.6897	1.4935	-685.0614	
PV Unit electricity exported	-406.0446	0.4600	-186.7990	
Total			-871.8604	(283)
Total Primary energy kWh/year			4277.8098	(286)
Target Primary Energy Rate (TPER)			61.1300	(287)

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Plot Reference	Plot 19				Issued on Date	22/12/2025	
Assessment Reference	Plot 19			Plot Type Ref			
Plot Address	Flat 6, 6 Cross Road Manchester, M21 9SA				SAP Version	10.2	
SAP Rating	88 B	DER	3.06	TER	11.55		
Environmental	98 A	% DER < TER				73.51	
CO ₂ Emissions (t/year)	0.19	DFEE	20.90	TFEE	26.51		
Compliance Check	See BREL	% DFEE < TFEE				21.16	
% DPER < TPER	47.41	DPER	32.15	TPER	61.13		
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	69.9800 (1b)	2.5000 (2b)	174.9500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		174.9500 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 174.9500 (5)

2. Ventilation rate

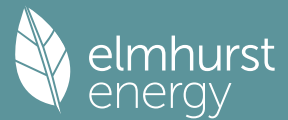
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	2.8700 (17)
Infiltration rate	0.1435 (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) = 0.1220 (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	0.1555	0.1525	0.1494	0.1342	0.1311	0.1159	0.1159	0.1128	0.1220	0.1311	0.1372	0.1433 (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	0.2955	0.2925	0.2894	0.2742	0.2711	0.2559	0.2559	0.2528	0.2620	0.2711	0.2772	0.2833 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Window N/E			3.6800	1.3258	4.8788		(27)
Window S/W			7.5200	1.3258	9.9697		(27)
EXT Wall	33.9800	11.2000	22.7800	0.1800	4.1004	110.0000	2505.7999 (29a)
External Roof	21.8900		21.8900	0.1500	3.2835	9.0000	197.0100 (30)
Total net area of external elements Aum(A, m ²)			55.8700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 22.2324		(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 Floor 1			69.9800			40.0000	2799.2000 (32d)
Party Ceiling			48.0900			30.0000	1442.7000 (32b)
Internal Wall			107.7800			9.0000	970.0200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11451.7300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							163.6429 (35)

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List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5600	0.0370	0.6497
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.9700	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
E15 Flat roof with parapet	15.1400	0.1320	1.9985
E9 Balcony between dwellings, wall insulation continuous	4.8800	0.1500	0.7320
E24 Eaves (insulation at ceiling level - inverted)	4.8100	0.1500	0.7215
P4 Party wall - Roof (insulation at ceiling level)	7.6900	0.0400	0.3076
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.3388 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	27.5712 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	17.0613	16.8852	16.7092	15.8289	15.6529	14.7726	14.7726	14.5966	15.1247	15.6529	16.0050	16.3571	(38)
Heat transfer coeff	44.6325	44.4564	44.2804	43.4001	43.2241	42.3438	42.3438	42.1678	42.6959	43.2241	43.5762	43.9283	(39)
Average = Sum(39)m / 12 =												43.3561	
HLP	0.6378	0.6353	0.6328	0.6202	0.6177	0.6051	0.6051	0.6026	0.6101	0.6177	0.6227	0.6277	(40)
HLP (average)												0.6195	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2456 (42)
Hot water usage for mixer showers	61.8716	60.9418	59.5869	56.9945	55.0814	52.9479	51.7352	53.0799	54.5539	56.8446	59.4927	61.6346	(42a)
Hot water usage for baths	26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397	(42b)
Hot water usage for other uses	37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276	(42c)
Average daily hot water use (litres/day)												116.0334	(43)
Daily hot water use	126.2293	123.5342	120.2520	115.2606	111.2074	106.8498	105.1748	108.4429	111.8896	116.4643	121.5327	125.9019	(44)
Energy conte	199.9163	175.9111	184.8228	157.7860	149.7065	131.3843	127.1999	134.2750	137.9711	158.0410	173.1456	197.1319	(45)
Energy content (annual)										Total = Sum(45)m =		1927.2913	
Distribution loss (46)m = 0.15 x (45)m	29.9874	26.3867	27.7234	23.6679	22.4560	19.7076	19.0800	20.1412	20.6957	23.7062	25.9718	29.5698	(46)
Water storage loss (or HIU loss):												201.0000	(47)
Store volume												1.6100	(48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400	(49)
Temperature factor from Table 2b												0.8694	(55)
Enter (49) or (54) in (55)													
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(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	66.4722	58.4904	61.4536	52.4638	49.7774	43.6853	42.2940	44.6464	45.8754	52.5486	57.5709	65.5464	(65)

