Full SAP Calculation Printout

Property Reference	78449-21	**Issued on Date**	18/08/2025
Assessment Reference	001	**Prop Type Ref**	GF Flat / Mid
Property	8 Shepherd Street, MANCHESTER, M9 4QW		

SAP Rating	88 B	**DER**	4.13	**TER**	15.88
Environmental	98 A	**% DER < TER**			73.99
CO_2 Emissions (t/year)	0.14	**DFEE**	24.40	**TFEE**	35.74
Compliance Check	See BREL	**% DFEE < TFEE**			31.73
% DPER < TPER	48.09	**DPER**	43.65	**TPER**	84.09

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		2.3400	(17)
Infiltration rate		0.1170	(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) =	0.0994	(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	0.1268	0.1243	0.1218	0.1094	0.1069	0.0945	0.0945	0.0920	0.0994	0.1069	0.1119	0.1169	(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	0.2263	0.2238	0.2213	0.2089	0.2064	0.1940	0.1940	0.1915	0.1989	0.2064	0.2114	0.2164	(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			4.4700	0.7282	3.2549			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	38.8100	6.6200	32.1900	0.1300	4.1847	9.0000	289.7100	(29a)
Total net area of external elements Aum(A, m2)			76.7800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	12.5339			(33)
Main dwelling								
Party Wall 1			27.2200	0.0000	0.0000	20.0000	544.4000	(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) =	4894.8600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		128.9139 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total

E2 Other lintels (including other steel lintels)	5.1000	0.1150	0.5865	
E3 Sill	5.1000	0.0170	0.0867	
E4 Jamb	10.8000	0.0940	1.0152	
E5 Ground floor (normal)	15.4000	0.0670	1.0318	
E7 Party floor between dwellings (in blocks of flats)	15.4000	0.0320	0.4928	
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	10.8000	0.0560	0.6048	
E18 Party wall between dwellings	2.5200	0.2400	0.6048	
E25 Staggered party wall between dwellings	5.0400	0.0560	0.2822	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.4886 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	18.0224 (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	6.6919	6.6184	6.5448	6.1772	6.1037	5.7361	5.7361	5.6626	5.8832	6.1037	6.2508	6.3978	(38)
Heat transfer coeff	24.7143	24.6408	24.5673	24.1997	24.1261	23.7585	23.7585	23.6850	23.9056	24.1261	24.2732	24.4202	(39)
Average = Sum(39)m / 12 =												24.1813	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6509	0.6490	0.6470	0.6373	0.6354	0.6257	0.6257	0.6238	0.6296	0.6354	0.6393	0.6431	(40)
HLP (average)												0.6369	
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	67.4075	74.6297	67.4075	69.6544	67.4075	69.6544	67.4075	67.4075	69.6544	67.4075	69.6544	67.4075	(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	294.9106	301.5944	287.9606	276.3452	261.3946	251.2255	240.9378	242.1262	250.2289	259.7073	277.2118	288.8284	(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)

Solar gains	43.6046	72.8247	96.9648	117.5754	130.7383	129.7432	125.0797	115.0218	103.9362	79.6516	51.9358	37.5212	(83)

Total gains	338.5153	374.4192	384.9254	393.9206	392.1329	380.9687	366.0174	357.1480	354.1651	339.3589	329.1476	326.3496	(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	55.0161	55.1802	55.3453	56.1861	56.3573	57.2293	57.2293	57.4069	56.8773	56.3573	56.0159	55.6786	
alpha	4.6677	4.6787	4.6897	4.7457	4.7572	4.8153	4.8153	4.8271	4.7918	4.7572	4.7344	4.7119	
util living area													
	0.8944	0.8469	0.7909	0.6863	0.5543	0.3962	0.2851	0.3044	0.4593	0.6838	0.8357	0.9046	(86)
MIT	20.4100	20.5724	20.7217	20.8788	20.9621	20.9940	20.9990	20.9987	20.9876	20.8982	20.6642	20.3811	(87)
Th 2	20.3844	20.3861	20.3879	20.3965	20.3982	20.4069	20.4069	20.4086	20.4034	20.3982	20.3948	20.3913	(88)
util rest of house													
	0.8827	0.8316	0.7712	0.6602	0.5221	0.3604	0.2469	0.2655	0.4214	0.6533	0.8174	0.8938	(89)
MIT 2	19.7048	19.9024	20.0822	20.2710	20.3628	20.4023	20.4063	20.4078	20.3934	20.2967	20.0238	19.6755	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	20.0413	20.2222	20.3874	20.5610	20.6488	20.6847	20.6892	20.6898	20.6770	20.5838	20.3294	20.0122	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0413	20.2222	20.3874	20.5610	20.6488	20.6847	20.6892	20.6898	20.6770	20.5838	20.3294	20.0122	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8756	0.8273	0.7712	0.6674	0.5356	0.3772	0.2651	0.2840	0.4388	0.6629	0.8153	0.8865	(94)
Useful gains	296.4101	309.7628	296.8354	262.9211	210.0362	143.7161	97.0329	101.4353	155.4244	224.9745	268.3427	289.3064	(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													
	389.0364	377.5502	341.1745	282.1933	215.8997	144.5633	97.1530	101.6037	157.2258	240.8693	321.1191	386.1381	(97)
Space heating kWh													
	68.9139	45.5531	32.9883	13.8760	4.3624	0.0000	0.0000	0.0000	0.0000	11.8257	37.9990	72.0428	(98a)
Space heating requirement - total per year (kWh/year)												287.5612	
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													
	68.9139	45.5531	32.9883	13.8760	4.3624	0.0000	0.0000	0.0000	0.0000	11.8257	37.9990	72.0428	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												287.5612	
Space heating per m2											(98c) / (4) =	7.5734	(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													
	68.9139	45.5531	32.9883	13.8760	4.3624	0.0000	0.0000	0.0000	0.0000	11.8257	37.9990	72.0428	(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		(210)
Space heating fuel (main heating system)													
	68.9139	45.5531	32.9883	13.8760	4.3624	0.0000	0.0000	0.0000	0.0000	11.8257	37.9990	72.0428	(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	13.5004	10.8306	9.7517	7.1445	5.5186	4.5088	5.0343	6.5438	8.4997	11.1521	12.5962	13.8757	(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												287.5612	(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)	108.9563	(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	1077.7218	(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	287.5612	0.1572	45.2179	(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			122.5293	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	108.9563	0.1443	15.7258	(268)
Total CO2, kg/year			156.7254	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1300	(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	287.5612	1.5821	454.9539	(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			1288.8767	(279)
Pumps, fans and electric keep-hot	133.1557	1.5128	201.4379	(281)
Energy for lighting	108.9563	1.5338	167.1209	(282)
Total Primary energy kWh/year			1657.4355	(286)
Dwelling Primary energy Rate (DPER)			43.6500	(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)

