Full SAP Calculation Printout

Property Reference	78449-19	**Issued on Date**	18/08/2025
Assessment Reference	001	**Prop Type Ref**	GF Flat / Mid
Property	12 Shepherd Street, MANCHESTER, M9 4QW		

SAP Rating	86 B	**DER**	4.79	**TER**	16.80
Environmental	97 A	**% DER < TER**			71.49
CO_2 Emissions (t/year)	0.17	**DFEE**	28.20	**TFEE**	40.27
Compliance Check	See BREL	**% DFEE < TFEE**			29.98
% DPER < TPER	43.35	**DPER**	50.40	**TPER**	88.97

Assessor Details	Mr. Daniel Goddard	**Assessor ID**	CP52-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	37.9700	(1b)	x 2.3600	(2b) =	89.6092	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.9700					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	89.6092	(5)

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2. Ventilation rate

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

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.3500	(17)
Infiltration rate		0.1675	(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) =	0.1424	(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	0.1815	0.1780	0.1744	0.1566	0.1531	0.1353	0.1353	0.1317	0.1424	0.1531	0.1602	0.1673	(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) =												80.1000	(23c)
Effective ac	0.2810	0.2775	0.2739	0.2561	0.2526	0.2348	0.2348	0.2312	0.2419	0.2526	0.2597	0.2668	(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								
Door			2.1500	0.7800	1.6770			(26)
Window			5.1900	0.7282	3.7791			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	51.1600	7.3400	43.8200	0.1300	5.6966	9.0000	394.3800	(29a)
Total net area of external elements Aum(A, m2)			89.1300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.5700			(33)
Main dwelling								
Party Wall 1			14.8700	0.0000	0.0000	20.0000	297.4000	(32)
Party Ceiling			37.9700			20.0000	759.4000	(32b)
Timber			50.4000			9.0000	453.6000	(32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			4752.5300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							125.1654	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total

E2 Other lintels (including other steel lintels)	5.7900	0.1150	0.6659	
E3 Sill	5.7900	0.0170	0.0984	
E4 Jamb	12.9000	0.0940	1.2126	
E5 Ground floor (normal)	20.3000	0.0670	1.3601	
E7 Party floor between dwellings (in blocks of flats)	20.3000	0.0320	0.6496	
E16 Corner (normal)	12.6000	0.0680	0.8568	
E17 Corner (inverted - internal area greater than external area)	2.5200	-0.0290	-0.0731	
P1 Party wall - Ground floor	5.9000	0.0560	0.3304	
E18 Party wall between dwellings	2.5200	0.2400	0.6048	
E25 Staggered party wall between dwellings	2.5200	0.0560	0.1411	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.8466 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 20.4166 (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	8.3103	8.2050	8.0998	7.5735	7.4683	6.9420	6.9420	6.8367	7.1525	7.4683	7.6788	7.8893	(38)
Heat transfer coeff	28.7269	28.6217	28.5164	27.9902	27.8849	27.3586	27.3586	27.2534	27.5691	27.8849	28.0954	28.3059	(39)

Average = Sum(39)m / 12 = 27.9638

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7566	0.7538	0.7510	0.7372	0.7344	0.7205	0.7205	0.7178	0.7261	0.7344	0.7399	0.7455	(40)
HLP (average)												0.7365	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3535 (42)

Hot water usage for mixer showers

46.9130	46.2079	45.1806	43.2150	41.7644	40.1467	39.2272	40.2468	41.3644	43.1013	45.1092	46.7332	(42a)

Hot water usage for baths

20.2973	19.9959	19.5714	18.7887	18.2026	17.5528	17.2017	17.6233	18.0822	18.7776	19.5764	20.2287	(42b)

Hot water usage for other uses

28.4911	27.4550	26.4190	25.3830	24.3469	23.3109	23.3109	24.3469	25.3830	26.4190	27.4550	28.4911	(42c)

Average daily hot water use (litres/day) 87.9720 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	95.7014	93.6589	91.1710	87.3866	84.3139	81.0104	79.7399	82.2170	84.8296	88.2979	92.1406	95.4530	(44)
Energy conte	151.5676	133.3690	140.1264	119.6279	113.5028	99.6117	96.4385	101.8018	104.6034	119.8195	131.2712	149.4563	(45)

Energy content (annual) Total = Sum(45)m = 1461.1961

Distribution loss (46)m = 0.15 x (45)m

22.7351	20.0053	21.0190	17.9442	17.0254	14.9418	14.4658	15.2703	15.6905	17.9729	19.6907	22.4185	(46)

Water storage loss:
Store volume 200.0000 (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

178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(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

178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(64)

Total per year (kWh/year) = Sum(64)m = 1778.5271 (64)

12Total per year (kWh/year) 1779 (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

50.3962	44.3452	46.5920	39.7763	37.7397	33.1209	32.0658	33.8491	34.7806	39.8400	43.6477	49.6942	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.2504	72.2415	65.2504	67.4254	65.2504	67.4254	65.2504	65.2504	67.4254	65.2504	67.4254	65.2504	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.4640	117.6725	114.6270	108.1436	99.9594	92.2675	87.1288	85.9203	88.9657	95.4491	103.6333	111.3253	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	(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)	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	(71)
Water heating gains (Table 5)	67.7369	65.9899	62.6237	55.2449	50.7254	46.0012	43.0992	45.4961	48.3064	53.5483	60.6218	66.7933	(72)
Total internal gains	292.7535	299.2062	285.8035	274.1162	259.2375	248.9965	238.7807	239.9691	247.9999	257.5502	274.9828	286.6713	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.6600	10.6334	0.3800	0.0000	0.7700	5.1648	(74)
South	2.8100	46.7521	0.3800	0.0000	0.7700	38.4398	(78)
West	0.7200	19.6403	0.3800	0.0000	0.7700	4.1377	(80)

Solar gains	47.7423	80.9189	110.2947	137.0162	154.5638	154.1328	148.2996	134.9674	119.4394	89.2559	57.0949	40.9238	(83)
Total gains	340.4958	380.1251	396.0981	411.1324	413.8013	403.1293	387.0802	374.9364	367.4393	346.8061	332.0777	327.5951	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	45.9550	46.1240	46.2943	47.1647	47.3427	48.2534	48.2534	48.4398	47.8850	47.3427	46.9880	46.6386	
alpha	4.0637	4.0749	4.0863	4.1443	4.1562	4.2169	4.2169	4.2293	4.1923	4.1562	4.1325	4.1092	
util living area	0.9125	0.8718	0.8203	0.7208	0.5898	0.4269	0.3094	0.3322	0.5014	0.7281	0.8644	0.9210	(86)
MIT	20.1057	20.3147	20.5304	20.7744	20.9187	20.9840	20.9968	20.9956	20.9679	20.8001	20.4494	20.0767	(87)
Th 2	20.2911	20.2936	20.2960	20.3081	20.3106	20.3227	20.3227	20.3252	20.3179	20.3106	20.3057	20.3008	(88)
util rest of house	0.9018	0.8574	0.8006	0.6930	0.5533	0.3839	0.2624	0.2843	0.4561	0.6959	0.8471	0.9111	(89)
MIT 2	19.2570	19.5142	19.7771	20.0731	20.2342	20.3104	20.3209	20.3226	20.2917	20.1091	19.6930	19.2291	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	19.6620	19.8962	20.1366	20.4078	20.5608	20.6319	20.6434	20.6438	20.6144	20.4389	20.0540	19.6336	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6620	19.8962	20.1366	20.4078	20.5608	20.6319	20.6434	20.6438	20.6144	20.4389	20.0540	19.6336	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8911	0.8485	0.7959	0.6972	0.5668	0.4037	0.2847	0.3070	0.4760	0.7021	0.8402	0.9005	(94)
Useful gains	303.4057	322.5237	315.2637	286.6253	234.5288	162.7478	110.2203	115.1027	174.9161	243.4972	279.0101	294.9977	(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	441.3039	429.2165	388.8677	322.1047	247.0832	165.0244	110.6226	115.6568	179.5962	274.3564	363.9472	436.8622	(97)
Space heating kWh	102.5963	71.6976	54.7614	25.5451	9.3404	0.0000	0.0000	0.0000	0.0000	22.9592	61.1547	105.5472	(98a)
Space heating requirement - total per year (kWh/year)												453.6019	
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	102.5963	71.6976	54.7614	25.5451	9.3404	0.0000	0.0000	0.0000	0.0000	22.9592	61.1547	105.5472	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												453.6019	
Space heating per m2											(98c) / (4) =	11.9463	(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	102.5963	71.6976	54.7614	25.5451	9.3404	0.0000	0.0000	0.0000	0.0000	22.9592	61.1547	105.5472	(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)	102.5963	71.6976	54.7614	25.5451	9.3404	0.0000	0.0000	0.0000	0.0000	22.9592	61.1547	105.5472	(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	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(64)
Efficiency of water heater												324.5200	(216)
(217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(217)
Fuel for water heating, kWh/month	55.0102	48.5986	51.4846	44.9001	43.2806	38.7322	38.0223	39.6750	40.2704	45.2271	48.4880	54.3596	(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	11.3091	10.2147	11.3091	10.9443	11.3091	10.9443	11.3091	11.3091	10.9443	11.3091	10.9443	11.3091	(231)
Lighting	13.0684	10.4840	9.4397	6.9159	5.3420	4.3645	4.8732	6.3343	8.2277	10.7952	12.1931	13.4316	(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												453.6019	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												324.5200	
Water heating fuel used												548.0485	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2180)		
mechanical ventilation fans (SFP = 1.2180)	133.1557	(230a)
Total electricity for the above, kWh/year	133.1557	(231)
Electricity for lighting (calculated in Appendix L)	105.4696	(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	1240.2758	(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	453.6019	0.1566	71.0202	(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)	548.0485	0.1411	77.3114	(264)
Space and water heating			148.3316	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	105.4696	0.1443	15.2225	(268)
Total CO2, kg/year			182.0245	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.7900	(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	453.6019	1.5796	716.5200	(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)	548.0485	1.5216	833.9227	(278)
Space and water heating			1550.4427	(279)
Pumps, fans and electric keep-hot	133.1557	1.5128	201.4379	(281)
Energy for lighting	105.4696	1.5338	161.7728	(282)
Total Primary energy kWh/year			1913.6535	(286)
Dwelling Primary energy Rate (DPER)			50.4000	(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						
Ground floor	37.9700	(1b)	x 2.3600	(2b) =	89.6092	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.9700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	89.6092	(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) =	0.2232	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4732	(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) =	0.4022	(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	0.5128	0.5028	0.4927	0.4424	0.4324	0.3821	0.3821	0.3720	0.4022	0.4324	0.4525	0.4726	(22b)
Effective ac	0.6315	0.6264	0.6214	0.5979	0.5935	0.5730	0.5730	0.5692	0.5809	0.5935	0.6024	0.6117	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1500	1.0000	2.1500			(26)
TER Opening Type			5.1900	1.1450	5.9427			(27)
GF			37.9700	0.1300	4.9361			(28a)
Main	51.1600	7.3400	43.8200	0.1800	7.8876			(29a)
Total net area of external elements Aum(A, m2)			89.1300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.9164			(33)
Main dwelling								
Party Wall 1			14.8700	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 135.1654 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	5.7900	0.0500	0.2895	
E3 Sill	5.7900	0.0500	0.2895	
E4 Jamb	12.9000	0.0500	0.6450	
E5 Ground floor (normal)	20.3000	0.1600	3.2480	
E7 Party floor between dwellings (in blocks of flats)	20.3000	0.0700	1.4210	
E16 Corner (normal)	12.6000	0.0900	1.1340	
E17 Corner (inverted - internal area greater than external area)	2.5200	-0.0900	-0.2268	
P1 Party wall - Ground floor	5.9000	0.0800	0.4720	
E18 Party wall between dwellings	2.5200	0.0600	0.1512	
E25 Staggered party wall between dwellings	2.5200	0.0600	0.1512	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.5746 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 28.4910 (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	18.6739	18.5229	18.3749	17.6798	17.5497	16.9442	16.9442	16.8321	17.1774	17.5497	17.8128	18.0879	(38)
Heat transfer coeff	47.1649	47.0140	46.8660	46.1708	46.0407	45.4353	45.4353	45.3232	45.6685	46.0407	46.3038	46.5789	(39)