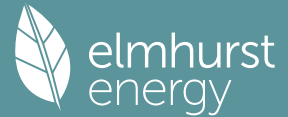
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.9362	19.4836	15.8451	11.9958	8.9670	7.5703	8.1800	10.6326	14.2711	18.1205	21.1492	22.5459	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.4036	297.4586	289.7601	273.3710	252.6826	233.2385	220.2486	217.1936	224.8921	241.2812	261.9696	281.4137	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	(71)
Water heating gains (Table 5)	89.3443	87.0393	82.5989	72.8664	66.9051	60.6740	56.8467	60.0086	63.7158	70.6299	79.9596	88.0999	(72)
Total internal gains	501.3164	499.6137	483.8364	453.8654	424.1870	397.1150	380.9076	383.4672	398.5113	425.6639	458.7107	487.6918	(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	621.6540	699.9897	748.8783	772.0516	774.9326	743.8200	715.7219	693.5719	681.5512	644.3626	601.9337	591.3077 (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	71.2718	71.5540	71.8385	73.2956	73.5941	75.1240	75.1240	75.4376	74.5045	73.5941	72.9995	72.4143
alpha	5.7515	5.7703	5.7892	5.8864	5.9063	6.0083	6.0083	6.0292	5.9670	5.9063	5.8666	5.8276
util living area	0.9173	0.8616	0.7800	0.6560	0.5135	0.3638	0.2603	0.2796	0.4306	0.6702	0.8570	0.9299 (86)
MIT	20.5766	20.7275	20.8597	20.9546	20.9901	20.9990	20.9999	20.9998	20.9973	20.9570	20.7819	20.5439 (87)
Th 2	20.3961	20.3984	20.4006	20.4119	20.4141	20.4254	20.4254	20.4277	20.4209	20.4141	20.4096	20.4051 (88)
util rest of house	0.9060	0.8455	0.7580	0.6286	0.4825	0.3313	0.2263	0.2448	0.3950	0.6382	0.8380	0.9200 (89)
MIT 2	19.9147	20.0967	20.2519	20.3672	20.4055	20.4247	20.4254	20.4276	20.4189	20.3736	20.1743	19.8829 (90)
Living area fraction	20.1804	20.3499	20.4959	20.6030	20.6402	20.6553	20.6560	20.6573	20.6510	20.6078	20.4182	20.1482 (91)
MIT	20.1804	20.3499	20.4959	20.6030	20.6402	20.6553	20.6560	20.6573	20.6510	20.6078	20.4182	20.1482 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1804	20.3499	20.4959	20.6030	20.6402	20.6553	20.6560	20.6573	20.6510	20.6078	20.4182	20.1482 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9016	0.8441	0.7616	0.6376	0.4945	0.3443	0.2399	0.2588	0.4092	0.6489	0.8383	0.9153 (94)
Useful gains	560.4815	590.8597	570.3544	492.2622	383.2262	256.1232	171.7213	179.4824	278.8895	418.1463	504.6137	541.2477 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.0000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	708.7796	686.8469	619.7423	507.9111	386.4321	256.4028	171.7460	179.5209	279.7025	432.5765	580.3539	700.5790 (97)
Space heating kWh	110.3338	64.5033	36.7446	11.2673	2.3852	0.0000	0.0000	0.0000	0.0000	10.7361	54.5330	118.5425 (98a)
Space heating requirement - total per year (kWh/year)												409.0457
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	110.3338	64.5033	36.7446	11.2673	2.3852	0.0000	0.0000	0.0000	0.0000	10.7361	54.5330	118.5425 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												409.0457
Space heating per m2										(98c) / (4) =		5.8452 (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	110.3338	64.5033	36.7446	11.2673	2.3852	0.0000	0.0000	0.0000	0.0000	10.7361	54.5330	118.5425 (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)	110.3338	64.5033	36.7446	11.2673	2.3852	0.0000	0.0000	0.0000	0.0000	10.7361	54.5330	118.5425 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating												
Water heating requirement	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833 (64)
Efficiency of water heater	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961 (216)
Fuel for water heating, kWh/month	65.8741	58.1465	61.4915	53.3885	51.2950	45.7224	44.7599	46.8142	47.6350	53.7150	57.8484	65.0656 (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	13.5958	12.2801	13.5958	13.1572	13.5958	13.1572	13.5958	13.5958	13.1572	13.5958	13.1572	13.5958 (231)
Lighting	19.2007	15.4035	13.8691	10.1611	7.8487	6.4125	7.1599	9.3067	12.0885	15.8607	17.9147	19.7343 (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												409.0457 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.3961

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Water heating fuel used	651.7561 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500) mechanical ventilation fans (SFP = 0.7500)	160.0793 (230a)
Total electricity for the above, kWh/year	160.0793 (231)
Electricity for lighting (calculated in Appendix L)	154.9604 (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	1375.8414 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	409.0457	16.4900	67.4516 (240)	
Space heating - main system 2	0.0000	16.4900	0.0000 (241)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	651.7561	16.4900	107.4746 (247)	
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)	
Pumps, fans and electric keep-hot	160.0793	16.4900	26.3971 (249)	
Energy for lighting	154.9604	16.4900	25.5530 (250)	
Additional standing charges			0.0000 (251)	
Total energy cost			226.8762 (255)	

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	0.7103 (257)
SAP value	88.4853
SAP rating (Section 12)	88 (258)
SAP band	B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	409.0457	0.1586	64.8699 (261)	
Space heating - main system 2	0.0000	0.0000	0.0000 (262)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	651.7561	0.1412	92.0103 (264)	
Space and water heating			156.8803 (265)	
Pumps, fans and electric keep-hot	160.0793	0.1387	22.2050 (267)	
Energy for lighting	154.9604	0.1443	22.3656 (268)	
Total CO2, kg/year			201.4508 (272)	
CO2 emissions per m2			2.8800 (273)	
EI value			97.6523	
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

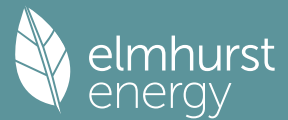
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	69.9800 (1b)	x 2.5000 (2b)	= 174.9500 (1b) - (3b)	
Ground floor			(4)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 174.9500 (5)	