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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	
TER Opaque door			2.1500	1.0000	2.1500			(26)
TER Opening Type			4.4700	1.1450	5.1183			(27)
GF			37.9700	0.1300	4.9361			(28a)
Main	38.8100	6.2200	32.1900	0.1800	5.7942			(29a)
Total net area of external elements Aum(A, m2)			76.7800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		17.9986			(33)
Main dwelling								
Party Wall 1			27.2200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 138.9139 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.1000	0.0500	0.2550
E3 Sill	5.1000	0.0500	0.2550
E4 Jamb	10.8000	0.0500	0.5400
E5 Ground floor (normal)	15.4000	0.1600	2.4640
E7 Party floor between dwellings (in blocks of flats)	15.4000	0.0700	1.0780
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	10.8000	0.0800	0.8640
E18 Party wall between dwellings	2.5200	0.0600	0.1512
E25 Staggered party wall between dwellings	5.0400	0.0600	0.3024

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.8168 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 24.8154 (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	43.4893	43.3383	43.1903	42.4952	42.3651	41.7597	41.7597	41.6475	41.9929	42.3651	42.6282	42.9033	(39)

Average = Sum(39)m / 12 = 42.4945

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1454	1.1414	1.1375	1.1192	1.1158	1.0998	1.0998	1.0969	1.1059	1.1158	1.1227	1.1299	(40)
HLP (average)												1.1192	
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 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)

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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	65.4789	72.4945	65.4789	67.6615	65.4789	67.6615	65.4789	65.4789	67.6615	65.4789	67.6615	65.4789	(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

	346.0841	352.5612	339.1340	327.4544	312.5681	299.3346	289.1112	290.2996	298.3381	310.8808	328.3210	340.0019 (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)

Solar gains	45.5439	76.0635	101.2772	122.8044	136.5527	135.5134	130.6424	120.1373	108.5587	83.1940	54.2455	39.1899 (83)
Total gains	391.6280	428.6248	440.4112	450.2588	449.1208	434.8480	419.7537	410.4369	406.8967	394.0747	382.5665	379.1918 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	33.6900	33.8074	33.9232	34.4782	34.5840	35.0854	35.0854	35.1799	34.8906	34.5840	34.3706	34.1502	
alpha	3.2460	3.2538	3.2615	3.2985	3.3056	3.3390	3.3390	3.3453	3.3260	3.3056	3.2914	3.2767	
util living area	0.9331	0.9096	0.8788	0.8155	0.7152	0.5616	0.4217	0.4466	0.6260	0.8086	0.9009	0.9383	(86)
MIT	19.4276	19.6570	19.9553	20.3546	20.6802	20.8982	20.9703	20.9634	20.8456	20.4642	19.9129	19.4026	(87)
Th 2	19.9640	19.9672	19.9703	19.9852	19.9880	20.0010	20.0010	20.0034	19.9960	19.9880	19.9824	19.9765	(88)
util rest of house	0.9221	0.8952	0.8589	0.7844	0.6661	0.4891	0.3323	0.3575	0.5568	0.7713	0.8829	0.9281	(89)
MIT 2	18.1741	18.4597	18.8299	19.3211	19.6950	19.9281	19.9866	19.9845	19.8771	19.4592	18.7927	18.1516	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	18.7723	19.0311	19.3669	19.8143	20.1651	20.3910	20.4560	20.4517	20.3393	19.9388	19.3273	18.7486	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7723	19.0311	19.3669	19.8143	20.1651	20.3910	20.4560	20.4517	20.3393	19.9388	19.3273	18.7486	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9066	0.8796	0.8455	0.7786	0.6753	0.5184	0.3738	0.3985	0.5816	0.7693	0.8692	0.9130	(94)
Useful gains	355.0307	377.0359	372.3463	350.5740	303.2715	225.4122	156.9122	163.5524	236.6520	303.1467	332.5204	346.2076	(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	629.3890	612.4174	555.7277	463.8067	358.6268	241.8317	161.0259	168.7415	262.0066	395.6381	521.2271	624.1838	(97)
Space heating kWh	204.1226	158.1763	136.4358	81.5275	41.1844	0.0000	0.0000	0.0000	0.0000	68.8136	135.8688	206.8142	(98a)
Space heating requirement - total per year (kWh/year)												1032.9432	
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	204.1226	158.1763	136.4358	81.5275	41.1844	0.0000	0.0000	0.0000	0.0000	68.8136	135.8688	206.8142	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1032.9432	
Space heating per m2											(98c) / (4) =	27.2042	(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	204.1226	158.1763	136.4358	81.5275	41.1844	0.0000	0.0000	0.0000	0.0000	68.8136	135.8688	206.8142	(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)	221.1512	171.3720	147.8177	88.3288	44.6201	0.0000	0.0000	0.0000	0.0000	74.5543	147.2035	224.0674	(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	84.3839	84.0839	83.6121	82.7764	81.6324	79.8000	79.8000	79.8000	79.8000	82.4221	83.7199	84.4353	(217)
Fuel for water heating, kWh/month	209.4188	186.1084	199.5640	179.1253	177.3442	164.8970	163.8339	169.5781	170.5829	182.4957	189.0110	207.2613	(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	13.6052	10.9146	9.8274	7.2000	5.5615	4.5438	5.0734	6.5945	8.5657	11.2386	12.6940	13.9834	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-18.3889	-26.2500	-38.2205	-43.5891	-47.5889	-44.7066	-44.2359	-41.5216	-36.7467	-30.3811	-20.3628	-15.8670	(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	-9.4088	-19.9034	-39.7394	-59.9177	-79.4083	-79.7844	-78.7658	-66.5369	-48.6209	-28.4473	-12.5639	-7.4254	(233b)

Electricity generated by wind turbines (Appendix M) (negative quantity)

(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)

Electricity generated by hydro-electric generators (Appendix M) (negative quantity)

(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)

Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)

(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1119.1150	(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	2199.2206	(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)	109.8019	(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	2575.7563	(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	1119.1150	0.2100	235.0142	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2199.2206	0.2100	461.8363	(264)
Space and water heating			696.8505	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	109.8019	0.1443	15.8478	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8591	0.1343	-54.7615	
PV Unit electricity exported	-530.5221	0.1258	-66.7429	
Total			-121.5044	(269)
Total CO2, kg/year			603.1231	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.8800	(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	1119.1150	1.1300	1264.6000	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2199.2206	1.1300	2485.1192	(278)
Space and water heating			3749.7192	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	109.8019	1.5338	168.4179	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8591	1.4962	-610.2410	
PV Unit electricity exported	-530.5221	0.4618	-244.9912	
Total			-855.2322	(283)
Total Primary energy kWh/year			3193.0057	(286)
Target Primary Energy Rate (TPER)			84.0900	(287)