Average = Sum(39)m / 12 = 46.1702

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2422	1.2382	1.2343	1.2160	1.2126	1.1966	1.1966	1.1937	1.2028	1.2126	1.2195	1.2267	(40)
HLP (average)												1.2160	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3535 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	46.9130	46.2079	45.1806	43.2150	41.7644	40.1467	39.2272	40.2468	41.3644	43.1013	45.1092	46.7332	(42a)
Hot water usage for baths	20.2973	19.9959	19.5714	18.7887	18.2026	17.5528	17.2017	17.6233	18.0822	18.7776	19.5764	20.2287	(42b)
Hot water usage for other uses	28.4911	27.4550	26.4190	25.3830	24.3469	23.3109	23.3109	24.3469	25.3830	26.4190	27.4550	28.4911	(42c)

Average daily hot water use (litres/day) 87.9720 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	95.7014	93.6589	91.1710	87.3866	84.3139	81.0104	79.7399	82.2170	84.8296	88.2979	92.1406	95.4530	(44)
Energy conte	151.5676	133.3690	140.1264	119.6279	113.5028	99.6117	96.4385	101.8018	104.6034	119.8195	131.2712	149.4563	(45)
Energy content (annual)										Total = Sum(45)m =		1461.1961	
Distribution loss (46)m = 0.15 x (45)m	22.7351	20.0053	21.0190	17.9442	17.0254	14.9418	14.4658	15.2703	15.6905	17.9729	19.6907	22.4185	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	198.1625	175.4547	186.7213	164.7198	160.0977	144.7035	143.0334	148.3967	149.6953	166.4144	176.3631	196.0513	(62)
WWHRS	-21.4466	-18.9676	-19.8618	-16.4463	-15.3274	-13.1158	-12.2939	-13.0734	-13.5701	-15.9976	-18.1233	-21.0495	(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	176.7158	156.4871	166.8596	148.2735	144.7703	131.5878	130.7394	135.3234	136.1252	150.4168	158.2397	175.0018	(64)
									Total per year (kWh/year) = Sum(64)m =			1810.5403	(64)
12Total per year (kWh/year)												1811	(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	87.6721	78.0138	83.8680	75.8498	75.0156	69.1944	69.3417	71.1250	70.8541	77.1159	79.7212	86.9702	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	63.3507	70.1383	63.3507	65.4624	63.3507	65.4624	63.3507	63.3507	65.4624	63.3507	65.4624	63.3507	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.4640	117.6725	114.6270	108.1436	99.9594	92.2675	87.1288	85.9203	88.9657	95.4491	103.6333	111.3253	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	(71)
Water heating gains (Table 5)													

	117.8389	116.0919	112.7258	105.3469	100.8274	96.1033	93.2012	95.5981	98.4085	103.6504	110.7238	116.8954	(72)
Total internal gains													
	343.9559	350.2050	337.0058	325.2552	310.4399	297.1355	286.9830	288.1714	296.1389	308.7526	326.1219	337.8737	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.6600	10.6334	0.6300	0.7000	0.7700	5.3945	(74)
South	2.8100	46.7521	0.6300	0.7000	0.7700	40.1494	(78)
West	0.7200	19.6403	0.6300	0.7000	0.7700	4.3217	(80)

Solar gains	49.8656	84.5176	115.1999	143.1098	161.4378	160.9877	154.8950	140.9699	124.7513	93.2255	59.6342	42.7438	(83)
Total gains	393.8215	434.7226	452.2057	468.3650	471.8777	458.1232	441.8780	429.1413	420.8903	401.9781	385.7560	380.6175	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.2263	30.3233	30.4191	30.8771	30.9643	31.3769	31.3769	31.4545	31.2167	30.9643	30.7884	30.6065	
alpha	3.0151	3.0216	3.0279	3.0585	3.0643	3.0918	3.0918	3.0970	3.0811	3.0643	3.0526	3.0404	
util living area													
	0.9341	0.9107	0.8791	0.8155	0.7162	0.5674	0.4302	0.4577	0.6374	0.8155	0.9040	0.9393	(86)
MIT	19.1869	19.4390	19.7792	20.2312	20.6071	20.8650	20.9571	20.9471	20.7955	20.3423	19.7182	19.1564	(87)
Th 2	19.8864	19.8896	19.8927	19.9072	19.9100	19.9227	19.9227	19.9251	19.9178	19.9100	19.9044	19.8987	(88)
util rest of house													
	0.9230	0.8961	0.8587	0.7835	0.6651	0.4906	0.3334	0.3611	0.5647	0.7776	0.8859	0.9291	(89)
MIT 2	17.8268	18.1410	18.5632	19.1185	19.5515	19.8268	19.9023	19.8982	19.7607	19.2614	18.5037	17.7969	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	18.4758	18.7604	19.1435	19.6495	20.0552	20.3222	20.4057	20.3987	20.2545	19.7772	19.0833	18.4457	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4758	18.7604	19.1435	19.6495	20.0552	20.3222	20.4057	20.3987	20.2545	19.7772	19.0833	18.4457	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9054	0.8781	0.8425	0.7750	0.6724	0.5203	0.3779	0.4049	0.5886	0.7724	0.8697	0.9120	(94)
Useful gains	356.5588	381.7240	380.9846	362.9783	317.3029	238.3496	166.9984	173.7631	247.7437	310.4937	335.4738	347.1228	(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													
	668.6026	651.6334	592.5504	496.3152	384.6815	259.9918	172.9116	181.2354	281.0678	422.5264	554.8722	663.5482	(97)
Space heating kWh													
	232.1605	181.3791	157.4050	96.0026	50.1297	0.0000	0.0000	0.0000	0.0000	83.3524	157.9669	235.4205	(98a)
Space heating requirement - total per year (kWh/year)												1193.8166	
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													
	232.1605	181.3791	157.4050	96.0026	50.1297	0.0000	0.0000	0.0000	0.0000	83.3524	157.9669	235.4205	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1193.8166	
Space heating per m2											(98c) / (4) =	31.4410	(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													
	232.1605	181.3791	157.4050	96.0026	50.1297	0.0000	0.0000	0.0000	0.0000	83.3524	157.9669	235.4205	(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)													
	251.5282	196.5104	170.5362	104.0115	54.3117	0.0000	0.0000	0.0000	0.0000	90.3059	171.1451	255.0601	(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													
	176.7158	156.4871	166.8596	148.2735	144.7703	131.5878	130.7394	135.3234	136.1252	150.4168	158.2397	175.0018	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6727	84.3917	83.9292	83.1105	81.9359	79.8000	79.8000	79.8000	79.8000	82.7919	84.0559	84.7256	(217)
Fuel for water heating, kWh/month													
	208.7046	185.4296	198.8100	178.4053	176.6872	164.8970	163.8339	169.5781	170.5829	181.6805	188.2553	206.5513	(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	13.1630	10.5599	9.5080	6.9660	5.3807	4.3961	4.9085	6.3802	8.2873	10.8733	12.2814	13.5289	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-18.3785	-26.2319	-38.1925	-43.5580	-47.5578	-44.6790	-44.2052	-41.4865	-36.7116	-30.3542	-20.3486	-15.8581	(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	-9.4192	-19.9215	-39.7673	-59.9488	-79.4394	-79.8120	-78.7965	-66.5719	-48.6560	-28.4742	-12.5781	-7.4342 (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	1293.4091	(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	2193.4158	(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)	106.2331	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-938.3812	(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	2740.6768	(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	1293.4091	0.2100	271.6159	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2193.4158	0.2100	460.6173	(264)
Space and water heating			732.2332	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	106.2331	0.1443	15.3327	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.5620	0.1343	-54.7219	
PV Unit electricity exported	-530.8192	0.1258	-66.7828	
Total			-121.5047	(269)
Total CO2, kg/year			637.9905	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.8000	(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	1293.4091	1.1300	1461.5523	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2193.4158	1.1300	2478.5598	(278)
Space and water heating			3940.1121	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	106.2331	1.5338	162.9439	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.5620	1.4962	-609.7976	
PV Unit electricity exported	-530.8192	0.4618	-245.1377	
Total			-854.9353	(283)
Total Primary energy kWh/year			3378.2216	(286)
Target Primary Energy Rate (TPER)			88.9700	(287)

Full SAP Calculation Printout

Property Reference	78449-19	**Issued on Date**	18/08/2025
Assessment Reference	001	**Prop Type Ref**	GF Flat / Mid
Property	12 Shepherd Street, MANCHESTER, M9 4QW		

SAP Rating	86 B	**DER**	4.79	**TER**	16.80
Environmental	97 A	**% DER < TER**			71.49
CO_2 Emissions (t/year)	0.17	**DFEE**	28.20	**TFEE**	40.27
Compliance Check	See BREL	**% DFEE < TFEE**			29.98
% DPER < TPER	43.35	**DPER**	50.40	**TPER**	88.97

Assessor Details	Mr. Daniel Goddard	**Assessor ID**	CP52-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	37.9700	(1b)	x 2.3600	(2b) =	89.6092	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.9700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		89.6092	(5)

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2. Ventilation rate

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	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) =	0.2232 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.3500 (17)
Infiltration rate		0.3907 (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) =	0.3321 (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	0.4234	0.4151	0.4068	0.3653	0.3570	0.3155	0.3155	0.3072	0.3321	0.3570	0.3736	0.3902	(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	0.5896	0.5862	0.5827	0.5667	0.5637	0.5498	0.5498	0.5472	0.5551	0.5637	0.5698	0.5761	(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								
Door			2.1500	0.7800	1.6770			(26)
Window			5.1900	0.7282	3.7791			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	51.1600	7.3400	43.8200	0.1300	5.6966	9.0000	394.3800	(29a)
Total net area of external elements Aum(A, m2)			89.1300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.5700			(33)
Main dwelling								
Party Wall 1			14.8700	0.0000	0.0000	20.0000	297.4000	(32)
Party Ceiling			37.9700			30.0000	1139.1000	(32b)
Timber			50.4000			9.0000	453.6000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5132.2300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		135.1654 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.7900	0.1150	0.6659
E3 Sill	5.7900	0.0170	0.0984
E4 Jamb	12.9000	0.0940	1.2126

E5 Ground floor (normal)	20.3000	0.0670	1.3601	
E7 Party floor between dwellings (in blocks of flats)	20.3000	0.0320	0.6496	
E16 Corner (normal)	12.6000	0.0680	0.8568	
E17 Corner (inverted - internal area greater than external area)	2.5200	-0.0290	-0.0731	
P1 Party wall - Ground floor	5.9000	0.0560	0.3304	
E18 Party wall between dwellings	2.5200	0.2400	0.6048	
E25 Staggered party wall between dwellings	2.5200	0.0560	0.1411	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.8466 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 20.4166 (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	17.4362	17.3333	17.2324	16.7585	16.6699	16.2571	16.2571	16.1807	16.4161	16.6699	16.8492	17.0367	(38)
Heat transfer coeff	37.8529	37.7499	37.6491	37.1752	37.0865	36.6738	36.6738	36.5973	36.8327	37.0865	37.2659	37.4534	(39)
Average = Sum(39)m / 12 =												37.1747	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9969	0.9942	0.9915	0.9791	0.9767	0.9659	0.9659	0.9638	0.9700	0.9767	0.9815	0.9864	(40)
HLP (average)												0.9791	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3535 (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

20.2973	19.9959	19.5714	18.7887	18.2026	17.5528	17.2017	17.6233	18.0822	18.7776	19.5764	20.2287	(42b)

Hot water usage for other uses

28.4911	27.4550	26.4190	25.3830	24.3469	23.3109	23.3109	24.3469	25.3830	26.4190	27.4550	28.4911	(42c)