2. Ventilation rate

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

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Pressure Test Method													Blower Door
Measured/design AP50													2.8700 (17)
Infiltration rate													0.1435 (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) = 0.1220 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Adj infilt rate	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
	0.1311	0.1281	0.1281	0.1189	0.1220	0.1037	0.1006	0.1006	0.1037	0.1159	0.1159	0.1189	(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	0.2711	0.2681	0.2681	0.2589	0.2620	0.2437	0.2406	0.2406	0.2437	0.2559	0.2559	0.2589	(25)

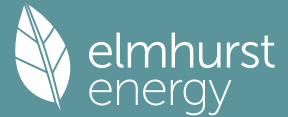
3. Heat losses and heat loss parameter													

Element			Gross	Openings	NetArea	U-value	A x U	K-value	A x K				
Main dwelling			m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K				
Window N/E					3.6800	1.3258	4.8788						(27)
Window S/W					7.5200	1.3258	9.9697						(27)
EXT Wall			33.9800	11.2000	22.7800	0.1800	4.1004	110.0000	2505.7999				(29a)
External Roof			21.8900		21.8900	0.1500	3.2835	9.0000	197.0100				(30)
Total net area of external elements Aum(A, m2)					55.8700								(31)
Fabric heat loss, W/K = Sum (A x U)							(26)...(30) + (32) =	22.2324					(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 Floor 1					69.9800			40.0000	2799.2000				(32d)
Party Ceiling					48.0900			30.0000	1442.7000				(32b)
Internal Wall					107.7800			9.0000	970.0200				(32c)
Heat capacity Cm = Sum(A x k)													
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K													(28)...(30) + (32) + (32a)...(32e) = 11451.7300 (34)
List of Thermal Bridges													163.6429 (35)
K1 Element						Length	Psi-value	Total					
E7 Party floor between dwellings (in blocks of flats)						17.5600	0.0370	0.6497					
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						50.9700	0.0000	0.0000					
E2 Other lintels (including other steel lintels)						5.7700	0.0250	0.1442					
E3 Sill						2.5000	0.0220	0.0550					
E4 Jamb						10.4800	0.0170	0.1782					
E16 Corner (normal)						5.3600	0.0420	0.2251					
E18 Party wall between dwellings						2.6800	0.0320	0.0858					
E25 Staggered party wall between dwellings						8.0400	0.0300	0.2412					
E15 Flat roof with parapet						15.1400	0.1320	1.9985					
E9 Balcony between dwellings, wall insulation continuous						4.8800	0.1500	0.7320					
E24 Eaves (insulation at ceiling level - inverted)						4.8100	0.1500	0.7215					
P4 Party wall - Roof (insulation at ceiling level)						7.6900	0.0400	0.3076					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													5.3388 (36)
Point Thermal bridges													(36a) = 0.0000
Total fabric heat loss													(33) + (36) + (36a) = 27.5712 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	15.6529	15.4768	15.4768	14.9487	15.1247	14.0684	13.8924	13.8924	14.0684	14.7726	14.7726	14.9487	(38)
Average = Sum(39)m / 12 =	43.2241	43.0480	43.0480	42.5199	42.6959	41.6396	41.4636	41.4636	41.6396	42.3438	42.3438	42.5199	(39)
													42.3291
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6177	0.6151	0.6151	0.6076	0.6101	0.5950	0.5925	0.5925	0.5950	0.6051	0.6051	0.6076	(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													2.2456 (42)
Hot water usage for mixer showers													
	61.8716	60.9418	59.5869	56.9945	55.0814	52.9479	51.7352	53.0799	54.5539	56.8446	59.4927	61.6346	(42a)
Hot water usage for baths													
	26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397	(42b)
Hot water usage for other uses													
	37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276	(42c)
Average daily hot water use (litres/day)													116.0334 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	126.2293	123.5342	120.2520	115.2606	111.2074	106.8498	105.1748	108.4429	111.8896	116.4643	121.5327	125.9019	(44)
Energy content (annual)	199.9163	175.9111	184.8228	157.7860	149.7065	131.3843	127.1999	134.2750	137.9711	158.0410	173.1456	197.1319	(45)
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 1927.2913
	29.9874	26.3867	27.7234	23.6679	22.4560	19.7076	19.0800	20.1412	20.6957	23.7062	25.9718	29.5698	(46)
Water storage loss (or HIU loss):													
Store volume													201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(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)