Full SAP Calculation Printout

Property Reference	78449-21	**Issued on Date**	18/08/2025
Assessment Reference	001	**Prop Type Ref**	GF Flat / Mid
Property	8 Shepherd Street, MANCHESTER, M9 4QW		

SAP Rating	88 B	**DER**	4.13	**TER**	15.88
Environmental	98 A	**% DER < TER**			73.99
CO_2 Emissions (t/year)	0.14	**DFEE**	24.40	**TFEE**	35.74
Compliance Check	See BREL	**% DFEE < TFEE**			31.73
% DPER < TPER	48.09	**DPER**	43.65	**TPER**	84.09

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		2.3400	(17)
Infiltration rate		0.3402	(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) =	0.2892	(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	0.3687	0.3615	0.3542	0.3181	0.3108	0.2747	0.2747	0.2675	0.2892	0.3108	0.3253	0.3398	(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	0.5680	0.5653	0.5627	0.5506	0.5483	0.5377	0.5377	0.5358	0.5418	0.5483	0.5529	0.5577	(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			4.4700	0.7282	3.2549			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	38.8100	6.6200	32.1900	0.1300	4.1847	9.0000	289.7100	(29a)
Total net area of external elements Aum(A, m2)			76.7800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.5339			(33)
Main dwelling								
Party Wall 1			27.2200	0.0000	0.0000	20.0000	544.4000	(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) =	5274.5600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		138.9139 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.1000	0.1150	0.5865
E3 Sill	5.1000	0.0170	0.0867
E4 Jamb	10.8000	0.0940	1.0152

E5 Ground floor (normal)	15.4000	0.0670	1.0318	
E7 Party floor between dwellings (in blocks of flats)	15.4000	0.0320	0.4928	
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	10.8000	0.0560	0.6048	
E18 Party wall between dwellings	2.5200	0.2400	0.6048	
E25 Staggered party wall between dwellings	5.0400	0.0560	0.2822	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.4886 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 18.0224 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	16.7953	16.7172	16.6407	16.2814	16.2142	15.9013	15.9013	15.8433	16.0218	16.2142	16.3502	16.4924	(38)

Heat transfer coeff

	34.8177	34.7396	34.6631	34.3038	34.2366	33.9237	33.9237	33.8657	34.0442	34.2366	34.3726	34.5148	(39)

Average = Sum(39)m / 12 = 34.3035

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9170	0.9149	0.9129	0.9034	0.9017	0.8934	0.8934	0.8919	0.8966	0.9017	0.9053	0.9090	(40)
HLP (average)												0.9034	
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

	67.4075	74.6297	67.4075	69.6544	67.4075	69.6544	67.4075	67.4075	69.6544	67.4075	69.6544	67.4075	(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

	261.8673	269.4248	257.8085	251.0589	238.9705	231.8243	223.6032	223.4142	229.8529	235.9589	248.8192	256.4472	(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)

Solar gains	43.6046	72.8247	96.9648	117.5754	130.7383	129.7432	125.0797	115.0218	103.9362	79.6516	51.9358	37.5212	(83)
Total gains	305.4720	342.2495	354.7734	368.6343	369.7089	361.5675	348.6829	338.4360	333.7891	315.6105	300.7549	293.9684	(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	42.0808	42.1753	42.2684	42.7111	42.7950	43.1898	43.1898	43.2637	43.0368	42.7950	42.6257	42.4501	
alpha	3.8054	3.8117	3.8179	3.8474	3.8530	3.8793	3.8793	3.8842	3.8691	3.8530	3.8417	3.8300	
util living area	0.9571	0.9341	0.9043	0.8380	0.7309	0.5643	0.4188	0.4478	0.6384	0.8389	0.9300	0.9620	(86)
MIT	19.6538	19.8836	20.1525	20.5036	20.7746	20.9387	20.9849	20.9802	20.8978	20.5729	20.0743	19.6135	(87)
Th 2	20.1531	20.1548	20.1565	20.1646	20.1661	20.1731	20.1731	20.1744	20.1704	20.1661	20.1630	20.1599	(88)
util rest of house	0.9501	0.9238	0.8890	0.8120	0.6883	0.5018	0.3438	0.3723	0.5783	0.8084	0.9173	0.9558	(89)
MIT 2	18.9343	19.1588	19.4201	19.7573	20.0006	20.1374	20.1669	20.1658	20.1065	19.8275	19.3540	18.9001	(90)
Living area fraction											fLA = Living area / (4) =	0.4772	(91)
MIT	19.2776	19.5047	19.7696	20.1134	20.3700	20.5198	20.5572	20.5544	20.4841	20.1832	19.6978	19.2405	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2776	19.5047	19.7696	20.1134	20.3700	20.5198	20.5572	20.5544	20.4841	20.1832	19.6978	19.2405	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9414	0.9146	0.8811	0.8102	0.6993	0.5287	0.3791	0.4076	0.6018	0.8091	0.9091	0.9475	(94)
Useful gains	287.5698	313.0145	312.5969	298.6844	258.5194	191.1503	132.1895	137.9376	200.8881	255.3454	273.4276	278.5368	(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	521.4869	507.3603	459.9657	384.6644	296.8303	200.8203	134.2444	140.6932	217.3423	328.0961	433.0177	519.1212	(97)
Space heating kWh	174.0343	130.6004	109.6424	61.9056	28.5033	0.0000	0.0000	0.0000	0.0000	54.1266	114.9049	178.9948	(98a)
Space heating requirement - total per year (kWh/year)												852.7122	
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	174.0343	130.6004	109.6424	61.9056	28.5033	0.0000	0.0000	0.0000	0.0000	54.1266	114.9049	178.9948	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												852.7122	
Space heating per m2											(98c) / (4) =	22.4575	(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	318.8826	251.0353	257.3796	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8692	0.9216	0.9100	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	277.1647	231.3648	234.2197	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	393.4028	379.9217	369.2923	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	83.6914	110.5263	100.4940	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	20.9229	27.6316	25.1235	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												73.6779	(107)
Energy for space heating												22.4575	(99)
Energy for space cooling												1.9404	(108)
Total												24.3979	(109)
Fabric Energy Efficiency (DFEE)												24.4	(109)