Average daily hot water use (litres/day) 44.7198 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	48.7884	47.4509	45.9904	44.1717	42.5496	40.8637	40.5126	41.9702	43.4652	45.1966	47.0315	48.7198	(44)
Energy conte	77.2689	67.5695	70.6855	60.4688	57.2799	50.2466	48.9965	51.9679	53.5969	61.3314	67.0049	76.2834	(45)
Energy content (annual)										Total = Sum(45)m =		742.7004	
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:													
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	65.6786	57.4341	60.0827	51.3985	48.6879	42.7096	41.6470	44.1727	45.5574	52.1317	56.9542	64.8409	(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	65.6786	57.4341	60.0827	51.3985	48.6879	42.7096	41.6470	44.1727	45.5574	52.1317	56.9542	64.8409	(64)
									Total per year (kWh/year) = Sum(64)m =			631.2953	(64)
12Total per year (kWh/year)												631	(64)
Electric shower(s)	37.5695	33.4747	36.5531	34.8822	35.5367	33.8986	35.0285	35.5367	34.8822	36.5531	35.8657	37.5695	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							427.3504	(64a)
Heat gains from water heating, kWh/month	25.8120	22.7272	24.1589	21.5702	21.0562	19.1521	19.1689	19.9274	20.1099	22.1712	23.2050	25.6026	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.2504	72.2415	65.2504	67.4254	65.2504	67.4254	65.2504	65.2504	67.4254	65.2504	67.4254	65.2504	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.4640	117.6725	114.6270	108.1436	99.9594	92.2675	87.1288	85.9203	88.9657	95.4491	103.6333	111.3253	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	(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)	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	(71)
Water heating gains (Table 5)	34.6936	33.8202	32.4717	29.9586	28.3013	26.6001	25.7646	26.7841	27.9304	29.8000	32.2292	34.4121	(72)
Total internal gains	259.7102	267.0365	255.6514	248.8299	236.8134	229.5953	221.4461	221.2570	227.6238	233.8018	246.5902	254.2901	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.6600	10.6334	0.3800	0.0000	0.7700	5.1648	(74)
South	2.8100	46.7521	0.3800	0.0000	0.7700	38.4398	(78)
West	0.7200	19.6403	0.3800	0.0000	0.7700	4.1377	(80)

Solar gains	47.7423	80.9189	110.2947	137.0162	154.5638	154.1328	148.2996	134.9674	119.4394	89.2559	57.0949	40.9238	(83)
Total gains	307.4525	347.9554	365.9461	385.8461	391.3772	383.7281	369.7457	356.2244	347.0633	323.0578	303.6851	295.2139	(84)

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7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	37.6621	37.7648	37.8660	38.3487	38.4404	38.8730	38.8730	38.9542	38.7052	38.4404	38.2554	38.0638	
alpha	3.5108	3.5177	3.5244	3.5566	3.5627	3.5915	3.5915	3.5969	3.5803	3.5627	3.5504	3.5376	
util living area	0.9575	0.9346	0.9037	0.8361	0.7291	0.5663	0.4236	0.4552	0.6477	0.8442	0.9319	0.9623	(86)
MIT	19.4341	19.6890	20.0008	20.4071	20.7222	20.9185	20.9778	20.9710	20.8629	20.4731	19.9055	19.3949	(87)
Th 2	20.0859	20.0882	20.0904	20.1008	20.1028	20.1119	20.1119	20.1136	20.1084	20.1028	20.0988	20.0947	(88)
util rest of house	0.9504	0.9242	0.8880	0.8093	0.6848	0.5005	0.3431	0.3741	0.5848	0.8135	0.9193	0.9560	(89)
MIT 2	18.6704	18.9201	19.2235	19.6154	19.8993	20.0646	20.1029	20.1011	20.0226	19.6847	19.1429	18.6387	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	19.0349	19.2870	19.5944	19.9932	20.2920	20.4721	20.5204	20.5163	20.4236	20.0610	19.5068	18.9996	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0349	19.2870	19.5944	19.9932	20.2920	20.4721	20.5204	20.5163	20.4236	20.0610	19.5068	18.9996	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9405	0.9134	0.8782	0.8057	0.6947	0.5279	0.3808	0.4116	0.6080	0.8119	0.9095	0.9466	(94)
Useful gains	289.1587	317.8109	321.3826	310.8904	271.8742	202.5838	140.7835	146.6339	211.0228	262.2841	276.1920	279.4530	(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	557.7581	543.1092	492.9930	412.3934	318.6477	215.3519	143.7776	150.6440	232.9160	350.8747	462.3511	554.2948	(97)
Space heating kWh	199.8380	151.4004	127.6781	73.0822	34.7995	0.0000	0.0000	0.0000	0.0000	65.9114	134.0346	204.4823	(98a)
Space heating requirement - total per year (kWh/year)												991.2264	
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	199.8380	151.4004	127.6781	73.0822	34.7995	0.0000	0.0000	0.0000	0.0000	65.9114	134.0346	204.4823	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												991.2264	
Space heating per m2											(98c) / (4) =	26.1055	(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	344.7334	271.3858	278.1397	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8534	0.9079	0.8937	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	294.1901	246.3850	248.5667	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	421.7214	406.8579	392.3402	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	91.8225	119.3919	106.9675	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	22.9556	29.8480	26.7419	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												79.5455	(107)
Energy for space heating												26.1055	(99)
Energy for space cooling												2.0950	(108)
Total												28.2005	(109)
Fabric Energy Efficiency (DFEE)												28.2	(109)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	37.9700	(1b)	x 2.3600	(2b) =	89.6092	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.9700					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	89.6092	(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) =	0.2232	(8)
Pressure test		Yes	

Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4732	(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) =	0.4022	(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	0.5128	0.5028	0.4927	0.4424	0.4324	0.3821	0.3821	0.3720	0.4022	0.4324	0.4525	0.4726	(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	0.6315	0.6264	0.6214	0.5979	0.5935	0.5730	0.5730	0.5692	0.5809	0.5935	0.6024	0.6117	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1500	1.0000	2.1500			(26)
TER Opening Type			5.1900	1.1450	5.9427			(27)
GF			37.9700	0.1300	4.9361			(28a)
Main	51.1600	7.3400	43.8200	0.1800	7.8876			(29a)
Total net area of external elements Aum(A, m2)			89.1300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.9164			(33)
Main dwelling								
Party Wall 1			14.8700	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							135.1654	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.7900	0.0500	0.2895
E3 Sill	5.7900	0.0500	0.2895
E4 Jamb	12.9000	0.0500	0.6450
E5 Ground floor (normal)	20.3000	0.1600	3.2480
E7 Party floor between dwellings (in blocks of flats)	20.3000	0.0700	1.4210
E16 Corner (normal)	12.6000	0.0900	1.1340
E17 Corner (inverted - internal area greater than external area)	2.5200	-0.0900	-0.2268
P1 Party wall - Ground floor	5.9000	0.0800	0.4720
E18 Party wall between dwellings	2.5200	0.0600	0.1512
E25 Staggered party wall between dwellings	2.5200	0.0600	0.1512

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	7.5746	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	28.4910	(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	18.6739	18.5229	18.3749	17.6798	17.5497	16.9442	16.9442	16.8321	17.1774	17.5497	17.8128	18.0879	(38)
Heat transfer coeff	47.1649	47.0140	46.8660	46.1708	46.0407	45.4353	45.4353	45.3232	45.6685	46.0407	46.3038	46.5789	(39)
Average = Sum(39)m / 12 =												46.1702	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2422	1.2382	1.2343	1.2160	1.2126	1.1966	1.1966	1.1937	1.2028	1.2126	1.2195	1.2267	(40)
HLP (average)												1.2160	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.3535	(42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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

20.2973	19.9959	19.5714	18.7887	18.2026	17.5528	17.2017	17.6233	18.0822	18.7776	19.5764	20.2287	(42b)

Hot water usage for other uses

28.4911	27.4550	26.4190	25.3830	24.3469	23.3109	23.3109	24.3469	25.3830	26.4190	27.4550	28.4911	(42c)

Average daily hot water use (litres/day)	44.7198	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	48.7884	47.4509	45.9904	44.1717	42.5496	40.8637	40.5126	41.9702	43.4652	45.1966	47.0315	48.7198	(44)
Energy conte	77.2689	67.5695	70.6855	60.4688	57.2799	50.2466	48.9965	51.9679	53.5969	61.3314	67.0049	76.2834	(45)
Energy content (annual)										Total = Sum(45)m =		742.7004	

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:

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

65.6786	57.4341	60.0827	51.3985	48.6879	42.7096	41.6470	44.1727	45.5574	52.1317	56.9542	64.8409	(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

65.6786	57.4341	60.0827	51.3985	48.6879	42.7096	41.6470	44.1727	45.5574	52.1317	56.9542	64.8409	(64)

Total per year (kWh/year) = Sum(64)m =	631.2953	(64)
12Total per year (kWh/year)	631	(64)

Electric shower(s)

37.5695	33.4747	36.5531	34.8822	35.5367	33.8986	35.0285	35.5367	34.8822	36.5531	35.8657	37.5695	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	427.3504	(64a)

Heat gains from water heating, kWh/month

25.8120	22.7272	24.1589	21.5702	21.0562	19.1521	19.1689	19.9274	20.1099	22.1712	23.2050	25.6026	(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	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	63.3507	70.1383	63.3507	65.4624	63.3507	65.4624	63.3507	63.3507	65.4624	63.3507	65.4624	63.3507	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	116.4640	117.6725	114.6270	108.1436	99.9594	92.2675	87.1288	85.9203	88.9657	95.4491	103.6333	111.3253	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	(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)													
	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	(71)
Water heating gains (Table 5)													
	34.6936	33.8202	32.4717	29.9586	28.3013	26.6001	25.7646	26.7841	27.9304	29.8000	32.2292	34.4121	(72)
Total internal gains													
	257.8106	264.9333	253.7518	246.8669	234.9138	227.6323	219.5465	219.3574	225.6608	231.9022	244.6272	252.3904	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.6600	10.6334	0.6300	0.7000	0.7700	5.3945	(74)
South	2.8100	46.7521	0.6300	0.7000	0.7700	40.1494	(78)
West	0.7200	19.6403	0.6300	0.7000	0.7700	4.3217	(80)

Solar gains	49.8656	84.5176	115.1999	143.1098	161.4378	160.9877	154.8950	140.9699	124.7513	93.2255	59.6342	42.7438	(83)
Total gains	307.6761	349.4510	368.9517	389.9767	396.3516	388.6200	374.4414	360.3272	350.4122	325.1276	304.2613	295.1342	(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, ni1,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.2263	30.3233	30.4191	30.8771	30.9643	31.3769	31.3769	31.4545	31.2167	30.9643	30.7884	30.6065	
alpha	3.0151	3.0216	3.0279	3.0585	3.0643	3.0918	3.0918	3.0970	3.0811	3.0643	3.0526	3.0404	
util living area	0.9633	0.9455	0.9214	0.8690	0.7823	0.6377	0.4952	0.5285	0.7135	0.8763	0.9437	0.9672	(86)
MIT	18.8782	19.1557	19.5300	20.0437	20.4855	20.8120	20.9366	20.9209	20.7158	20.1556	19.4506	18.8439	(87)
Th 2	19.8864	19.8896	19.8927	19.9072	19.9100	19.9227	19.9227	19.9251	19.9178	19.9100	19.9044	19.8987	(88)
util rest of house	0.9566	0.9356	0.9065	0.8428	0.7358	0.5590	0.3883	0.4228	0.6428	0.8466	0.9319	0.9612	(89)
MIT 2	17.9826	18.2562	18.6235	19.1262	19.5339	19.8151	19.8984	19.8925	19.7411	19.2420	18.5598	17.9574	(90)
Living area fraction									fLA = Living area / (4) =			0.4772	(91)
MIT	18.4100	18.6855	19.0561	19.5640	19.9880	20.2908	20.3938	20.3833	20.2063	19.6779	18.9849	18.3804	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4100	18.6855	19.0561	19.5640	19.9880	20.2908	20.3938	20.3833	20.2063	19.6779	18.9849	18.3804	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9450	0.9222	0.8929	0.8334	0.7395	0.5875	0.4368	0.4698	0.6632	0.8392	0.9195	0.9503	(94)
Useful gains	290.7534	322.2763	329.4441	325.0024	293.0868	228.3006	163.5529	169.2771	232.3967	272.8403	279.7552	280.4705	(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	665.4969	648.1092	588.4536	492.3676	381.5869	258.5634	172.3729	180.5365	278.8637	417.9552	550.3172	660.5093	(97)
Space heating kWh	278.8092	218.9597	192.7030	120.5030	65.8441	0.0000	0.0000	0.0000	0.0000	107.9655	194.8047	282.7489	(98a)
Space heating requirement - total per year (kWh/year)												1462.3380	
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	278.8092	218.9597	192.7030	120.5030	65.8441	0.0000	0.0000	0.0000	0.0000	107.9655	194.8047	282.7489	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1462.3380	
Space heating per m2											(98c) / (4) =	38.5130	(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	427.0916	336.2211	344.4560	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7578	0.8281	0.8084	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	323.6448	278.4109	278.4730	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	429.5673	414.3872	399.1226	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	76.2642	101.1664	89.7633	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	19.0661	25.2916	22.4408	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												66.7985	(107)
Energy for space heating												38.5130	(99)
Energy for space cooling												1.7592	(108)
Total												40.2722	(109)
Fabric Energy Efficiency (TFEE)												40.3	(109)