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FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833 (64)
	Total per year (kWh/year) = Sum(64)m =											2244.6223 (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	66.4722	58.4904	61.4536	52.4638	49.7774	43.6853	42.2940	44.6464	45.8754	52.5486	57.5709	65.5464 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.9362	19.4836	15.8451	11.9958	8.9670	7.5703	8.1800	10.6326	14.2711	18.1205	21.1492	22.5459	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.4036	297.4586	289.7601	273.3710	252.6826	233.2385	220.2486	217.1936	224.8921	241.2812	261.9696	281.4137	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	(71)
Water heating gains (Table 5)	89.3443	87.0393	82.5989	72.8664	66.9051	60.6740	56.8467	60.0086	63.7158	70.6299	79.9596	88.0999	(72)
Total internal gains	501.3164	499.6137	483.8364	453.8654	424.1870	397.1150	380.9076	383.4672	398.5113	425.6639	458.7107	487.6918	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c				Access factor Table 6d			Gains W
North					3.6800	9.3942	0.4000	0.0000				0.7700			10.6478 (74)
South					7.5200	41.2355	0.4000	0.0000				0.7700			95.5081 (78)
Solar gains	106.1559	181.3171	250.6009	306.9806	330.2024	334.2102	314.9500	287.8882	275.0128	208.1891	129.8386			93.4882 (83)	
Total gains	607.4723	680.9308	734.4372	760.8461	754.3894	731.3252	695.8576	671.3553	673.5241	633.8530	588.5493			581.1800 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	73.5941	73.8951	73.8951	74.8130	74.5045	76.3945	76.7189	76.7189	76.3945	75.1240	75.1240	74.8130
alpha	5.9063	5.9263	5.9263	5.9875	5.9670	6.0930	6.1146	6.1146	6.0930	6.0083	6.0083	5.9875
util living area	0.9002	0.8380	0.7439	0.6063	0.4561	0.3016	0.2205	0.2408	0.3887	0.6303	0.8307	0.9150 (86)
MIT	20.6691	20.7964	20.9048	20.9740	20.9956	20.9997	21.0000	21.0000	20.9987	20.9727	20.8395	20.6377 (87)
Th 2	20.4141	20.4164	20.4164	20.4232	20.4209	20.4345	20.4367	20.4367	20.4345	20.4254	20.4254	20.4232 (88)
util rest of house	0.8868	0.8198	0.7200	0.5777	0.4242	0.2695	0.1869	0.2061	0.3541	0.5971	0.8091	0.9032 (89)
MIT 2	20.0432	20.1947	20.3178	20.3985	20.4174	20.4343	20.4367	20.4367	20.4336	20.4005	20.2558	20.0135 (90)
Living area fraction	fLA = Living area / (4) = 0.4014 (91)											
MIT	20.2944	20.4362	20.5534	20.6295	20.6495	20.6613	20.6628	20.6628	20.6605	20.6302	20.4901	20.2641 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.2944	20.4362	20.5534	20.6295	20.6495	20.6613	20.6628	20.6628	20.6605	20.6302	20.4901	20.2641 (93)

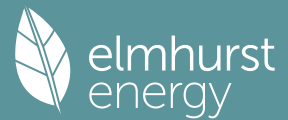
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	536.9398	558.6350	532.9812	447.4279	329.5081	206.5191	139.4285	147.7156	247.8330	386.0542	477.6936	522.8446	(94)
Ext temp.	5.2000	5.8000	7.4000	9.9000	12.9000	15.7000	17.3000	17.1000	14.7000	11.3000	7.9000	5.0000	(96)
Heat loss rate W	652.4420	630.0583	566.2290	456.2187	330.8712	206.5860	139.4345	147.7266	248.1910	395.0749	533.1112	649.0266	(97)
Space heating kWh	85.9336	47.9965	24.7364	6.3294	1.0142	0.0000	0.0000	0.0000	0.0000	6.7114	39.9006	93.8795	(98a)
Space heating requirement - total per year (kWh/year)												306.5015	
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	85.9336	47.9965	24.7364	6.3294	1.0142	0.0000	0.0000	0.0000	0.0000	6.7114	39.9006	93.8795	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												306.5015	
Space heating per m2										(98c) / (4) =		4.3798	(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	85.9336	47.9965	24.7364	6.3294	1.0142	0.0000	0.0000	0.0000	0.0000	6.7114	39.9006	93.8795	(98)

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Space heating efficiency (main heating system 1)	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)	85.9336	47.9965	24.7364	6.3294	1.0142	0.0000	0.0000	0.0000	0.0000	6.7114	39.9006	93.8795 (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	(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	(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	(215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating requirement	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833 (64)
Efficiency of water heater (217)m	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961 (216)
Fuel for water heating, kWh/month	65.8741	58.1465	61.4915	53.3885	51.2950	45.7224	44.7599	46.8142	47.6350	53.7150	57.8484	65.0656 (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	13.5958	12.2801	13.5958	13.1572	13.5958	13.1572	13.5958	13.5958	13.1572	13.5958	13.1572	13.5958 (231)
Lighting	19.2007	15.4035	13.8691	10.1611	7.8487	6.4125	7.1599	9.3067	12.0885	15.8607	17.9147	19.7343 (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												306.5015 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.3961
Water heating fuel used												651.7561 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)												
mechanical ventilation fans (SFP = 0.7500)												160.0793 (230a)
Total electricity for the above, kWh/year												160.0793 (231)
Electricity for lighting (calculated in Appendix L)												154.9604 (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												1273.2972 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	306.5015	28.4300	87.1384 (240)	
Space heating - main system 2	0.0000	28.4300	0.0000 (241)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	651.7561	28.4300	185.2943 (247)	
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)	
Pumps, fans and electric keep-hot	160.0793	28.4300	45.5105 (249)	
Energy for lighting	154.9604	28.4300	44.0552 (250)	
Additional standing charges			0.0000 (251)	
Total energy cost			361.9984 (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	306.5015	0.1591	48.7503 (261)	
Space heating - main system 2	0.0000	0.0000	0.0000 (262)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	651.7561	0.1412	92.0103 (264)	
Space and water heating			140.7607 (265)	
Pumps, fans and electric keep-hot	160.0793	0.1387	22.2050 (267)	
Energy for lighting	154.9604	0.1443	22.3656 (268)	
Total CO2, kg/year			185.3312 (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	306.5015	1.5887	486.9445 (275)	
Space heating - main system 2	0.0000	0.0000	0.0000 (276)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	651.7561	1.5220	991.9858 (278)	
Space and water heating			1478.9302 (279)	
Pumps, fans and electric keep-hot	160.0793	1.5128	242.1679 (281)	
Energy for lighting	154.9604	1.5338	237.6835 (282)	
Total Primary energy kWh/year			1958.7816 (286)	