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

---

1. Overall dwelling characteristics

		Area (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	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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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			4.4700	1.1450	5.1183			(27)
GF			37.9700	0.1300	4.9361			(28a)
Main	38.8100	6.6200	32.1900	0.1800	5.7942			(29a)
Total net area of external elements Aum(A, m2)			76.7800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		17.9986			(33)
Main dwelling								
Party Wall 1			27.2200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	138.9139	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.1000	0.0500	0.2550
E3 Sill	5.1000	0.0500	0.2550
E4 Jamb	10.8000	0.0500	0.5400
E5 Ground floor (normal)	15.4000	0.1600	2.4640
E7 Party floor between dwellings (in blocks of flats)	15.4000	0.0700	1.0780
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	10.8000	0.0800	0.8640
E18 Party wall between dwellings	2.5200	0.0600	0.1512
E25 Staggered party wall between dwellings	5.0400	0.0600	0.3024

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	6.8168	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	24.8154	(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	43.4893	43.3383	43.1903	42.4952	42.3651	41.7597	41.7597	41.6475	41.9929	42.3651	42.6282	42.9033	(39)
Average = Sum(39)m / 12 =												42.4945	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1454	1.1414	1.1375	1.1192	1.1158	1.0998	1.0998	1.0969	1.1059	1.1158	1.1227	1.1299	(40)
HLP (average)												1.1192	
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													
	65.4789	72.4945	65.4789	67.6615	65.4789	67.6615	65.4789	65.4789	67.6615	65.4789	67.6615	65.4789	(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													
	259.9388	267.2895	255.8800	249.0660	237.0420	229.8314	221.6747	221.4856	227.8600	234.0304	246.8263	254.5186	(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)

Solar gains	45.5439	76.0635	101.2772	122.8044	136.5527	135.5134	130.6424	120.1373	108.5587	83.1940	54.2455	39.1899	(83)
Total gains	305.4827	343.3531	357.1572	371.8704	373.5947	365.3448	352.3171	341.6228	336.4186	317.2243	301.0719	293.7085	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	33.6900	33.8074	33.9232	34.4782	34.5840	35.0854	35.0854	35.1799	34.8906	34.5840	34.3706	34.1502	
alpha	3.2460	3.2538	3.2615	3.2985	3.3056	3.3390	3.3390	3.3453	3.3260	3.3056	3.2914	3.2767	
util living area													
	0.9643	0.9468	0.9243	0.8736	0.7877	0.6384	0.4913	0.5221	0.7085	0.8751	0.9440	0.9680	(86)
MIT	19.1188	19.3743	19.7066	20.1688	20.5619	20.8498	20.9531	20.9416	20.7735	20.2838	19.6478	19.0898	(87)
Th 2	19.9640	19.9672	19.9703	19.9852	19.9880	20.0010	20.0010	20.0034	19.9960	19.9880	19.9824	19.9765	(88)
util rest of house													
	0.9578	0.9374	0.9101	0.8487	0.7434	0.5635	0.3913	0.4231	0.6405	0.8460	0.9324	0.9622	(89)
MIT 2	18.2705	18.5226	18.8492	19.3028	19.6655	19.9142	19.9826	19.9790	19.8545	19.4196	18.8051	18.2510	(90)
Living area fraction									fLA = Living area / (4) =			0.4772	(91)
MIT	18.6753	18.9291	19.2584	19.7161	20.0933	20.3607	20.4457	20.4384	20.2931	19.8320	19.2073	18.6513	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6753	18.9291	19.2584	19.7161	20.0933	20.3607	20.4457	20.4384	20.2931	19.8320	19.2073	18.6513	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9475	0.9256	0.8985	0.8412	0.7484	0.5919	0.4372	0.4678	0.6621	0.8408	0.9215	0.9526	(94)
Useful gains	289.4340	317.8246	320.8950	312.8213	279.6084	216.2368	154.0380	159.8259	222.7356	266.7334	277.4516	279.7745	(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													
	625.1719	607.9967	551.0377	459.6303	355.5811	240.5635	160.5967	168.1877	260.0653	391.1152	516.1108	620.0088	(97)
Space heating kWh													
	249.7890	194.9957	171.2262	105.7025	56.5237	0.0000	0.0000	0.0000	0.0000	92.5400	171.8347	253.1343	(98a)
Space heating requirement - total per year (kWh/year)												1295.7461	
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													
	249.7890	194.9957	171.2262	105.7025	56.5237	0.0000	0.0000	0.0000	0.0000	92.5400	171.8347	253.1343	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1295.7461	
Space heating per m2										(98c) / (4) =		34.1255	(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	392.5407	309.0214	316.5212	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7767	0.8469	0.8304	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	304.8873	261.7117	262.8314	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	399.9784	386.2413	375.0344	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	68.4656	92.6500	83.4790	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	17.1164	23.1625	20.8697	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												61.1486	(107)
Energy for space heating												34.1255	(99)
Energy for space cooling												1.6104	(108)
Total												35.7360	(109)
Fabric Energy Efficiency (TFEE)												35.7	(109)

Full SAP Calculation Printout

Property Reference	78449-21	**Issued on Date**	18/08/2025
Assessment Reference	001	**Prop Type Ref**	GF Flat / Mid
Property	8 Shepherd Street, MANCHESTER, M9 4QW		

SAP Rating	88 B	**DER**	4.13	**TER**	15.88
Environmental	98 A	**% DER < TER**			73.99
CO_2 Emissions (t/year)	0.14	**DFEE**	24.40	**TFEE**	35.74
Compliance Check	See BREL	**% DFEE < TFEE**			31.73
% DPER < TPER	48.09	**DPER**	43.65	**TPER**	84.09

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		2.3400	(17)
Infiltration rate		0.1170	(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) =	0.0994	(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	0.1268	0.1243	0.1218	0.1094	0.1069	0.0945	0.0945	0.0920	0.0994	0.1069	0.1119	0.1169	(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	0.2263	0.2238	0.2213	0.2089	0.2064	0.1940	0.1940	0.1915	0.1989	0.2064	0.2114	0.2164	(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			4.4700	0.7282	3.2549			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	38.8100	6.6200	32.1900	0.1300	4.1847	9.0000	289.7100	(29a)
Total net area of external elements Aum(A, m2)			76.7800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	12.5339			(33)
Main dwelling								
Party Wall 1			27.2200	0.0000	0.0000	20.0000	544.4000	(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) =	4894.8600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		128.9139 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total