Full SAP Calculation Printout

Property Reference	78449-19	**Issued on Date**	18/08/2025
Assessment Reference	001	**Prop Type Ref**	GF Flat / Mid
Property	12 Shepherd Street, MANCHESTER, M9 4QW		

SAP Rating	86 B	**DER**	4.79	**TER**	16.80
Environmental	97 A	**% DER < TER**			71.49
CO_2 Emissions (t/year)	0.17	**DFEE**	28.20	**TFEE**	40.27
Compliance Check	See BREL	**% DFEE < TFEE**			29.98
% DPER < TPER	43.35	**DPER**	50.40	**TPER**	88.97

Assessor Details	Mr. Daniel Goddard	**Assessor ID**	CP52-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	37.9700	(1b)	x 2.3600	(2b) =	89.6092	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.9700					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	89.6092	(5)

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2. Ventilation rate

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

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.3500	(17)
Infiltration rate		0.1675	(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) =	0.1424	(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	0.1815	0.1780	0.1744	0.1566	0.1531	0.1353	0.1353	0.1317	0.1424	0.1531	0.1602	0.1673	(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) =												80.1000	(23c)
Effective ac	0.2810	0.2775	0.2739	0.2561	0.2526	0.2348	0.2348	0.2312	0.2419	0.2526	0.2597	0.2668	(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								
Door			2.1500	0.7800	1.6770			(26)
Window			5.1900	0.7282	3.7791			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	51.1600	7.3400	43.8200	0.1300	5.6966	9.0000	394.3800	(29a)
Total net area of external elements Aum(A, m2)			89.1300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.5700			(33)
Main dwelling								
Party Wall 1			14.8700	0.0000	0.0000	20.0000	297.4000	(32)
Party Ceiling			37.9700			20.0000	759.4000	(32b)
Timber			50.4000			9.0000	453.6000	(32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			4752.5300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							125.1654	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total

E2 Other lintels (including other steel lintels)	5.7900	0.1150	0.6659	
E3 Sill	5.7900	0.0170	0.0984	
E4 Jamb	12.9000	0.0940	1.2126	
E5 Ground floor (normal)	20.3000	0.0670	1.3601	
E7 Party floor between dwellings (in blocks of flats)	20.3000	0.0320	0.6496	
E16 Corner (normal)	12.6000	0.0680	0.8568	
E17 Corner (inverted - internal area greater than external area)	2.5200	-0.0290	-0.0731	
P1 Party wall - Ground floor	5.9000	0.0560	0.3304	
E18 Party wall between dwellings	2.5200	0.2400	0.6048	
E25 Staggered party wall between dwellings	2.5200	0.0560	0.1411	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.8466 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 20.4166 (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	8.3103	8.2050	8.0998	7.5735	7.4683	6.9420	6.9420	6.8367	7.1525	7.4683	7.6788	7.8893	(38)
Heat transfer coeff	28.7269	28.6217	28.5164	27.9902	27.8849	27.3586	27.3586	27.2534	27.5691	27.8849	28.0954	28.3059	(39)

Average = Sum(39)m / 12 = 27.9638

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7566	0.7538	0.7510	0.7372	0.7344	0.7205	0.7205	0.7178	0.7261	0.7344	0.7399	0.7455	(40)
HLP (average)												0.7365	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3535 (42)

Hot water usage for mixer showers

46.9130	46.2079	45.1806	43.2150	41.7644	40.1467	39.2272	40.2468	41.3644	43.1013	45.1092	46.7332	(42a)

Hot water usage for baths

20.2973	19.9959	19.5714	18.7887	18.2026	17.5528	17.2017	17.6233	18.0822	18.7776	19.5764	20.2287	(42b)

Hot water usage for other uses

28.4911	27.4550	26.4190	25.3830	24.3469	23.3109	23.3109	24.3469	25.3830	26.4190	27.4550	28.4911	(42c)

Average daily hot water use (litres/day) 87.9720 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	95.7014	93.6589	91.1710	87.3866	84.3139	81.0104	79.7399	82.2170	84.8296	88.2979	92.1406	95.4530	(44)
Energy conte	151.5676	133.3690	140.1264	119.6279	113.5028	99.6117	96.4385	101.8018	104.6034	119.8195	131.2712	149.4563	(45)

Energy content (annual) Total = Sum(45)m = 1461.1961

Distribution loss (46)m = 0.15 x (45)m

22.7351	20.0053	21.0190	17.9442	17.0254	14.9418	14.4658	15.2703	15.6905	17.9729	19.6907	22.4185	(46)

Water storage loss:
Store volume 200.0000 (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

178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(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

178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(64)

Total per year (kWh/year) = Sum(64)m = 1778.5271 (64)

12Total per year (kWh/year) 1779 (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

50.3962	44.3452	46.5920	39.7763	37.7397	33.1209	32.0658	33.8491	34.7806	39.8400	43.6477	49.6942	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	65.2504	72.2415	65.2504	67.4254	65.2504	67.4254	65.2504	65.2504	67.4254	65.2504	67.4254	65.2504	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.4640	117.6725	114.6270	108.1436	99.9594	92.2675	87.1288	85.9203	88.9657	95.4491	103.6333	111.3253	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	(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)	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	(71)
Water heating gains (Table 5)	67.7369	65.9899	62.6237	55.2449	50.7254	46.0012	43.0992	45.4961	48.3064	53.5483	60.6218	66.7933	(72)
Total internal gains	292.7535	299.2062	285.8035	274.1162	259.2375	248.9965	238.7807	239.9691	247.9999	257.5502	274.9828	286.6713	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.6600	10.6334	0.3800	0.0000	0.7700	5.1648	(74)
South	2.8100	46.7521	0.3800	0.0000	0.7700	38.4398	(78)
West	0.7200	19.6403	0.3800	0.0000	0.7700	4.1377	(80)

Solar gains	47.7423	80.9189	110.2947	137.0162	154.5638	154.1328	148.2996	134.9674	119.4394	89.2559	57.0949	40.9238	(83)
Total gains	340.4958	380.1251	396.0981	411.1324	413.8013	403.1293	387.0802	374.9364	367.4393	346.8061	332.0777	327.5951	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	45.9550	46.1240	46.2943	47.1647	47.3427	48.2534	48.2534	48.4398	47.8850	47.3427	46.9880	46.6386	
alpha	4.0637	4.0749	4.0863	4.1443	4.1562	4.2169	4.2169	4.2293	4.1923	4.1562	4.1325	4.1092	
util living area	0.9125	0.8718	0.8203	0.7208	0.5898	0.4269	0.3094	0.3322	0.5014	0.7281	0.8644	0.9210	(86)
MIT	20.1057	20.3147	20.5304	20.7744	20.9187	20.9840	20.9968	20.9956	20.9679	20.8001	20.4494	20.0767	(87)
Th 2	20.2911	20.2936	20.2960	20.3081	20.3106	20.3227	20.3227	20.3252	20.3179	20.3106	20.3057	20.3008	(88)
util rest of house	0.9018	0.8574	0.8006	0.6930	0.5533	0.3839	0.2624	0.2843	0.4561	0.6959	0.8471	0.9111	(89)
MIT 2	19.2570	19.5142	19.7771	20.0731	20.2342	20.3104	20.3209	20.3226	20.2917	20.1091	19.6930	19.2291	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	19.6620	19.8962	20.1366	20.4078	20.5608	20.6319	20.6434	20.6438	20.6144	20.4389	20.0540	19.6336	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6620	19.8962	20.1366	20.4078	20.5608	20.6319	20.6434	20.6438	20.6144	20.4389	20.0540	19.6336	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8911	0.8485	0.7959	0.6972	0.5668	0.4037	0.2847	0.3070	0.4760	0.7021	0.8402	0.9005	(94)
Useful gains	303.4057	322.5237	315.2637	286.6253	234.5288	162.7478	110.2203	115.1027	174.9161	243.4972	279.0101	294.9977	(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	441.3039	429.2165	388.8677	322.1047	247.0832	165.0244	110.6226	115.6568	179.5962	274.3564	363.9472	436.8622	(97)
Space heating kWh	102.5963	71.6976	54.7614	25.5451	9.3404	0.0000	0.0000	0.0000	0.0000	22.9592	61.1547	105.5472	(98a)
Space heating requirement - total per year (kWh/year)												453.6019	
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	102.5963	71.6976	54.7614	25.5451	9.3404	0.0000	0.0000	0.0000	0.0000	22.9592	61.1547	105.5472	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												453.6019	
Space heating per m2											(98c) / (4) =	11.9463	(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	102.5963	71.6976	54.7614	25.5451	9.3404	0.0000	0.0000	0.0000	0.0000	22.9592	61.1547	105.5472	(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)	102.5963	71.6976	54.7614	25.5451	9.3404	0.0000	0.0000	0.0000	0.0000	22.9592	61.1547	105.5472	(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	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(64)
Efficiency of water heater												324.5200	(216)
(217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(217)
Fuel for water heating, kWh/month	55.0102	48.5986	51.4846	44.9001	43.2806	38.7322	38.0223	39.6750	40.2704	45.2271	48.4880	54.3596	(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	11.3091	10.2147	11.3091	10.9443	11.3091	10.9443	11.3091	11.3091	10.9443	11.3091	10.9443	11.3091	(231)
Lighting	13.0684	10.4840	9.4397	6.9159	5.3420	4.3645	4.8732	6.3343	8.2277	10.7952	12.1931	13.4316	(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												453.6019	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												324.5200	
Water heating fuel used												548.0485	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2180)		
mechanical ventilation fans (SFP = 1.2180)	133.1557	(230a)
Total electricity for the above, kWh/year	133.1557	(231)
Electricity for lighting (calculated in Appendix L)	105.4696	(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	1240.2758	(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	453.6019	0.1566	71.0202	(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)	548.0485	0.1411	77.3114	(264)
Space and water heating			148.3316	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	105.4696	0.1443	15.2225	(268)
Total CO2, kg/year			182.0245	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.7900	(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	453.6019	1.5796	716.5200	(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)	548.0485	1.5216	833.9227	(278)
Space and water heating			1550.4427	(279)
Pumps, fans and electric keep-hot	133.1557	1.5128	201.4379	(281)
Energy for lighting	105.4696	1.5338	161.7728	(282)
Total Primary energy kWh/year			1913.6535	(286)
Dwelling Primary energy Rate (DPER)			50.4000	(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						
Ground floor	37.9700	(1b)	x 2.3600	(2b) =	89.6092	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.9700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	89.6092	(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) =	0.2232	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4732	(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) =	0.4022	(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	0.5128	0.5028	0.4927	0.4424	0.4324	0.3821	0.3821	0.3720	0.4022	0.4324	0.4525	0.4726	(22b)
Effective ac	0.6315	0.6264	0.6214	0.5979	0.5935	0.5730	0.5730	0.5692	0.5809	0.5935	0.6024	0.6117	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1500	1.0000	2.1500			(26)
TER Opening Type			5.1900	1.1450	5.9427			(27)
GF			37.9700	0.1300	4.9361			(28a)
Main	51.1600	7.3400	43.8200	0.1800	7.8876			(29a)
Total net area of external elements Aum(A, m2)			89.1300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.9164			(33)
Main dwelling								
Party Wall 1			14.8700	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 135.1654 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	5.7900	0.0500	0.2895	
E3 Sill	5.7900	0.0500	0.2895	
E4 Jamb	12.9000	0.0500	0.6450	
E5 Ground floor (normal)	20.3000	0.1600	3.2480	
E7 Party floor between dwellings (in blocks of flats)	20.3000	0.0700	1.4210	
E16 Corner (normal)	12.6000	0.0900	1.1340	
E17 Corner (inverted - internal area greater than external area)	2.5200	-0.0900	-0.2268	
P1 Party wall - Ground floor	5.9000	0.0800	0.4720	
E18 Party wall between dwellings	2.5200	0.0600	0.1512	
E25 Staggered party wall between dwellings	2.5200	0.0600	0.1512	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.5746 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 28.4910 (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	18.6739	18.5229	18.3749	17.6798	17.5497	16.9442	16.9442	16.8321	17.1774	17.5497	17.8128	18.0879	(38)
Heat transfer coeff	47.1649	47.0140	46.8660	46.1708	46.0407	45.4353	45.4353	45.3232	45.6685	46.0407	46.3038	46.5789	(39)