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SAP 10 EPC IMPROVEMENTS

Plot 19

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

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

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

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

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

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

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

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

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	69.9800 (1b)	x 2.5000 (2b)	= 174.9500 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 174.9500 (5)

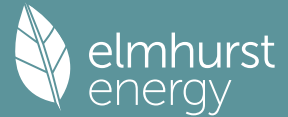
2. Ventilation rate

	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 2.8700 (17)
Infiltration rate 0.1435 (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) = 0.1220 (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	0.1555	0.1525	0.1494	0.1342	0.1311	0.1159	0.1159	0.1128	0.1220	0.1311	0.1372	0.1433 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)

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

Effective ac	0.2955	0.2925	0.2894	0.2742	0.2711	0.2559	0.2559	0.2528	0.2620	0.2711	0.2772	0.2833 (25)
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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window N/E			3.6800	1.3258	4.8788			(27)
Window S/W			7.5200	1.3258	9.9697			(27)
EXT Wall	33.9800	11.2000	22.7800	0.1800	4.1004	110.0000	2505.7999	(29a)
External Roof	21.8900		21.8900	0.1500	3.2835	9.0000	197.0100	(30)
Total net area of external elements Aum(A, m2)			55.8700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		22.2324			(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 Floor 1			69.9800			40.0000	2799.2000	(32d)
Party Ceiling			48.0900			30.0000	1442.7000	(32b)
Internal Wall			107.7800			9.0000	970.0200	(32c)

Heat capacity Cm = Sum(A x k) (28) ... (30) + (32) + (32a) ... (32e) = 11451.7300 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 163.6429 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	17.5600	0.0370	0.6497
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	50.9700	0.0000	0.0000
E2 Other lintels (including other steel lintels)	5.7700	0.0250	0.1442
E3 Sill	2.5000	0.0220	0.0550
E4 Jamb	10.4800	0.0170	0.1782
E16 Corner (normal)	5.3600	0.0420	0.2251
E18 Party wall between dwellings	2.6800	0.0320	0.0858
E25 Staggered party wall between dwellings	8.0400	0.0300	0.2412
E15 Flat roof with parapet	15.1400	0.1320	1.9985
E9 Balcony between dwellings, wall insulation continuous	4.8800	0.1500	0.7320
E24 Eaves (insulation at ceiling level - inverted)	4.8100	0.1500	0.7215
P4 Party wall - Roof (insulation at ceiling level)	7.6900	0.0400	0.3076

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.3388 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 27.5712 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	17.0613	16.8852	16.7092	15.8289	15.6529	14.7726	14.7726	14.5966	15.1247	15.6529	16.0050	16.3571 (38)
Heat transfer coeff	44.6325	44.4564	44.2804	43.4001	43.2241	42.3438	42.3438	42.1678	42.6959	43.2241	43.5762	43.9283 (39)
Average = Sum(39)m / 12 =												43.3561

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6378	0.6353	0.6328	0.6202	0.6177	0.6051	0.6051	0.6026	0.6101	0.6177	0.6227	0.6277 (40)
HLP (average)												0.6195
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