E2 Other lintels (including other steel lintels)	5.1000	0.1150	0.5865	
E3 Sill	5.1000	0.0170	0.0867	
E4 Jamb	10.8000	0.0940	1.0152	
E5 Ground floor (normal)	15.4000	0.0670	1.0318	
E7 Party floor between dwellings (in blocks of flats)	15.4000	0.0320	0.4928	
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	10.8000	0.0560	0.6048	
E18 Party wall between dwellings	2.5200	0.2400	0.6048	
E25 Staggered party wall between dwellings	5.0400	0.0560	0.2822	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.4886 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	18.0224 (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	6.6919	6.6184	6.5448	6.1772	6.1037	5.7361	5.7361	5.6626	5.8832	6.1037	6.2508	6.3978	(38)
Heat transfer coeff	24.7143	24.6408	24.5673	24.1997	24.1261	23.7585	23.7585	23.6850	23.9056	24.1261	24.2732	24.4202	(39)
Average = Sum(39)m / 12 =												24.1813	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6509	0.6490	0.6470	0.6373	0.6354	0.6257	0.6257	0.6238	0.6296	0.6354	0.6393	0.6431	(40)
HLP (average)												0.6369	
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	67.4075	74.6297	67.4075	69.6544	67.4075	69.6544	67.4075	67.4075	69.6544	67.4075	69.6544	67.4075	(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	294.9106	301.5944	287.9606	276.3452	261.3946	251.2255	240.9378	242.1262	250.2289	259.7073	277.2118	288.8284	(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)

Solar gains	43.6046	72.8247	96.9648	117.5754	130.7383	129.7432	125.0797	115.0218	103.9362	79.6516	51.9358	37.5212	(83)

Total gains	338.5153	374.4192	384.9254	393.9206	392.1329	380.9687	366.0174	357.1480	354.1651	339.3589	329.1476	326.3496	(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	55.0161	55.1802	55.3453	56.1861	56.3573	57.2293	57.2293	57.4069	56.8773	56.3573	56.0159	55.6786	
alpha	4.6677	4.6787	4.6897	4.7457	4.7572	4.8153	4.8153	4.8271	4.7918	4.7572	4.7344	4.7119	
util living area													
	0.8944	0.8469	0.7909	0.6863	0.5543	0.3962	0.2851	0.3044	0.4593	0.6838	0.8357	0.9046	(86)
MIT	20.4100	20.5724	20.7217	20.8788	20.9621	20.9940	20.9990	20.9987	20.9876	20.8982	20.6642	20.3811	(87)
Th 2	20.3844	20.3861	20.3879	20.3965	20.3982	20.4069	20.4069	20.4086	20.4034	20.3982	20.3948	20.3913	(88)
util rest of house													
	0.8827	0.8316	0.7712	0.6602	0.5221	0.3604	0.2469	0.2655	0.4214	0.6533	0.8174	0.8938	(89)
MIT 2	19.7048	19.9024	20.0822	20.2710	20.3628	20.4023	20.4063	20.4078	20.3934	20.2967	20.0238	19.6755	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	20.0413	20.2222	20.3874	20.5610	20.6488	20.6847	20.6892	20.6898	20.6770	20.5838	20.3294	20.0122	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0413	20.2222	20.3874	20.5610	20.6488	20.6847	20.6892	20.6898	20.6770	20.5838	20.3294	20.0122	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8756	0.8273	0.7712	0.6674	0.5356	0.3772	0.2651	0.2840	0.4388	0.6629	0.8153	0.8865	(94)
Useful gains	296.4101	309.7628	296.8354	262.9211	210.0362	143.7161	97.0329	101.4353	155.4244	224.9745	268.3427	289.3064	(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													
	389.0364	377.5502	341.1745	282.1933	215.8997	144.5633	97.1530	101.6037	157.2258	240.8693	321.1191	386.1381	(97)
Space heating kWh													
	68.9139	45.5531	32.9883	13.8760	4.3624	0.0000	0.0000	0.0000	0.0000	11.8257	37.9990	72.0428	(98a)
Space heating requirement - total per year (kWh/year)												287.5612	
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													
	68.9139	45.5531	32.9883	13.8760	4.3624	0.0000	0.0000	0.0000	0.0000	11.8257	37.9990	72.0428	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												287.5612	
Space heating per m2											(98c) / (4) =	7.5734	(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													
	68.9139	45.5531	32.9883	13.8760	4.3624	0.0000	0.0000	0.0000	0.0000	11.8257	37.9990	72.0428	(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		(210)
Space heating fuel (main heating system)													
	68.9139	45.5531	32.9883	13.8760	4.3624	0.0000	0.0000	0.0000	0.0000	11.8257	37.9990	72.0428	(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	13.5004	10.8306	9.7517	7.1445	5.5186	4.5088	5.0343	6.5438	8.4997	11.1521	12.5962	13.8757	(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												287.5612	(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)	108.9563	(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	1077.7218	(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	287.5612	0.1572	45.2179	(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			122.5293	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	108.9563	0.1443	15.7258	(268)
Total CO2, kg/year			156.7254	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1300	(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	287.5612	1.5821	454.9539	(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			1288.8767	(279)
Pumps, fans and electric keep-hot	133.1557	1.5128	201.4379	(281)
Energy for lighting	108.9563	1.5338	167.1209	(282)
Total Primary energy kWh/year			1657.4355	(286)
Dwelling Primary energy Rate (DPER)			43.6500	(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)

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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	
TER Opaque door			2.1500	1.0000	2.1500			(26)
TER Opening Type			4.4700	1.1450	5.1183			(27)
GF			37.9700	0.1300	4.9361			(28a)
Main	38.8100	6.2200	32.1900	0.1800	5.7942			(29a)
Total net area of external elements Aum(A, m2)			76.7800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		17.9986			(33)
Main dwelling								
Party Wall 1			27.2200	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 138.9139 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.1000	0.0500	0.2550
E3 Sill	5.1000	0.0500	0.2550
E4 Jamb	10.8000	0.0500	0.5400
E5 Ground floor (normal)	15.4000	0.1600	2.4640
E7 Party floor between dwellings (in blocks of flats)	15.4000	0.0700	1.0780
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	10.8000	0.0800	0.8640
E18 Party wall between dwellings	2.5200	0.0600	0.1512
E25 Staggered party wall between dwellings	5.0400	0.0600	0.3024

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.8168 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 24.8154 (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	43.4893	43.3383	43.1903	42.4952	42.3651	41.7597	41.7597	41.6475	41.9929	42.3651	42.6282	42.9033	(39)

Average = Sum(39)m / 12 = 42.4945

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1454	1.1414	1.1375	1.1192	1.1158	1.0998	1.0998	1.0969	1.1059	1.1158	1.1227	1.1299	(40)
HLP (average)												1.1192	
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 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)

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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	65.4789	72.4945	65.4789	67.6615	65.4789	67.6615	65.4789	65.4789	67.6615	65.4789	67.6615	65.4789	(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

	346.0841	352.5612	339.1340	327.4544	312.5681	299.3346	289.1112	290.2996	298.3381	310.8808	328.3210	340.0019 (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)