Average = Sum(39)m / 12 = 46.1702

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2422	1.2382	1.2343	1.2160	1.2126	1.1966	1.1966	1.1937	1.2028	1.2126	1.2195	1.2267	(40)
HLP (average)												1.2160	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3535 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	46.9130	46.2079	45.1806	43.2150	41.7644	40.1467	39.2272	40.2468	41.3644	43.1013	45.1092	46.7332	(42a)
Hot water usage for baths	20.2973	19.9959	19.5714	18.7887	18.2026	17.5528	17.2017	17.6233	18.0822	18.7776	19.5764	20.2287	(42b)
Hot water usage for other uses	28.4911	27.4550	26.4190	25.3830	24.3469	23.3109	23.3109	24.3469	25.3830	26.4190	27.4550	28.4911	(42c)

Average daily hot water use (litres/day) 87.9720 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	95.7014	93.6589	91.1710	87.3866	84.3139	81.0104	79.7399	82.2170	84.8296	88.2979	92.1406	95.4530	(44)
Energy conte	151.5676	133.3690	140.1264	119.6279	113.5028	99.6117	96.4385	101.8018	104.6034	119.8195	131.2712	149.4563	(45)
Energy content (annual)										Total = Sum(45)m =		1461.1961	
Distribution loss (46)m = 0.15 x (45)m	22.7351	20.0053	21.0190	17.9442	17.0254	14.9418	14.4658	15.2703	15.6905	17.9729	19.6907	22.4185	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	198.1625	175.4547	186.7213	164.7198	160.0977	144.7035	143.0334	148.3967	149.6953	166.4144	176.3631	196.0513	(62)
WWHRS	-21.4466	-18.9676	-19.8618	-16.4463	-15.3274	-13.1158	-12.2939	-13.0734	-13.5701	-15.9976	-18.1233	-21.0495	(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	176.7158	156.4871	166.8596	148.2735	144.7703	131.5878	130.7394	135.3234	136.1252	150.4168	158.2397	175.0018	(64)
									Total per year (kWh/year) = Sum(64)m =			1810.5403	(64)
12Total per year (kWh/year)												1811	(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	87.6721	78.0138	83.8680	75.8498	75.0156	69.1944	69.3417	71.1250	70.8541	77.1159	79.7212	86.9702	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	67.6745	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	63.3507	70.1383	63.3507	65.4624	63.3507	65.4624	63.3507	63.3507	65.4624	63.3507	65.4624	63.3507	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.4640	117.6725	114.6270	108.1436	99.9594	92.2675	87.1288	85.9203	88.9657	95.4491	103.6333	111.3253	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	29.7674	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	(71)
Water heating gains (Table 5)													

	117.8389	116.0919	112.7258	105.3469	100.8274	96.1033	93.2012	95.5981	98.4085	103.6504	110.7238	116.8954	(72)
Total internal gains													
	343.9559	350.2050	337.0058	325.2552	310.4399	297.1355	286.9830	288.1714	296.1389	308.7526	326.1219	337.8737	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.6600	10.6334	0.6300	0.7000	0.7700	5.3945	(74)
South	2.8100	46.7521	0.6300	0.7000	0.7700	40.1494	(78)
West	0.7200	19.6403	0.6300	0.7000	0.7700	4.3217	(80)

Solar gains	49.8656	84.5176	115.1999	143.1098	161.4378	160.9877	154.8950	140.9699	124.7513	93.2255	59.6342	42.7438	(83)
Total gains	393.8215	434.7226	452.2057	468.3650	471.8777	458.1232	441.8780	429.1413	420.8903	401.9781	385.7560	380.6175	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	30.2263	30.3233	30.4191	30.8771	30.9643	31.3769	31.3769	31.4545	31.2167	30.9643	30.7884	30.6065	
alpha	3.0151	3.0216	3.0279	3.0585	3.0643	3.0918	3.0918	3.0970	3.0811	3.0643	3.0526	3.0404	
util living area													
	0.9341	0.9107	0.8791	0.8155	0.7162	0.5674	0.4302	0.4577	0.6374	0.8155	0.9040	0.9393	(86)
MIT	19.1869	19.4390	19.7792	20.2312	20.6071	20.8650	20.9571	20.9471	20.7955	20.3423	19.7182	19.1564	(87)
Th 2	19.8864	19.8896	19.8927	19.9072	19.9100	19.9227	19.9227	19.9251	19.9178	19.9100	19.9044	19.8987	(88)
util rest of house													
	0.9230	0.8961	0.8587	0.7835	0.6651	0.4906	0.3334	0.3611	0.5647	0.7776	0.8859	0.9291	(89)
MIT 2	17.8268	18.1410	18.5632	19.1185	19.5515	19.8268	19.9023	19.8982	19.7607	19.2614	18.5037	17.7969	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	18.4758	18.7604	19.1435	19.6495	20.0552	20.3222	20.4057	20.3987	20.2545	19.7772	19.0833	18.4457	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4758	18.7604	19.1435	19.6495	20.0552	20.3222	20.4057	20.3987	20.2545	19.7772	19.0833	18.4457	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9054	0.8781	0.8425	0.7750	0.6724	0.5203	0.3779	0.4049	0.5886	0.7724	0.8697	0.9120	(94)
Useful gains	356.5588	381.7240	380.9846	362.9783	317.3029	238.3496	166.9984	173.7631	247.7437	310.4937	335.4738	347.1228	(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													
	668.6026	651.6334	592.5504	496.3152	384.6815	259.9918	172.9116	181.2354	281.0678	422.5264	554.8722	663.5482	(97)
Space heating kWh													
	232.1605	181.3791	157.4050	96.0026	50.1297	0.0000	0.0000	0.0000	0.0000	83.3524	157.9669	235.4205	(98a)
Space heating requirement - total per year (kWh/year)												1193.8166	
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													
	232.1605	181.3791	157.4050	96.0026	50.1297	0.0000	0.0000	0.0000	0.0000	83.3524	157.9669	235.4205	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1193.8166	
Space heating per m2											(98c) / (4) =	31.4410	(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													
	232.1605	181.3791	157.4050	96.0026	50.1297	0.0000	0.0000	0.0000	0.0000	83.3524	157.9669	235.4205	(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)													
	251.5282	196.5104	170.5362	104.0115	54.3117	0.0000	0.0000	0.0000	0.0000	90.3059	171.1451	255.0601	(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													
	176.7158	156.4871	166.8596	148.2735	144.7703	131.5878	130.7394	135.3234	136.1252	150.4168	158.2397	175.0018	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6727	84.3917	83.9292	83.1105	81.9359	79.8000	79.8000	79.8000	79.8000	82.7919	84.0559	84.7256	(217)
Fuel for water heating, kWh/month													
	208.7046	185.4296	198.8100	178.4053	176.6872	164.8970	163.8339	169.5781	170.5829	181.6805	188.2553	206.5513	(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	13.1630	10.5599	9.5080	6.9660	5.3807	4.3961	4.9085	6.3802	8.2873	10.8733	12.2814	13.5289	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-18.3785	-26.2319	-38.1925	-43.5580	-47.5578	-44.6790	-44.2052	-41.4865	-36.7116	-30.3542	-20.3486	-15.8581	(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	-9.4192	-19.9215	-39.7673	-59.9488	-79.4394	-79.8120	-78.7965	-66.5719	-48.6560	-28.4742	-12.5781	-7.4342 (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	1293.4091	(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	2193.4158	(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)	106.2331	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-938.3812	(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	2740.6768	(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	1293.4091	0.2100	271.6159	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2193.4158	0.2100	460.6173	(264)
Space and water heating			732.2332	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	106.2331	0.1443	15.3327	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.5620	0.1343	-54.7219	
PV Unit electricity exported	-530.8192	0.1258	-66.7828	
Total			-121.5047	(269)
Total CO2, kg/year			637.9905	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.8000	(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	1293.4091	1.1300	1461.5523	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2193.4158	1.1300	2478.5598	(278)
Space and water heating			3940.1121	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	106.2331	1.5338	162.9439	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.5620	1.4962	-609.7976	
PV Unit electricity exported	-530.8192	0.4618	-245.1377	
Total			-854.9353	(283)
Total Primary energy kWh/year			3378.2216	(286)
Target Primary Energy Rate (TPER)			88.9700	(287)

Full SAP Calculation Printout

Property Reference	78449-19	**Issued on Date**	18/08/2025
Assessment Reference	001	**Prop Type Ref**	GF Flat / Mid
Property	12 Shepherd Street, MANCHESTER, M9 4QW		

SAP Rating	86 B	**DER**	4.79	**TER**	16.80
Environmental	97 A	**% DER < TER**			71.49
CO_2 Emissions (t/year)	0.17	**DFEE**	28.20	**TFEE**	40.27
Compliance Check	See BREL	**% DFEE < TFEE**			29.98
% DPER < TPER	43.35	**DPER**	50.40	**TPER**	88.97

Assessor Details	Mr. Daniel Goddard	**Assessor ID**	CP52-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	37.9700	(1b)	x 2.3600	(2b) =	89.6092	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.9700					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	89.6092	(5)

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2. Ventilation rate

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

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.3500 (17)
Infiltration rate		0.1675 (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) =	0.1424 (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	0.1815	0.1780	0.1744	0.1566	0.1531	0.1353	0.1353	0.1317	0.1424	0.1531	0.1602	0.1673	(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) =		80.1000 (23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.2810	0.2775	0.2739	0.2561	0.2526	0.2348	0.2348	0.2312	0.2419	0.2526	0.2597	0.2668	(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								
Door			2.1500	0.7800	1.6770			(26)
Window			5.1900	0.7282	3.7791			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	51.1600	7.3400	43.8200	0.1300	5.6966	9.0000	394.3800	(29a)
Total net area of external elements Aum(A, m2)			89.1300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.5700			(33)
Main dwelling								
Party Wall 1			14.8700	0.0000	0.0000	20.0000	297.4000	(32)
Party Ceiling			37.9700			30.0000	1139.1000	(32b)
Timber			50.4000			9.0000	453.6000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5132.2300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		135.1654 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total

E2 Other lintels (including other steel lintels)	5.7900	0.1150	0.6659	
E3 Sill	5.7900	0.0170	0.0984	
E4 Jamb	12.9000	0.0940	1.2126	
E5 Ground floor (normal)	20.3000	0.0670	1.3601	
E7 Party floor between dwellings (in blocks of flats)	20.3000	0.0320	0.6496	
E16 Corner (normal)	12.6000	0.0680	0.8568	
E17 Corner (inverted - internal area greater than external area)	2.5200	-0.0290	-0.0731	
P1 Party wall - Ground floor	5.9000	0.0560	0.3304	
E18 Party wall between dwellings	2.5200	0.2400	0.6048	
E25 Staggered party wall between dwellings	2.5200	0.0560	0.1411	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.8466 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	20.4166 (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	8.3103	8.2050	8.0998	7.5735	7.4683	6.9420	6.9420	6.8367	7.1525	7.4683	7.6788	7.8893	(38)
Heat transfer coeff	28.7269	28.6217	28.5164	27.9902	27.8849	27.3586	27.3586	27.2534	27.5691	27.8849	28.0954	28.3059	(39)
Average = Sum(39)m / 12 =												27.9638	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7566	0.7538	0.7510	0.7372	0.7344	0.7205	0.7205	0.7178	0.7261	0.7344	0.7399	0.7455	(40)
HLP (average)												0.7365	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3535	(42)
Hot water usage for mixer showers	46.9130	46.2079	45.1806	43.2150	41.7644	40.1467	39.2272	40.2468	41.3644	43.1013	45.1092	46.7332	(42a)
Hot water usage for baths	20.2973	19.9959	19.5714	18.7887	18.2026	17.5528	17.2017	17.6233	18.0822	18.7776	19.5764	20.2287	(42b)
Hot water usage for other uses	28.4911	27.4550	26.4190	25.3830	24.3469	23.3109	23.3109	24.3469	25.3830	26.4190	27.4550	28.4911	(42c)
Average daily hot water use (litres/day)												87.9720	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	95.7014	93.6589	91.1710	87.3866	84.3139	81.0104	79.7399	82.2170	84.8296	88.2979	92.1406	95.4530	(44)
Energy conte	151.5676	133.3690	140.1264	119.6279	113.5028	99.6117	96.4385	101.8018	104.6034	119.8195	131.2712	149.4563	(45)
Energy content (annual)											Total = Sum(45)m =	1461.1961	
Distribution loss (46)m = 0.15 x (45)m	22.7351	20.0053	21.0190	17.9442	17.0254	14.9418	14.4658	15.2703	15.6905	17.9729	19.6907	22.4185	(46)
Water storage loss:													
Store volume												200.0000	(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	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(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	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(64)
										Total per year (kWh/year) = Sum(64)m =		1778.5271	(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	50.3962	44.3452	46.5920	39.7763	37.7397	33.1209	32.0658	33.8491	34.7806	39.8400	43.6477	49.6942	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.9303	13.2610	10.7845	8.1646	6.1031	5.1525	5.5675	7.2368	9.7132	12.3332	14.3947	15.3453	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	173.8268	175.6306	171.0851	161.4084	149.1932	137.7127	130.0430	128.2392	132.7847	142.4614	154.6766	166.1571	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	(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)	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	(71)
Water heating gains (Table 5)	67.7369	65.9899	62.6237	55.2449	50.7254	46.0012	43.0992	45.4961	48.3064	53.5483	60.6218	66.7933	(72)
Total internal gains	328.0382	326.4256	316.0376	296.3620	277.5659	260.4106	250.2538	252.5163	262.3486	279.8872	301.2372	319.8399	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.6600	10.6334	0.3800	0.0000	0.7700	5.1648	(74)
South	2.8100	46.7521	0.3800	0.0000	0.7700	38.4398	(78)
West	0.7200	19.6403	0.3800	0.0000	0.7700	4.1377	(80)