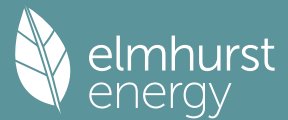
Assumed occupancy												2.2456 (42)
Hot water usage for mixer showers												
61.8716	60.9418	59.5869	56.9945	55.0814	52.9479	51.7352	53.0799	54.5539	56.8446	59.4927	61.6346	(42a)
Hot water usage for baths												
26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397	(42b)
Hot water usage for other uses												
37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276	(42c)
Average daily hot water use (litres/day)												116.0334 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
126.2293	123.5342	120.2520	115.2606	111.2074	106.8498	105.1748	108.4429	111.8896	116.4643	121.5327	125.9019	(44)
Energy conte	199.9163	175.9111	184.8228	157.7860	149.7065	131.3843	127.1999	134.2750	137.9711	158.0410	173.1456	197.1319 (45)
Energy content (annual)												Total = Sum(45)m = 1927.2913
Distribution loss (46)m = 0.15 x (45)m												
29.9874	26.3867	27.7234	23.6679	22.4560	19.7076	19.0800	20.1412	20.6957	23.7062	25.9718	29.5698	(46)
Water storage loss (or HIU loss):												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month												
226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h												
226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833	(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												
66.4722	58.4904	61.4536	52.4638	49.7774	43.6853	42.2940	44.6464	45.8754	52.5486	57.5709	65.5464	(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
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(66)m	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.9362	19.4836	15.8451	11.9958	8.9670	7.5703	8.1800	10.6326	14.2711	18.1205	21.1492	22.5459	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.4036	297.4586	289.7601	273.3710	252.6826	233.2385	220.2486	217.1936	224.8921	241.2812	261.9696	281.4137	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	(71)
Water heating gains (Table 5)	89.3443	87.0393	82.5989	72.8664	66.9051	60.6740	56.8467	60.0086	63.7158	70.6299	79.9596	88.0999	(72)
Total internal gains	501.3164	499.6137	483.8364	453.8654	424.1870	397.1150	380.9076	383.4672	398.5113	425.6639	458.7107	487.6918	(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)	
Solar gains	120.3376	200.3759	265.0420	318.1862	350.7456	346.7050	334.8143	310.1047	283.0399	218.6987	143.2230	103.6158 (83)
Total gains	621.6540	699.9897	748.8783	772.0516	774.9326	743.8200	715.7219	693.5719	681.5512	644.3626	601.9337	591.3077 (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	71.2718	71.5540	71.8385	73.2956	73.5941	75.1240	75.1240	75.4376	74.5045	73.5941	72.9995	72.4143
alpha	5.7515	5.7703	5.7892	5.8864	5.9063	6.0083	6.0083	6.0292	5.9670	5.9063	5.8666	5.8276
util living area	0.9173	0.8616	0.7800	0.6560	0.5135	0.3638	0.2603	0.2796	0.4306	0.6702	0.8570	0.9299 (86)
MIT	20.5766	20.7275	20.8597	20.9546	20.9901	20.9990	20.9999	20.9998	20.9973	20.9570	20.7819	20.5439 (87)
Th 2	20.3961	20.3984	20.4006	20.4119	20.4141	20.4254	20.4254	20.4277	20.4209	20.4141	20.4096	20.4051 (88)
util rest of house	0.9060	0.8455	0.7580	0.6286	0.4825	0.3313	0.2263	0.2448	0.3950	0.6382	0.8380	0.9200 (89)
MIT 2	19.9147	20.0967	20.2519	20.3672	20.4055	20.4247	20.4254	20.4276	20.4189	20.3736	20.1743	19.8829 (90)
Living area fraction	fLA = Living area / (4) = 0.4014 (91)											
MIT	20.1804	20.3499	20.4959	20.6030	20.6402	20.6553	20.6560	20.6573	20.6510	20.6078	20.4182	20.1482 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.1804	20.3499	20.4959	20.6030	20.6402	20.6553	20.6560	20.6573	20.6510	20.6078	20.4182	20.1482 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9016	0.8441	0.7616	0.6376	0.4945	0.3443	0.2399	0.2588	0.4092	0.6489	0.8383	0.9153 (94)
Ext temp.	560.4815	590.8597	570.3544	492.2622	383.2262	256.1232	171.7213	179.4824	278.8895	418.1463	504.6137	541.2477 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	708.7796	686.8469	619.7423	507.9111	386.4321	256.4028	171.7460	179.5209	279.7025	432.5765	580.3539	700.5790 (97)
Space heating requirement - total per year (kWh/year)	110.3338	64.5033	36.7446	11.2673	2.3852	0.0000	0.0000	0.0000	0.0000	10.7361	54.5330	118.5425 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Space heating kWh	110.3338	64.5033	36.7446	11.2673	2.3852	0.0000	0.0000	0.0000	0.0000	10.7361	54.5330	118.5425 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	409.0457											
Space heating per m2	(98c) / (4) = 5.8452 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Fraction of main heating from main system 2	0.0000 (203)											
Fraction of total heating from main system 1	1.0000 (204)											
Fraction of total heating from main system 2	0.0000 (205)											
Efficiency of main space heating system 1 (in %)	100.0000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	110.3338	64.5033	36.7446	11.2673	2.3852	0.0000	0.0000	0.0000	0.0000	10.7361	54.5330	118.5425 (98)
Space heating fuel (main heating system)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating efficiency (main heating system 2)	110.3338	64.5033	36.7446	11.2673	2.3852	0.0000	0.0000	0.0000	0.0000	10.7361	54.5330	118.5425 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833 (64)
Efficiency of water heater	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961 (216)
(217)m	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961 (217)

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Fuel for water heating, kWh/month	65.8741	58.1465	61.4915	53.3885	51.2950	45.7224	44.7599	46.8142	47.6350	53.7150	57.8484	65.0656 (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	13.5958	12.2801	13.5958	13.1572	13.5958	13.1572	13.5958	13.5958	13.1572	13.5958	13.1572	13.5958 (231)
Lighting	19.2007	15.4035	13.8691	10.1611	7.8487	6.4125	7.1599	9.3067	12.0885	15.8607	17.9147	19.7343 (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												409.0457 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.3961
Water heating fuel used												651.7561 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)												
mechanical ventilation fans (SFP = 0.7500)												160.0793 (230a)
Total electricity for the above, kWh/year												160.0793 (231)
Electricity for lighting (calculated in Appendix L)												154.9604 (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												1375.8414 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	409.0457	16.4900	67.4516 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	651.7561	16.4900	107.4746 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	160.0793	16.4900	26.3971 (249)
Energy for lighting	154.9604	16.4900	25.5530 (250)
Additional standing charges			0.0000 (251)
Total energy cost			226.8762 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7103 (257)
SAP value		88.4853
SAP rating (Section 12)		88 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	409.0457	0.1586	64.8699 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	651.7561	0.1412	92.0103 (264)
Space and water heating			156.8803 (265)
Pumps, fans and electric keep-hot	160.0793	0.1387	22.2050 (267)
Energy for lighting	154.9604	0.1443	22.3656 (268)
Total CO2, kg/year			201.4508 (272)
CO2 emissions per m2			2.8800 (273)
EI value			97.6523
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