Solar gains	45.5439	76.0635	101.2772	122.8044	136.5527	135.5134	130.6424	120.1373	108.5587	83.1940	54.2455	39.1899 (83)
Total gains	391.6280	428.6248	440.4112	450.2588	449.1208	434.8480	419.7537	410.4369	406.8967	394.0747	382.5665	379.1918 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	33.6900	33.8074	33.9232	34.4782	34.5840	35.0854	35.0854	35.1799	34.8906	34.5840	34.3706	34.1502	
alpha	3.2460	3.2538	3.2615	3.2985	3.3056	3.3390	3.3390	3.3453	3.3260	3.3056	3.2914	3.2767	
util living area	0.9331	0.9096	0.8788	0.8155	0.7152	0.5616	0.4217	0.4466	0.6260	0.8086	0.9009	0.9383	(86)
MIT	19.4276	19.6570	19.9553	20.3546	20.6802	20.8982	20.9703	20.9634	20.8456	20.4642	19.9129	19.4026	(87)
Th 2	19.9640	19.9672	19.9703	19.9852	19.9880	20.0010	20.0010	20.0034	19.9960	19.9880	19.9824	19.9765	(88)
util rest of house	0.9221	0.8952	0.8589	0.7844	0.6661	0.4891	0.3323	0.3575	0.5568	0.7713	0.8829	0.9281	(89)
MIT 2	18.1741	18.4597	18.8299	19.3211	19.6950	19.9281	19.9866	19.9845	19.8771	19.4592	18.7927	18.1516	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	18.7723	19.0311	19.3669	19.8143	20.1651	20.3910	20.4560	20.4517	20.3393	19.9388	19.3273	18.7486	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7723	19.0311	19.3669	19.8143	20.1651	20.3910	20.4560	20.4517	20.3393	19.9388	19.3273	18.7486	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9066	0.8796	0.8455	0.7786	0.6753	0.5184	0.3738	0.3985	0.5816	0.7693	0.8692	0.9130	(94)
Useful gains	355.0307	377.0359	372.3463	350.5740	303.2715	225.4122	156.9122	163.5524	236.6520	303.1467	332.5204	346.2076	(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	629.3890	612.4174	555.7277	463.8067	358.6268	241.8317	161.0259	168.7415	262.0066	395.6381	521.2271	624.1838	(97)
Space heating kWh	204.1226	158.1763	136.4358	81.5275	41.1844	0.0000	0.0000	0.0000	0.0000	68.8136	135.8688	206.8142	(98a)
Space heating requirement - total per year (kWh/year)												1032.9432	
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	204.1226	158.1763	136.4358	81.5275	41.1844	0.0000	0.0000	0.0000	0.0000	68.8136	135.8688	206.8142	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1032.9432	
Space heating per m2											(98c) / (4) =	27.2042	(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	204.1226	158.1763	136.4358	81.5275	41.1844	0.0000	0.0000	0.0000	0.0000	68.8136	135.8688	206.8142	(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)	221.1512	171.3720	147.8177	88.3288	44.6201	0.0000	0.0000	0.0000	0.0000	74.5543	147.2035	224.0674	(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	84.3839	84.0839	83.6121	82.7764	81.6324	79.8000	79.8000	79.8000	79.8000	82.4221	83.7199	84.4353	(217)
Fuel for water heating, kWh/month	209.4188	186.1084	199.5640	179.1253	177.3442	164.8970	163.8339	169.5781	170.5829	182.4957	189.0110	207.2613	(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	13.6052	10.9146	9.8274	7.2000	5.5615	4.5438	5.0734	6.5945	8.5657	11.2386	12.6940	13.9834	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-18.3889	-26.2500	-38.2205	-43.5891	-47.5889	-44.7066	-44.2359	-41.5216	-36.7467	-30.3811	-20.3628	-15.8670	(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	-9.4088	-19.9034	-39.7394	-59.9177	-79.4083	-79.7844	-78.7658	-66.5369	-48.6209	-28.4473	-12.5639	-7.4254	(233b)

Electricity generated by wind turbines (Appendix M) (negative quantity)

(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)

Electricity generated by hydro-electric generators (Appendix M) (negative quantity)

(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)

Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)

(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1119.1150	(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	2199.2206	(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)	109.8019	(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	2575.7563	(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	1119.1150	0.2100	235.0142	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2199.2206	0.2100	461.8363	(264)
Space and water heating			696.8505	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	109.8019	0.1443	15.8478	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8591	0.1343	-54.7615	
PV Unit electricity exported	-530.5221	0.1258	-66.7429	
Total			-121.5044	(269)
Total CO2, kg/year			603.1231	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.8800	(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	1119.1150	1.1300	1264.6000	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2199.2206	1.1300	2485.1192	(278)
Space and water heating			3749.7192	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	109.8019	1.5338	168.4179	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8591	1.4962	-610.2410	
PV Unit electricity exported	-530.5221	0.4618	-244.9912	
Total			-855.2322	(283)
Total Primary energy kWh/year			3193.0057	(286)
Target Primary Energy Rate (TPER)			84.0900	(287)

Full SAP Calculation Printout

Property Reference	78449-21	**Issued on Date**	18/08/2025
Assessment Reference	001	**Prop Type Ref**	GF Flat / Mid
Property	8 Shepherd Street, MANCHESTER, M9 4QW		

SAP Rating	88 B	**DER**	4.13	**TER**	15.88
Environmental	98 A	**% DER < TER**			73.99
CO_2 Emissions (t/year)	0.14	**DFEE**	24.40	**TFEE**	35.74
Compliance Check	See BREL	**% DFEE < TFEE**			31.73
% DPER < TPER	48.09	**DPER**	43.65	**TPER**	84.09

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		2.3400	(17)
Infiltration rate		0.1170	(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) =	0.0994	(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	0.1268	0.1243	0.1218	0.1094	0.1069	0.0945	0.0945	0.0920	0.0994	0.1069	0.1119	0.1169	(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	0.2263	0.2238	0.2213	0.2089	0.2064	0.1940	0.1940	0.1915	0.1989	0.2064	0.2114	0.2164	(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			4.4700	0.7282	3.2549			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	38.8100	6.6200	32.1900	0.1300	4.1847	9.0000	289.7100	(29a)
Total net area of external elements Aum(A, m2)			76.7800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.5339			(33)
Main dwelling								
Party Wall 1			27.2200	0.0000	0.0000	20.0000	544.4000	(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) =	5274.5600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		138.9139 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total