Solar gains	47.7423	80.9189	110.2947	137.0162	154.5638	154.1328	148.2996	134.9674	119.4394	89.2559	57.0949	40.9238	(83)

Total gains	375.7805	407.3445	426.3323	433.3782	432.1297	414.5435	398.5534	387.4837	381.7880	369.1431	358.3322	360.7637	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	49.6266	49.8091	49.9929	50.9329	51.1251	52.1086	52.1086	52.3098	51.7107	51.1251	50.7421	50.3647	
alpha	4.3084	4.3206	4.3329	4.3955	4.4083	4.4739	4.4739	4.4873	4.4474	4.4083	4.3828	4.3576	
util living area													
	0.8959	0.8585	0.7998	0.7029	0.5731	0.4172	0.3010	0.3222	0.4867	0.7058	0.8475	0.9062	(86)
MIT	20.2853	20.4445	20.6373	20.8289	20.9414	20.9891	20.9980	20.9973	20.9778	20.8519	20.5638	20.2551	(87)
Th 2	20.2911	20.2936	20.2960	20.3081	20.3106	20.3227	20.3227	20.3252	20.3179	20.3106	20.3057	20.3008	(88)
util rest of house													
	0.8832	0.8425	0.7785	0.6741	0.5363	0.3747	0.2551	0.2755	0.4419	0.6722	0.8281	0.8946	(89)
MIT 2	19.4740	19.6686	19.9009	20.1328	20.2567	20.3146	20.3216	20.3236	20.3003	20.1644	19.8270	19.4453	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	19.8612	20.0389	20.2523	20.4650	20.5834	20.6365	20.6444	20.6451	20.6236	20.4925	20.1786	19.8317	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8612	20.0389	20.2523	20.4650	20.5834	20.6365	20.6444	20.6451	20.6236	20.4925	20.1786	19.8317	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8747	0.8362	0.7771	0.6808	0.5511	0.3945	0.2770	0.2977	0.4622	0.6813	0.8243	0.8859	(94)
Useful gains	328.7012	340.6388	331.2891	295.0507	238.1466	163.5210	110.3904	115.3350	176.4482	251.5146	295.3751	319.6118	(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													
	447.0243	433.2999	392.1672	323.7063	247.7132	165.1496	110.6494	115.6933	179.8496	275.8502	367.4498	442.4700	(97)
Space heating kWh													
	88.0324	62.2683	45.2933	20.6320	7.1175	0.0000	0.0000	0.0000	0.0000	18.1056	51.8938	91.4065	(98a)
Space heating requirement - total per year (kWh/year)												384.7494	
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													
	88.0324	62.2683	45.2933	20.6320	7.1175	0.0000	0.0000	0.0000	0.0000	18.1056	51.8938	91.4065	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												384.7494	
Space heating per m2											(98c) / (4) =	10.1330	(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													
	88.0324	62.2683	45.2933	20.6320	7.1175	0.0000	0.0000	0.0000	0.0000	18.1056	51.8938	91.4065	(98)
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	100.0000	(210)
Space heating fuel (main heating system)													
	88.0324	62.2683	45.2933	20.6320	7.1175	0.0000	0.0000	0.0000	0.0000	18.1056	51.8938	91.4065	(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													
	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(64)
Efficiency of water heater												324.5200	(216)
(217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(217)
Fuel for water heating, kWh/month													
	55.0102	48.5986	51.4846	44.9001	43.2806	38.7322	38.0223	39.6750	40.2704	45.2271	48.4880	54.3596	(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	11.3091	10.2147	11.3091	10.9443	11.3091	10.9443	11.3091	11.3091	10.9443	11.3091	10.9443	11.3091	(231)
Lighting	13.0684	10.4840	9.4397	6.9159	5.3420	4.3645	4.8732	6.3343	8.2277	10.7952	12.1931	13.4316	(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												384.7494	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												324.5200	
Water heating fuel used												548.0485	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2180)		
mechanical ventilation fans (SFP = 1.2180)	133.1557	(230a)
Total electricity for the above, kWh/year	133.1557	(231)
Electricity for lighting (calculated in Appendix L)	105.4696	(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	1171.4233	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	384.7494	16.4900	63.4452	(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)	548.0485	16.4900	90.3732	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	133.1557	16.4900	21.9574	(249)
Energy for lighting	105.4696	16.4900	17.3919	(250)
Additional standing charges			0.0000	(251)
Total energy cost			193.1677	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.8381	(257)
SAP value		86.4138	
SAP rating (Section 12)		86	(258)
SAP band		B	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	384.7494	0.1568	60.3296	(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)	548.0485	0.1411	77.3114	(264)
Space and water heating			137.6410	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	105.4696	0.1443	15.2225	(268)
Total CO2, kg/year			171.3339	(272)
CO2 emissions per m2			4.5100	(273)
EI value			97.2329	
EI rating			97	(274)
EI band			A	

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

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		37.9700 (1b)	x	2.3600 (2b)	=	89.6092	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.9700						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	89.6092	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.3500	(17)
Infiltration rate		0.1675	(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) = 0.1424 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6000	4.5000	4.5000	4.1000	4.2000	3.7000	3.5000	3.5000	3.7000	4.1000	4.1000	4.2000	(22)
Wind factor	1.1500	1.1250	1.1250	1.0250	1.0500	0.9250	0.8750	0.8750	0.9250	1.0250	1.0250	1.0500	(22a)
Adj infilt rate	0.1637	0.1602	0.1602	0.1459	0.1495	0.1317	0.1246	0.1246	0.1317	0.1459	0.1459	0.1495	(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) = 80.1000 (23c)

Effective ac	0.2632	0.2597	0.2597	0.2454	0.2490	0.2312	0.2241	0.2241	0.2312	0.2454	0.2454	0.2490	(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								
Door			2.1500	0.7800	1.6770			(26)
Window			5.1900	0.7282	3.7791			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	51.1600	7.3400	43.8200	0.1300	5.6966	9.0000	394.3800	(29a)
Total net area of external elements Aum(A, m2)			89.1300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.5700			(33)
Main dwelling								
Party Wall 1			14.8700	0.0000	0.0000	20.0000	297.4000	(32)
Party Ceiling			37.9700			30.0000	1139.1000	(32b)
Timber			50.4000			9.0000	453.6000	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5132.2300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 135.1654 (35)
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.7900	0.1150	0.6659
E3 Sill	5.7900	0.0170	0.0984
E4 Jamb	12.9000	0.0940	1.2126
E5 Ground floor (normal)	20.3000	0.0670	1.3601
E7 Party floor between dwellings (in blocks of flats)	20.3000	0.0320	0.6496
E16 Corner (normal)	12.6000	0.0680	0.8568
E17 Corner (inverted - internal area greater than external area)	2.5200	-0.0290	-0.0731
P1 Party wall - Ground floor	5.9000	0.0560	0.3304
E18 Party wall between dwellings	2.5200	0.2400	0.6048
E25 Staggered party wall between dwellings	2.5200	0.0560	0.1411

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.8466 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 20.4166 (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	7.7840	7.6788	7.6788	7.2577	7.3630	6.8367	6.6262	6.6262	6.8367	7.2577	7.2577	7.3630	(38)
Heat transfer coeff	28.2007	28.0954	28.0954	27.6744	27.7796	27.2534	27.0429	27.0429	27.2534	27.6744	27.6744	27.7796	(39)
Average = Sum(39)m / 12 =												27.6305	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7427	0.7399	0.7399	0.7288	0.7316	0.7178	0.7122	0.7122	0.7178	0.7288	0.7288	0.7316	(40)
HLP (average)												0.7277	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3535 (42)
Hot water usage for mixer showers
46.9130 46.2079 45.1806 43.2150 41.7644 40.1467 39.2272 40.2468 41.3644 43.1013 45.1092 46.7332 (42a)
Hot water usage for baths
20.2973 19.9959 19.5714 18.7887 18.2026 17.5528 17.2017 17.6233 18.0822 18.7776 19.5764 20.2287 (42b)
Hot water usage for other uses
28.4911 27.4550 26.4190 25.3830 24.3469 23.3109 23.3109 24.3469 25.3830 26.4190 27.4550 28.4911 (42c)
Average daily hot water use (litres/day) 87.9720 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	95.7014	93.6589	91.1710	87.3866	84.3139	81.0104	79.7399	82.2170	84.8296	88.2979	92.1406	95.4530	(44)
Energy conte	151.5676	133.3690	140.1264	119.6279	113.5028	99.6117	96.4385	101.8018	104.6034	119.8195	131.2712	149.4563	(45)
Energy content (annual)										Total = Sum(45)m =		1461.1961	
Distribution loss (46)m = 0.15 x (45)m	22.7351	20.0053	21.0190	17.9442	17.0254	14.9418	14.4658	15.2703	15.6905	17.9729	19.6907	22.4185	(46)

Water storage loss:
Store volume 200.0000 (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

	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(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	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(64)
										Total per year (kWh/year) = Sum(64)m =		1778.5271	(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

	50.3962	44.3452	46.5920	39.7763	37.7397	33.1209	32.0658	33.8491	34.7806	39.8400	43.6477	49.6942 (65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

	14.9303	13.2610	10.7845	8.1646	6.1031	5.1525	5.5675	7.2368	9.7132	12.3332	14.3947	15.3453 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

	173.8268	175.6306	171.0851	161.4084	149.1932	137.7127	130.0430	128.2392	132.7847	142.4614	154.6766	166.1571 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744 (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)

	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396 (71)

Water heating gains (Table 5)

	67.7369	65.9899	62.6237	55.2449	50.7254	46.0012	43.0992	45.4961	48.3064	53.5483	60.6218	66.7933 (72)

Total internal gains

	328.0382	326.4256	316.0376	296.3620	277.5659	260.4106	250.2538	252.5163	262.3486	279.8872	301.2372	319.8399 (73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.6600	8.9975	0.3800	0.0000	0.7700	4.3702	(74)
South	2.8100	39.5594	0.3800	0.0000	0.7700	32.5260	(78)
West	0.7200	16.6187	0.3800	0.0000	0.7700	3.5011	(80)