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Main dwelling		Area (m ²)	Storey height (m)	Volume (m ³)	
Ground floor		69.9800 (1b)	x 2.5000 (2b)	= 174.9500 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800			(4)	
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =		174.9500 (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)
										Air changes per hour	
Infiltration due to chimneys, flues and fans										0.0000 / (5) =	0.0000 (8)
Pressure test										Yes	
Pressure Test Method										Blower Door	
Measured/design AP50										2.8700	(17)
Infiltration rate										0.1435	(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) =	0.1220 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.3000	4.2000	4.2000	3.9000	4.0000	3.4000	3.3000	3.3000	3.4000	3.8000	3.8000	3.9000	(22)
Wind factor	1.0750	1.0500	1.0500	0.9750	1.0000	0.8500	0.8250	0.8250	0.8500	0.9500	0.9500	0.9750	(22a)
Adj infilt rate	0.1311	0.1281	0.1281	0.1189	0.1220	0.1037	0.1006	0.1006	0.1037	0.1159	0.1159	0.1189	(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	0.2711	0.2681	0.2681	0.2589	0.2620	0.2437	0.2406	0.2406	0.2437	0.2559	0.2559	0.2589	(25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K	
Main dwelling								
Window N/E			3.6800	1.3258	4.8788			(27)
Window S/W			7.5200	1.3258	9.9697			(27)
EXT Wall	33.9800	11.2000	22.7800	0.1800	4.1004	110.0000	2505.7999	(29a)
External Roof	21.8900		21.8900	0.1500	3.2835	9.0000	197.0100	(30)
Total net area of external elements Aum(A, m ²)			55.8700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		22.2324			(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 Floor 1			69.9800			40.0000	2799.2000	(32d)
Party Ceiling			48.0900			30.0000	1442.7000	(32b)
Internal Wall			107.7800			9.0000	970.0200	(32c)
Heat capacity Cm = Sum(A x k)						(28) ... (30) + (32) + (32a) ... (32e) =	11451.7300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							163.6429	(35)

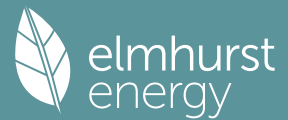
List of Thermal Bridges													
K1 Element						Length	Psi-value	Total					
E7 Party floor between dwellings (in blocks of flats)						17.5600	0.0370	0.6497					
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						50.9700	0.0000	0.0000					
E2 Other lintels (including other steel lintels)						5.7700	0.0250	0.1442					
E3 Sill						2.5000	0.0220	0.0550					
E4 Jamb						10.4800	0.0170	0.1782					
E16 Corner (normal)						5.3600	0.0420	0.2251					
E18 Party wall between dwellings						2.6800	0.0320	0.0858					
E25 Staggered party wall between dwellings						8.0400	0.0300	0.2412					
E15 Flat roof with parapet						15.1400	0.1320	1.9985					
E9 Balcony between dwellings, wall insulation continuous						4.8800	0.1500	0.7320					
E24 Eaves (insulation at ceiling level - inverted)						4.8100	0.1500	0.7215					
P4 Party wall - Roof (insulation at ceiling level)						7.6900	0.0400	0.3076					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												5.3388	(36)
Point Thermal Bridges												0.0000	
Total fabric heat loss												(33) + (36) + (36a) =	27.5712 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	15.6529	15.4768	15.4768	14.9487	15.1247	14.0684	13.8924	13.8924	14.0684	14.7726	14.7726	14.9487	(38)
Average = Sum(39)m / 12 =	43.2241	43.0480	43.0480	42.5199	42.6959	41.6396	41.4636	41.4636	41.6396	42.3438	42.3438	42.5199	(39)
												42.3291	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6177	0.6151	0.6151	0.6076	0.6101	0.5950	0.5925	0.5925	0.5950	0.6051	0.6051	0.6076	(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													2.2456 (42)
Hot water usage for mixer showers													
	61.8716	60.9418	59.5869	56.9945	55.0814	52.9479	51.7352	53.0799	54.5539	56.8446	59.4927	61.6346	(42a)
Hot water usage for baths													
	26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397	(42b)

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Hot water usage for other uses	37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276 (42c)
Average daily hot water use (litres/day)												116.0334 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	126.2293	123.5342	120.2520	115.2606	111.2074	106.8498	105.1748	108.4429	111.8896	116.4643	121.5327	125.9019 (44)
Energy content (annual)	199.9163	175.9111	184.8228	157.7860	149.7065	131.3843	127.1999	134.2750	137.9711	158.0410	173.1456	197.1319 (45)
Distribution loss (46)m = 0.15 x (45)m	29.9874	26.3867	27.7234	23.6679	22.4560	19.7076	19.0800	20.1412	20.6957	23.7062	25.9718	29.5698 (46)
Water storage loss (or HIU loss):												201.0000 (47)
Store volume												1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8694 (55)
Enter (49) or (54) in (55)												
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833 (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	66.4722	58.4904	61.4536	52.4638	49.7774	43.6853	42.2940	44.6464	45.8754	52.5486	57.5709	65.5464 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384	134.7384 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.9362	19.4836	15.8451	11.9958	8.9670	7.5703	8.1800	10.6326	14.2711	18.1205	21.1492	22.5459 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	294.4036	297.4586	289.7601	273.3710	252.6826	233.2385	220.2486	217.1936	224.8921	241.2812	261.9696	281.4137 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195	50.7195 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256 (71)
Water heating gains (Table 5)	89.3443	87.0393	82.5989	72.8664	66.9051	60.6740	56.8467	60.0086	63.7158	70.6299	79.9596	88.0999 (72)
Total internal gains	501.3164	499.6137	483.8364	453.8654	424.1870	397.1150	380.9076	383.4672	398.5113	425.6639	458.7107	487.6918 (73)