E2 Other lintels (including other steel lintels)	5.1000	0.1150	0.5865	
E3 Sill	5.1000	0.0170	0.0867	
E4 Jamb	10.8000	0.0940	1.0152	
E5 Ground floor (normal)	15.4000	0.0670	1.0318	
E7 Party floor between dwellings (in blocks of flats)	15.4000	0.0320	0.4928	
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	10.8000	0.0560	0.6048	
E18 Party wall between dwellings	2.5200	0.2400	0.6048	
E25 Staggered party wall between dwellings	5.0400	0.0560	0.2822	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.4886 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 18.0224 (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	6.6919	6.6184	6.5448	6.1772	6.1037	5.7361	5.7361	5.6626	5.8832	6.1037	6.2508	6.3978	(38)
Heat transfer coeff	24.7143	24.6408	24.5673	24.1997	24.1261	23.7585	23.7585	23.6850	23.9056	24.1261	24.2732	24.4202	(39)

Average = Sum(39)m / 12 = 24.1813

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6509	0.6490	0.6470	0.6373	0.6354	0.6257	0.6257	0.6238	0.6296	0.6354	0.6393	0.6431	(40)
HLP (average)												0.6369	
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	15.4239	13.6994	11.1411	8.4345	6.3049	5.3229	5.7515	7.4761	10.0344	12.7409	14.8705	15.8526	(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	328.5318	326.8640	316.3941	296.6319	277.7677	260.5810	250.4379	252.7556	262.6697	280.2949	301.7131	320.3472	(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)

Solar gains	43.6046	72.8247	96.9648	117.5754	130.7383	129.7432	125.0797	115.0218	103.9362	79.6516	51.9358	37.5212	(83)
Total gains	372.1364	399.6888	413.3589	414.2073	408.5060	390.3242	375.5175	367.7774	366.6059	359.9465	353.6489	357.8684	(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	59.2837	59.4606	59.6385	60.5445	60.7290	61.6686	61.6686	61.8600	61.2893	60.7290	60.3611	59.9976	
alpha	4.9522	4.9640	4.9759	5.0363	5.0486	5.1112	5.1112	5.1240	5.0860	5.0486	5.0241	4.9998	
util living area	0.8720	0.8292	0.7653	0.6657	0.5369	0.3876	0.2781	0.2958	0.4456	0.6586	0.8138	0.8847	(86)
MIT	20.5534	20.6693	20.7979	20.9132	20.9743	20.9962	20.9994	20.9992	20.9920	20.9295	20.7480	20.5248	(87)
Th 2	20.3844	20.3861	20.3879	20.3965	20.3982	20.4069	20.4069	20.4086	20.4034	20.3982	20.3948	20.3913	(88)
util rest of house	0.8582	0.8125	0.7441	0.6390	0.5049	0.3523	0.2407	0.2580	0.4084	0.6275	0.7936	0.8720	(89)
MIT 2	19.8769	20.0167	20.1694	20.3082	20.3748	20.4040	20.4066	20.4082	20.3971	20.3294	20.1207	19.8487	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	20.1997	20.3281	20.4693	20.5970	20.6609	20.6866	20.6895	20.6902	20.6810	20.6158	20.4201	20.1714	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.1997	20.3281	20.4693	20.5970	20.6609	20.6866	20.6895	20.6902	20.6810	20.6158	20.4201	20.1714	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8538	0.8108	0.7470	0.6480	0.5190	0.3690	0.2585	0.2760	0.4258	0.6389	0.7945	0.8670	(94)
Useful gains	317.7299	324.0740	308.7844	268.4165	212.0058	144.0386	97.0890	101.5136	156.0998	229.9730	280.9749	310.2814	(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	392.9511	380.1614	343.1876	283.0624	216.1916	144.6089	97.1608	101.6146	157.3223	241.6427	323.3201	390.0239	(97)
Space heating kWh	55.9646	37.6907	25.5959	10.5450	3.1142	0.0000	0.0000	0.0000	0.0000	8.6822	30.4885	59.3284	(98a)
Space heating requirement - total per year (kWh/year)												231.4097	
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	55.9646	37.6907	25.5959	10.5450	3.1142	0.0000	0.0000	0.0000	0.0000	8.6822	30.4885	59.3284	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												231.4097	
Space heating per m2											(98c) / (4) =	6.0945	(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	55.9646	37.6907	25.5959	10.5450	3.1142	0.0000	0.0000	0.0000	0.0000	8.6822	30.4885	59.3284	(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)	55.9646	37.6907	25.5959	10.5450	3.1142	0.0000	0.0000	0.0000	0.0000	8.6822	30.4885	59.3284	(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	13.5004	10.8306	9.7517	7.1445	5.5186	4.5088	5.0343	6.5438	8.4997	11.1521	12.5962	13.8757	(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	231.4097	(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)	108.9563	(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	1021.5703	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	231.4097	16.4900	38.1595	(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	108.9563	16.4900	17.9669	(250)
Additional standing charges			0.0000	(251)
Total energy cost			168.4569	(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] =	0.7309	(257)
SAP value		88.1518	
SAP rating (Section 12)		88	(258)
SAP band		B	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	231.4097	0.1575	36.4430	(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			113.7545	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	108.9563	0.1443	15.7258	(268)
Total CO2, kg/year			147.9506	(272)
CO2 emissions per m2			3.9000	(273)
EI value			97.6105	
EI rating			98	(274)
EI band			A	

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
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		2.3400	(17)
Infiltration rate		0.1170	(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) = 0.0994 (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	0.1144	0.1119	0.1119	0.1019	0.1044	0.0920	0.0870	0.0870	0.0920	0.1019	0.1019	0.1044	(22b)
Effective ac	0.2139	0.2114	0.2114	0.2014	0.2039	0.1915	0.1865	0.1865	0.1915	0.2014	0.2014	0.2039	(25)

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)

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			4.4700	0.7282	3.2549			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	38.8100	6.6200	32.1900	0.1300	4.1847	9.0000	289.7100	(29a)
Total net area of external elements Aum(A, m2)			76.7800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.5339			(33)
Main dwelling								
Party Wall 1			27.2200	0.0000	0.0000	20.0000	544.4000	(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) = 5274.5600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 138.9139 (35)
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.1000	0.1150	0.5865
E3 Sill	5.1000	0.0170	0.0867
E4 Jamb	10.8000	0.0940	1.0152
E5 Ground floor (normal)	15.4000	0.0670	1.0318
E7 Party floor between dwellings (in blocks of flats)	15.4000	0.0320	0.4928
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	10.8000	0.0560	0.6048
E18 Party wall between dwellings	2.5200	0.2400	0.6048
E25 Staggered party wall between dwellings	5.0400	0.0560	0.2822