Solar gains	40.3973	71.9279	103.4013	130.6221	144.0985	146.4262	138.0991	123.7917	113.2078	82.4941	50.1743	37.0263	(83)
Total gains	368.4355	398.3535	419.4389	426.9841	421.6644	406.8368	388.3529	376.3081	375.5564	362.3813	351.4116	356.8662	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	50.5527	50.7421	50.7421	51.5140	51.3188	52.3098	52.7170	52.7170	52.3098	51.5140	51.5140	51.3188	
alpha	4.3702	4.3828	4.3828	4.4343	4.4213	4.4873	4.5145	4.5145	4.4873	4.4343	4.4343	4.4213	
util living area	0.8914	0.8532	0.7963	0.6892	0.5512	0.3979	0.3054	0.3220	0.4892	0.7024	0.8401	0.8997	(86)
MIT	20.3416	20.4917	20.6597	20.8513	20.9534	20.9917	20.9980	20.9974	20.9782	20.8601	20.6049	20.3227	(87)
Th 2	20.3033	20.3057	20.3057	20.3154	20.3130	20.3252	20.3301	20.3301	20.3252	20.3154	20.3154	20.3130	(88)
util rest of house	0.8782	0.8365	0.7746	0.6594	0.5126	0.3545	0.2593	0.2747	0.4447	0.6681	0.8197	0.8873	(89)
MIT 2	19.5534	19.7364	19.9360	20.1647	20.2714	20.3192	20.3289	20.3286	20.3079	20.1782	19.8847	19.5386	(90)
Living area fraction									fLA = Living area / (4) =			0.4772	(91)
MIT	19.9295	20.0968	20.2814	20.4923	20.5968	20.6401	20.6482	20.6478	20.6278	20.5036	20.2284	19.9128	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9295	20.0968	20.2814	20.4923	20.5968	20.6401	20.6482	20.6478	20.6278	20.5036	20.2284	19.9128	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8704	0.8312	0.7738	0.6673	0.5288	0.3748	0.2812	0.2972	0.4648	0.6778	0.8170	0.8793	(94)
Useful gains	320.6707	331.0990	324.5569	284.9162	222.9664	152.4937	109.2167	111.8343	174.5727	245.6363	287.0870	313.8072	(95)
Ext temp.	4.7000	5.3000	6.7000	9.3000	12.3000	15.0000	16.6000	16.5000	14.1000	10.8000	7.5000	4.6000	(96)
Heat loss rate W	429.4825	415.7223	381.5738	309.7412	230.4835	153.7123	109.4757	112.1681	177.9038	268.5425	352.2503	425.3837	(97)
Space heating kWh	80.9560	56.8669	42.4206	17.8740	5.5927	0.0000	0.0000	0.0000	0.0000	17.0422	46.9175	83.0129	(98a)
Space heating requirement - total per year (kWh/year)												350.6829	
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	80.9560	56.8669	42.4206	17.8740	5.5927	0.0000	0.0000	0.0000	0.0000	17.0422	46.9175	83.0129	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												350.6829	
Space heating per m2											(98c) / (4) =	9.2358	(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	80.9560	56.8669	42.4206	17.8740	5.5927	0.0000	0.0000	0.0000	0.0000	17.0422	46.9175	83.0129	(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)	80.9560	56.8669	42.4206	17.8740	5.5927	0.0000	0.0000	0.0000	0.0000	17.0422	46.9175	83.0129	(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												
	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077 (64)
Efficiency of water heater												324.5200 (216)
(217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200 (217)
Fuel for water heating, kWh/month												
	55.0102	48.5986	51.4846	44.9001	43.2806	38.7322	38.0223	39.6750	40.2704	45.2271	48.4880	54.3596 (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	11.3091	10.2147	11.3091	10.9443	11.3091	10.9443	11.3091	11.3091	10.9443	11.3091	10.9443	11.3091 (231)
Lighting	13.0684	10.4840	9.4397	6.9159	5.3420	4.3645	4.8732	6.3343	8.2277	10.7952	12.1931	13.4316 (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	350.6829 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	324.5200
Water heating fuel used	548.0485 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2180)	
mechanical ventilation fans (SFP = 1.2180)	133.1557 (230a)
Total electricity for the above, kWh/year	133.1557 (231)
Electricity for lighting (calculated in Appendix L)	105.4696 (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	1137.3567 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	350.6829	28.4300	99.6991	(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)	548.0485	28.4300	155.8102	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	133.1557	28.4300	37.8562	(249)
Energy for lighting	105.4696	28.4300	29.9850	(250)
Additional standing charges			0.0000	(251)
Total energy cost			323.3505	(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	350.6829	0.1569	55.0125	(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)	548.0485	0.1411	77.3114	(264)
Space and water heating			132.3239	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	105.4696	0.1443	15.2225	(268)
Total CO2, kg/year			166.0168	(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	350.6829	1.5807	554.3413	(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)	548.0485	1.5216	833.9227	(278)
Space and water heating			1388.2640	(279)
Pumps, fans and electric keep-hot	133.1557	1.5128	201.4379	(281)
Energy for lighting	105.4696	1.5338	161.7728	(282)
Total Primary energy kWh/year			1751.4747	(286)

SAP 10 EPC IMPROVEMENTS

001

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

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

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

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

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

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current	Potential	Saving
Electricity	£323	£323	£0
Space heating	£138	£138	£0
Water heating	£156	£156	£0
Lighting	£30	£30	£0
Total cost of fuels	£323	£323	£0
Total cost of uses	£324	£324	£0
Delivered energy	30 kWh/m²	30 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	4 kg/m²	4 kg/m²	0 kg/m²
Primary energy	46 kWh/m²	46 kWh/m²	0 kWh/m²

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	37.9700 (1b)	x	2.3600 (2b)	=	89.6092	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.9700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	89.6092	(5)

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2. Ventilation rate

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

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.3500	(17)
Infiltration rate		0.1675	(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) =	0.1424	(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	0.1815	0.1780	0.1744	0.1566	0.1531	0.1353	0.1353	0.1317	0.1424	0.1531	0.1602	0.1673	(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) =	80.1000 (23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.2810	0.2775	0.2739	0.2561	0.2526	0.2348	0.2348	0.2312	0.2419	0.2526	0.2597	0.2668	(25)

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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	
Door			2.1500	0.7800	1.6770			(26)
Window			5.1900	0.7282	3.7791			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	51.1600	7.3400	43.8200	0.1300	5.6966	9.0000	394.3800	(29a)
Total net area of external elements Aum(A, m2)			89.1300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.5700			(33)
Main dwelling								
Party Wall 1			14.8700	0.0000	0.0000	20.0000	297.4000	(32)
Party Ceiling			37.9700			30.0000	1139.1000	(32b)
Timber			50.4000			9.0000	453.6000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5132.2300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		135.1654 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.7900	0.1150	0.6659
E3 Sill	5.7900	0.0170	0.0984
E4 Jamb	12.9000	0.0940	1.2126
E5 Ground floor (normal)	20.3000	0.0670	1.3601
E7 Party floor between dwellings (in blocks of flats)	20.3000	0.0320	0.6496
E16 Corner (normal)	12.6000	0.0680	0.8568
E17 Corner (inverted - internal area greater than external area)	2.5200	-0.0290	-0.0731
P1 Party wall - Ground floor	5.9000	0.0560	0.3304
E18 Party wall between dwellings	2.5200	0.2400	0.6048
E25 Staggered party wall between dwellings	2.5200	0.0560	0.1411

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		5.8466 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	20.4166 (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	8.3103	8.2050	8.0998	7.5735	7.4683	6.9420	6.9420	6.8367	7.1525	7.4683	7.6788	7.8893	(38)
Heat transfer coeff	28.7269	28.6217	28.5164	27.9902	27.8849	27.3586	27.3586	27.2534	27.5691	27.8849	28.0954	28.3059	(39)
Average = Sum(39)m / 12 =												27.9638	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7566	0.7538	0.7510	0.7372	0.7344	0.7205	0.7205	0.7178	0.7261	0.7344	0.7399	0.7455	(40)
HLP (average)												0.7365	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.3535 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	46.9130	46.2079	45.1806	43.2150	41.7644	40.1467	39.2272	40.2468	41.3644	43.1013	45.1092	46.7332	(42a)
Hot water usage for baths	20.2973	19.9959	19.5714	18.7887	18.2026	17.5528	17.2017	17.6233	18.0822	18.7776	19.5764	20.2287	(42b)
Hot water usage for other uses	28.4911	27.4550	26.4190	25.3830	24.3469	23.3109	23.3109	24.3469	25.3830	26.4190	27.4550	28.4911	(42c)
Average daily hot water use (litres/day)												87.9720	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	95.7014	93.6589	91.1710	87.3866	84.3139	81.0104	79.7399	82.2170	84.8296	88.2979	92.1406	95.4530	(44)
Energy conte	151.5676	133.3690	140.1264	119.6279	113.5028	99.6117	96.4385	101.8018	104.6034	119.8195	131.2712	149.4563	(45)
Energy content (annual)										Total = Sum(45)m =		1461.1961	
Distribution loss (46)m = 0.15 x (45)m	22.7351	20.0053	21.0190	17.9442	17.0254	14.9418	14.4658	15.2703	15.6905	17.9729	19.6907	22.4185	(46)
Water storage loss:													
Store volume												200.0000	(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	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(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	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(64)
										Total per year (kWh/year) = Sum(64)m =		1778.5271	(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	50.3962	44.3452	46.5920	39.7763	37.7397	33.1209	32.0658	33.8491	34.7806	39.8400	43.6477	49.6942	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.9303	13.2610	10.7845	8.1646	6.1031	5.1525	5.5675	7.2368	9.7132	12.3332	14.3947	15.3453	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	173.8268	175.6306	171.0851	161.4084	149.1932	137.7127	130.0430	128.2392	132.7847	142.4614	154.6766	166.1571	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	44.4744	(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)	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	-54.1396	(71)

Water heating gains (Table 5)													
	67.7369	65.9899	62.6237	55.2449	50.7254	46.0012	43.0992	45.4961	48.3064	53.5483	60.6218	66.7933	(72)
Total internal gains													
	328.0382	326.4256	316.0376	296.3620	277.5659	260.4106	250.2538	252.5163	262.3486	279.8872	301.2372	319.8399	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.6600	10.6334	0.3800	0.0000	0.7700	5.1648	(74)
South	2.8100	46.7521	0.3800	0.0000	0.7700	38.4398	(78)
West	0.7200	19.6403	0.3800	0.0000	0.7700	4.1377	(80)

Solar gains	47.7423	80.9189	110.2947	137.0162	154.5638	154.1328	148.2996	134.9674	119.4394	89.2559	57.0949	40.9238	(83)
Total gains	375.7805	407.3445	426.3323	433.3782	432.1297	414.5435	398.5534	387.4837	381.7880	369.1431	358.3322	360.7637	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	49.6266	49.8091	49.9929	50.9329	51.1251	52.1086	52.1086	52.3098	51.7107	51.1251	50.7421	50.3647	
alpha	4.3084	4.3206	4.3329	4.3955	4.4083	4.4739	4.4739	4.4873	4.4474	4.4083	4.3828	4.3576	
util living area													
	0.8959	0.8585	0.7998	0.7029	0.5731	0.4172	0.3010	0.3222	0.4867	0.7058	0.8475	0.9062	(86)
MIT	20.2853	20.4445	20.6373	20.8289	20.9414	20.9891	20.9980	20.9973	20.9778	20.8519	20.5638	20.2551	(87)
Th 2	20.2911	20.2936	20.2960	20.3081	20.3106	20.3227	20.3227	20.3252	20.3179	20.3106	20.3057	20.3008	(88)
util rest of house													
	0.8832	0.8425	0.7785	0.6741	0.5363	0.3747	0.2551	0.2755	0.4419	0.6722	0.8281	0.8946	(89)
MIT 2	19.4740	19.6686	19.9009	20.1328	20.2567	20.3146	20.3216	20.3236	20.3003	20.1644	19.8270	19.4453	(90)
Living area fraction									fLA = Living area / (4) =			0.4772	(91)
MIT	19.8612	20.0389	20.2523	20.4650	20.5834	20.6365	20.6444	20.6451	20.6236	20.4925	20.1786	19.8317	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8612	20.0389	20.2523	20.4650	20.5834	20.6365	20.6444	20.6451	20.6236	20.4925	20.1786	19.8317	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8747	0.8362	0.7771	0.6808	0.5511	0.3945	0.2770	0.2977	0.4622	0.6813	0.8243	0.8859	(94)
Useful gains	328.7012	340.6388	331.2891	295.0507	238.1466	163.5210	110.3904	115.3350	176.4482	251.5146	295.3751	319.6118	(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													
	447.0243	433.2999	392.1672	323.7063	247.7132	165.1496	110.6494	115.6933	179.8496	275.8502	367.4498	442.4700	(97)
Space heating kWh													
	88.0324	62.2683	45.2933	20.6320	7.1175	0.0000	0.0000	0.0000	0.0000	18.1056	51.8938	91.4065	(98a)
Space heating requirement - total per year (kWh/year)												384.7494	
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													
	88.0324	62.2683	45.2933	20.6320	7.1175	0.0000	0.0000	0.0000	0.0000	18.1056	51.8938	91.4065	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												384.7494	
Space heating per m2											(98c) / (4) =	10.1330	(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													
	88.0324	62.2683	45.2933	20.6320	7.1175	0.0000	0.0000	0.0000	0.0000	18.1056	51.8938	91.4065	(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)													
	88.0324	62.2683	45.2933	20.6320	7.1175	0.0000	0.0000	0.0000	0.0000	18.1056	51.8938	91.4065	(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													
	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(64)
Efficiency of water heater												324.5200	(216)
(217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(217)
Fuel for water heating, kWh/month													
	55.0102	48.5986	51.4846	44.9001	43.2806	38.7322	38.0223	39.6750	40.2704	45.2271	48.4880	54.3596	(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	11.3091	10.2147	11.3091	10.9443	11.3091	10.9443	11.3091	11.3091	10.9443	11.3091	10.9443	11.3091	(231)
Lighting	13.0684	10.4840	9.4397	6.9159	5.3420	4.3645	4.8732	6.3343	8.2277	10.7952	12.1931	13.4316	(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	384.7494	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	324.5200	
Water heating fuel used	548.0485	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2180)		
mechanical ventilation fans (SFP = 1.2180)	133.1557	(230a)
Total electricity for the above, kWh/year	133.1557	(231)
Electricity for lighting (calculated in Appendix L)	105.4696	(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	1171.4233	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	384.7494	16.4900	63.4452	(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)	548.0485	16.4900	90.3732	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	133.1557	16.4900	21.9574	(249)
Energy for lighting	105.4696	16.4900	17.3919	(250)
Additional standing charges			0.0000	(251)
Total energy cost			193.1677	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.8381	(257)
SAP value		86.4138	
SAP rating (Section 12)		86	(258)
SAP band		B	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	384.7494	0.1568	60.3296	(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)	548.0485	0.1411	77.3114	(264)
Space and water heating			137.6410	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	105.4696	0.1443	15.2225	(268)
Total CO2, kg/year			171.3339	(272)
CO2 emissions per m2			4.5100	(273)
EI value			97.2329	
EI rating			97	(274)
EI band			A	