6. Solar gains

[Jan]						Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF			Access factor Table 6d			Gains W
North						3.6800	9.3942	0.4000		0.0000			0.7700			10.6478 (74)
South						7.5200	41.2355	0.4000		0.0000			0.7700			95.5081 (78)
Solar gains	106.1559	181.3171	250.6009	306.9806	330.2024	334.2102	314.9500	287.8882	275.0128	208.1891	129.8386					93.4882 (83)
Total gains	607.4723	680.9308	734.4372	760.8461	754.3894	731.3252	695.8576	671.3553	673.5241	633.8530	588.5493	581.1800			(84)	

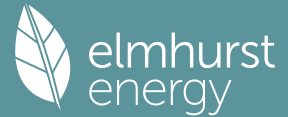
7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	73.5941	73.8951	73.8951	74.8130	74.5045	76.3945	76.7189	76.7189	76.3945	75.1240	75.1240	74.8130
alpha	5.9063	5.9263	5.9263	5.9875	5.9670	6.0930	6.1146	6.1146	6.0930	6.0083	6.0083	5.9875
util living area	0.9002	0.8380	0.7439	0.6063	0.4561	0.3016	0.2205	0.2408	0.3887	0.6303	0.8307	0.9150 (86)
MIT	20.6691	20.7964	20.9048	20.9740	20.9956	20.9997	21.0000	21.0000	20.9987	20.9727	20.8395	20.6377 (87)
Th 2	20.4141	20.4164	20.4164	20.4232	20.4209	20.4345	20.4367	20.4367	20.4345	20.4254	20.4254	20.4232 (88)
util rest of house	0.8868	0.8198	0.7200	0.5777	0.4242	0.2695	0.1869	0.2061	0.3541	0.5971	0.8091	0.9032 (89)
MIT 2	20.0432	20.1947	20.3178	20.3985	20.4174	20.4343	20.4367	20.4367	20.4336	20.4005	20.2558	20.0135 (90)
Living area fraction	20.2944	20.4362	20.5534	20.6295	20.6495	20.6613	20.6628	20.6628	20.6605	20.6302	20.4901	20.2641 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2944	20.4362	20.5534	20.6295	20.6495	20.6613	20.6628	20.6628	20.6605	20.6302	20.4901	20.2641 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8839	0.8204	0.7257	0.5881	0.4368	0.2824	0.2004	0.2200	0.3680	0.6091	0.8116	0.8996 (94)
Ext temp.	536.9398	558.6350	532.9812	447.4279	329.5081	206.5191	139.4285	147.7156	247.8330	386.0542	477.6936	522.8446 (95)
Heat loss rate W	5.2000	5.8000	7.4000	9.9000	12.9000	15.7000	17.3000	17.1000	14.7000	11.3000	7.9000	5.0000 (96)
Space heating kWh	652.4420	630.0583	566.2290	456.2187	330.8712	206.5860	139.4345	147.7266	248.1910	395.0749	533.1112	649.0266 (97)

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Space heating requirement - total per year (kWh/year)	85.9336	47.9965	24.7364	6.3294	1.0142	0.0000	0.0000	0.0000	0.0000	6.7114	39.9006	93.8795 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	306.5015 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	85.9336	47.9965	24.7364	6.3294	1.0142	0.0000	0.0000	0.0000	0.0000	6.7114	39.9006	93.8795 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												306.5015 (98c)
Space heating per m2										(98c) / (4) =		4.3798 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
85.9336	47.9965	24.7364	6.3294	1.0142	0.0000	0.0000	0.0000	0.0000	0.0000	6.7114	39.9006	93.8795 (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)	85.9336	47.9965	24.7364	6.3294	1.0142	0.0000	0.0000	0.0000	0.0000	6.7114	39.9006	93.8795 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	226.8677	200.2543	211.7742	183.8680	176.6579	157.4663	154.1513	161.2264	164.0531	184.9924	199.2276	224.0833 (64)
Efficiency of water heater (217)m	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961	344.3961 (216)
Fuel for water heating, kWh/month	65.8741	58.1465	61.4915	53.3885	51.2950	45.7224	44.7599	46.8142	47.6350	53.7150	57.8484	65.0656 (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	13.5958	12.2801	13.5958	13.1572	13.5958	13.1572	13.5958	13.5958	13.1572	13.5958	13.1572	13.5958 (231)
Lighting	19.2007	15.4035	13.8691	10.1611	7.8487	6.4125	7.1599	9.3067	12.0885	15.8607	17.9147	19.7343 (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												306.5015 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												344.3961
Water heating fuel used												651.7561 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7500)												
mechanical ventilation fans (SFP = 0.7500)												160.0793 (230a)
Total electricity for the above, kWh/year												160.0793 (231)
Electricity for lighting (calculated in Appendix L)												154.9604 (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												1273.2972 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	306.5015	28.4300	87.1384 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	651.7561	28.4300	185.2943 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	160.0793	28.4300	45.5105 (249)
Energy for lighting	154.9604	28.4300	44.0552 (250)
Additional standing charges			0.0000 (251)
Total energy cost			361.9984 (255)

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

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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	306.5015	0.1591	48.7503 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	651.7561	0.1412	92.0103 (264)
Space and water heating			140.7607 (265)
Pumps, fans and electric keep-hot	160.0793	0.1387	22.2050 (267)
Energy for lighting	154.9604	0.1443	22.3656 (268)
Total CO2, kg/year			185.3312 (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	306.5015	1.5887	486.9445 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	651.7561	1.5220	991.9858 (278)
Space and water heating			1478.9302 (279)
Pumps, fans and electric keep-hot	160.0793	1.5128	242.1679 (281)
Energy for lighting	154.9604	1.5338	237.6835 (282)
Total Primary energy kWh/year			1958.7816 (286)