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

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1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		37.9700	(1b)	x 2.3600	(2b) =	89.6092	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.9700						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		89.6092	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.3500	(17)
Infiltration rate		0.1675	(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) =	0.1424	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6000	4.5000	4.5000	4.1000	4.2000	3.7000	3.5000	3.5000	3.7000	4.1000	4.1000	4.2000	(22)
Wind factor	1.1500	1.1250	1.1250	1.0250	1.0500	0.9250	0.8750	0.8750	0.9250	1.0250	1.0250	1.0500	(22a)
Adj infilt rate	0.1637	0.1602	0.1602	0.1459	0.1495	0.1317	0.1246	0.1246	0.1317	0.1459	0.1459	0.1495	(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) =	80.1000	(23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.2632	0.2597	0.2597	0.2454	0.2490	0.2312	0.2241	0.2241	0.2312	0.2454	0.2454	0.2490	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
Door			2.1500	0.7800	1.6770			(26)
Window			5.1900	0.7282	3.7791			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	51.1600	7.3400	43.8200	0.1300	5.6966	9.0000	394.3800	(29a)
Total net area of external elements Aum(A, m2)			89.1300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.5700			(33)
Main dwelling								
Party Wall 1			14.8700	0.0000	0.0000	20.0000	297.4000	(32)
Party Ceiling			37.9700			30.0000	1139.1000	(32b)
Timber			50.4000			9.0000	453.6000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5132.2300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		135.1654 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.7900	0.1150	0.6659
E3 Sill	5.7900	0.0170	0.0984
E4 Jamb	12.9000	0.0940	1.2126
E5 Ground floor (normal)	20.3000	0.0670	1.3601
E7 Party floor between dwellings (in blocks of flats)	20.3000	0.0320	0.6496
E16 Corner (normal)	12.6000	0.0680	0.8568
E17 Corner (inverted - internal area greater than external area)	2.5200	-0.0290	-0.0731
P1 Party wall - Ground floor	5.9000	0.0560	0.3304
E18 Party wall between dwellings	2.5200	0.2400	0.6048
E25 Staggered party wall between dwellings	2.5200	0.0560	0.1411

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		5.8466 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	20.4166 (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	7.7840	7.6788	7.6788	7.2577	7.3630	6.8367	6.6262	6.6262	6.8367	7.2577	7.2577	7.3630	(38)
Heat transfer coeff	28.2007	28.0954	28.0954	27.6744	27.7796	27.2534	27.0429	27.0429	27.2534	27.6744	27.6744	27.7796	(39)
Average = Sum(39)m / 12 =												27.6305	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7427	0.7399	0.7399	0.7288	0.7316	0.7178	0.7122	0.7122	0.7178	0.7288	0.7288	0.7316	(40)
HLP (average)												0.7277	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.3535	(42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	46.9130	46.2079	45.1806	43.2150	41.7644	40.1467	39.2272	40.2468	41.3644	43.1013	45.1092	46.7332	(42a)
Hot water usage for baths	20.2973	19.9959	19.5714	18.7887	18.2026	17.5528	17.2017	17.6233	18.0822	18.7776	19.5764	20.2287	(42b)
Hot water usage for other uses	28.4911	27.4550	26.4190	25.3830	24.3469	23.3109	23.3109	24.3469	25.3830	26.4190	27.4550	28.4911	(42c)
Average daily hot water use (litres/day)												87.9720	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	95.7014	93.6589	91.1710	87.3866	84.3139	81.0104	79.7399	82.2170	84.8296	88.2979	92.1406	95.4530	(44)
Energy conte	151.5676	133.3690	140.1264	119.6279	113.5028	99.6117	96.4385	101.8018	104.6034	119.8195	131.2712	149.4563	(45)
Energy content (annual)										Total = Sum(45)m =		1461.1961	
Distribution loss (46)m = 0.15 x (45)m	22.7351	20.0053	21.0190	17.9442	17.0254	14.9418	14.4658	15.2703	15.6905	17.9729	19.6907	22.4185	(46)
Water storage loss:													
Store volume												200.0000	(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
178.5190 157.7122 167.0778 145.7099 140.4542 125.6937 123.3899 128.7532 130.6854 146.7709 157.3532 176.4077 (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
178.5190 157.7122 167.0778 145.7099 140.4542 125.6937 123.3899 128.7532 130.6854 146.7709 157.3532 176.4077 (64)
Total per year (kWh/year) = Sum(64)m = 1778.5271 (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
50.3962 44.3452 46.5920 39.7763 37.7397 33.1209 32.0658 33.8491 34.7806 39.8400 43.6477 49.6942 (65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	81.2094	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5
14.9303 13.2610 10.7845 8.1646 6.1031 5.1525 5.5675 7.2368 9.7132 12.3332 14.3947 15.3453 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5
173.8268 175.6306 171.0851 161.4084 149.1932 137.7127 130.0430 128.2392 132.7847 142.4614 154.6766 166.1571 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5
44.4744 44.4744 44.4744 44.4744 44.4744 44.4744 44.4744 44.4744 44.4744 44.4744 44.4744 44.4744 (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)
-54.1396 -54.1396 -54.1396 -54.1396 -54.1396 -54.1396 -54.1396 -54.1396 -54.1396 -54.1396 -54.1396 -54.1396 (71)
Water heating gains (Table 5)
67.7369 65.9899 62.6237 55.2449 50.7254 46.0012 43.0992 45.4961 48.3064 53.5483 60.6218 66.7933 (72)
Total internal gains
328.0382 326.4256 316.0376 296.3620 277.5659 260.4106 250.2538 252.5163 262.3486 279.8872 301.2372 319.8399 (73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.6600	8.9975	0.3800	0.0000	0.7700	4.3702	(74)
South	2.8100	39.5594	0.3800	0.0000	0.7700	32.5260	(78)
West	0.7200	16.6187	0.3800	0.0000	0.7700	3.5011	(80)

Solar gains 40.3973 71.9279 103.4013 130.6221 144.0985 146.4262 138.0991 123.7917 113.2078 82.4941 50.1743 37.0263 (83)
Total gains 368.4355 398.3535 419.4389 426.9841 421.6644 406.8368 388.3529 376.3081 375.5564 362.3813 351.4116 356.8662 (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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	50.5527	50.7421	50.7421	51.5140	51.3188	52.3098	52.7170	52.7170	52.3098	51.5140	51.5140	51.3188	
alpha	4.3702	4.3828	4.3828	4.4343	4.4213	4.4873	4.5145	4.5145	4.4873	4.4343	4.4343	4.4213	
util living area	0.8914	0.8532	0.7963	0.6892	0.5512	0.3979	0.3054	0.3220	0.4892	0.7024	0.8401	0.8997	(86)
MIT	20.3416	20.4917	20.6597	20.8513	20.9534	20.9917	20.9980	20.9974	20.9782	20.8601	20.6049	20.3227	(87)
Th 2	20.3033	20.3057	20.3057	20.3154	20.3130	20.3252	20.3301	20.3301	20.3252	20.3154	20.3154	20.3130	(88)
util rest of house	0.8782	0.8365	0.7746	0.6594	0.5126	0.3545	0.2593	0.2747	0.4447	0.6681	0.8197	0.8873	(89)
MIT 2	19.5534	19.7364	19.9360	20.1647	20.2714	20.3192	20.3289	20.3286	20.3079	20.1782	19.8847	19.5386	(90)
Living area fraction									fLA = Living area / (4) =			0.4772	(91)
MIT	19.9295	20.0968	20.2814	20.4923	20.5968	20.6401	20.6482	20.6478	20.6278	20.5036	20.2284	19.9128	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9295	20.0968	20.2814	20.4923	20.5968	20.6401	20.6482	20.6478	20.6278	20.5036	20.2284	19.9128	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8704	0.8312	0.7738	0.6673	0.5288	0.3748	0.2812	0.2972	0.4648	0.6778	0.8170	0.8793	(94)
Useful gains	320.6707	331.0990	324.5569	284.9162	222.9664	152.4937	109.2167	111.8343	174.5727	245.6363	287.0870	313.8072	(95)
Ext temp.	4.7000	5.3000	6.7000	9.3000	12.3000	15.0000	16.6000	16.5000	14.1000	10.8000	7.5000	4.6000	(96)
Heat loss rate W	429.4825	415.7223	381.5738	309.7412	230.4835	153.7123	109.4757	112.1681	177.9038	268.5425	352.2503	425.3837	(97)
Space heating kWh	80.9560	56.8669	42.4206	17.8740	5.5927	0.0000	0.0000	0.0000	0.0000	17.0422	46.9175	83.0129	(98a)
Space heating requirement - total per year (kWh/year)												350.6829	
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	80.9560	56.8669	42.4206	17.8740	5.5927	0.0000	0.0000	0.0000	0.0000	17.0422	46.9175	83.0129	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												350.6829	
Space heating per m2											(98c) / (4) =	9.2358	(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													
	80.9560	56.8669	42.4206	17.8740	5.5927	0.0000	0.0000	0.0000	0.0000	17.0422	46.9175	83.0129	(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)													
	80.9560	56.8669	42.4206	17.8740	5.5927	0.0000	0.0000	0.0000	0.0000	17.0422	46.9175	83.0129	(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													
	178.5190	157.7122	167.0778	145.7099	140.4542	125.6937	123.3899	128.7532	130.6854	146.7709	157.3532	176.4077	(64)
Efficiency of water heater												324.5200	(216)
(217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(217)
Fuel for water heating, kWh/month													
	55.0102	48.5986	51.4846	44.9001	43.2806	38.7322	38.0223	39.6750	40.2704	45.2271	48.4880	54.3596	(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	11.3091	10.2147	11.3091	10.9443	11.3091	10.9443	11.3091	11.3091	10.9443	11.3091	10.9443	11.3091	(231)
Lighting	13.0684	10.4840	9.4397	6.9159	5.3420	4.3645	4.8732	6.3343	8.2277	10.7952	12.1931	13.4316	(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												350.6829	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												324.5200	
Water heating fuel used												548.0485	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2180)													
mechanical ventilation fans (SFP = 1.2180)												133.1557	(230a)
Total electricity for the above, kWh/year												133.1557	(231)
Electricity for lighting (calculated in Appendix L)												105.4696	(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												1137.3567	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	350.6829	28.4300	99.6991	(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)	548.0485	28.4300	155.8102	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	133.1557	28.4300	37.8562	(249)
Energy for lighting	105.4696	28.4300	29.9850	(250)
Additional standing charges			0.0000	(251)
Total energy cost			323.3505	(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	350.6829	0.1569	55.0125	(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)	548.0485	0.1411	77.3114	(264)
Space and water heating			132.3239	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	105.4696	0.1443	15.2225	(268)
Total CO2, kg/year			166.0168	(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	350.6829	1.5807	554.3413	(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)	548.0485	1.5216	833.9227	(278)
Space and water heating			1388.2640	(279)
Pumps, fans and electric keep-hot	133.1557	1.5128	201.4379	(281)
Energy for lighting	105.4696	1.5338	161.7728	(282)
Total Primary energy kWh/year			1751.4747	(286)