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.4886 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 18.0224 (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	6.3243	6.2508	6.2508	5.9567	6.0302	5.6626	5.5156	5.5156	5.6626	5.9567	5.9567	6.0302	(38)
Heat transfer coeff	24.3467	24.2732	24.2732	23.9791	24.0526	23.6850	23.5380	23.5380	23.6850	23.9791	23.9791	24.0526	(39)
Average = Sum(39)m / 12 =												23.9485	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6412	0.6393	0.6393	0.6315	0.6335	0.6238	0.6199	0.6199	0.6238	0.6315	0.6315	0.6335	(40)
HLP (average)												0.6307	
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

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)

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

	15.4239	13.6994	11.1411	8.4345	6.3049	5.3229	5.7515	7.4761	10.0344	12.7409	14.8705	15.8526	(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

	328.5318	326.8640	316.3941	296.6319	277.7677	260.5810	250.4379	252.7556	262.6697	280.2949	301.7131	320.3472	(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	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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	36.8962	64.7331	90.9045	112.0885	121.8862	123.2561	116.4763	105.4977	98.5135	73.6174	45.6405	33.9477	(83)
Total gains	365.4280	391.5971	407.2986	408.7205	399.6539	383.8371	366.9142	358.2533	361.1831	353.9123	347.3536	354.2950	(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	60.1788	60.3611	60.3611	61.1014	60.9146	61.8600	62.2465	62.2465	61.8600	61.1014	61.1014	60.9146	
alpha	5.0119	5.0241	5.0241	5.0734	5.0610	5.1240	5.1498	5.1498	5.1240	5.0734	5.0734	5.0610	
util living area	0.8661	0.8225	0.7610	0.6509	0.5140	0.3688	0.2820	0.2953	0.4482	0.6545	0.8046	0.8764	(86)
MIT	20.5920	20.7002	20.8113	20.9261	20.9804	20.9972	20.9994	20.9993	20.9921	20.9340	20.7746	20.5727	(87)
Th 2	20.3931	20.3948	20.3948	20.4017	20.4000	20.4086	20.4121	20.4121	20.4086	20.4017	20.4017	20.4000	(88)
util rest of house	0.8517	0.8051	0.7396	0.6235	0.4808	0.3329	0.2444	0.2569	0.4111	0.6229	0.7835	0.8628	(89)
MIT 2	19.9315	20.0615	20.1914	20.3273	20.3826	20.4066	20.4118	20.4117	20.4024	20.3376	20.1584	19.9145	(90)

Living area fraction fLA = Living area / (4) = 0.4772 (91)

MIT	20.2467	20.3663	20.4872	20.6130	20.6679	20.6884	20.6922	20.6921	20.6838	20.6222	20.4525	20.2286	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2467	20.3663	20.4872	20.6130	20.6679	20.6884	20.6922	20.6921	20.6838	20.6222	20.4525	20.2286	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8480	0.8042	0.7429	0.6333	0.4957	0.3499	0.2623	0.2752	0.4284	0.6347	0.7854	0.8587	(94)
Useful gains	309.8731	314.9331	302.5925	258.8433	198.1160	134.3211	96.2503	98.5802	154.7325	224.6273	272.7963	304.2360	(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	378.5099	365.7060	334.6597	271.2763	201.2692	134.7309	96.3228	98.6737	155.9373	235.5276	310.5892	375.9081	(97)
Space heating kWh	51.0658	34.1194	23.8580	8.9518	2.3460	0.0000	0.0000	0.0000	0.0000	8.1099	27.2109	53.3240	(98a)

Space heating requirement - total per year (kWh/year) 208.9857

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	51.0658	34.1194	23.8580	8.9518	2.3460	0.0000	0.0000	0.0000	0.0000	8.1099	27.2109	53.3240	(98c)

Space heating requirement after solar contribution - total per year (kWh/year) 208.9857

Space heating per m2 (98c) / (4) = 5.5040 (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	51.0658	34.1194	23.8580	8.9518	2.3460	0.0000	0.0000	0.0000	0.0000	8.1099	27.2109	53.3240	(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)	51.0658	34.1194	23.8580	8.9518	2.3460	0.0000	0.0000	0.0000	0.0000	8.1099	27.2109	53.3240	(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 13.5004 10.8306 9.7517 7.1445 5.5186 4.5088 5.0343 6.5438 8.4997 11.1521 12.5962 13.8757 (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 1 208.9857 (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) 108.9563 (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 999.1463 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	208.9857	28.4300	59.4146	(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	108.9563	28.4300	30.9763	(250)
Additional standing charges			0.0000	(251)
Total energy cost			284.0573	(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	208.9857	0.1576	32.9265	(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			110.2379	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	108.9563	0.1443	15.7258	(268)
Total CO2, kg/year			144.4340	(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	208.9857	1.5833	330.8772	(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			1164.7999	(279)
Pumps, fans and electric keep-hot	133.1557	1.5128	201.4379	(281)
Energy for lighting	108.9563	1.5338	167.1209	(282)
Total Primary energy kWh/year			1533.3587	(286)

SAP 10 EPC IMPROVEMENTS

001

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

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

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

Typical annual savings | Energy efficiency | Environmental impact

Recommended measures
(none)

Total Savings £0 0.00 kg/m²

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

Fuel prices for cost data on this page from database revision number 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	£284	£284	£0
Space heating	£97	£97	£0
Water heating	£156	£156	£0
Lighting	£31	£31	£0
Total cost of fuels	£284	£284	£0
Total cost of uses	£284	£284	£0
Delivered energy	26 kWh/m²	26 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.1 tonnes	0.1 tonnes	0.0 tonnes
CO2 emissions per m²	4 kg/m²	4 kg/m²	0 kg/m²
Primary energy	40 kWh/m²	40 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)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		2.3400	(17)
Infiltration rate		0.1170	(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) =	0.0994	(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	0.1268	0.1243	0.1218	0.1094	0.1069	0.0945	0.0945	0.0920	0.0994	0.1069	0.1119	0.1169	(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	0.2263	0.2238	0.2213	0.2089	0.2064	0.1940	0.1940	0.1915	0.1989	0.2064	0.2114	0.2164	(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	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
Door			2.1500	0.7800	1.6770			(26)
Window			4.4700	0.7282	3.2549			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	38.8100	6.2200	32.1900	0.1300	4.1847	9.0000	289.7100	(29a)
Total net area of external elements Aum(A, m2)			76.7800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.5339			(33)
Main dwelling								
Party Wall 1			27.2200	0.0000	0.0000	20.0000	544.4000	(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) =	5274.5600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		138.9139 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.1000	0.1150	0.5865
E3 Sill	5.1000	0.0170	0.0867
E4 Jamb	10.8000	0.0940	1.0152
E5 Ground floor (normal)	15.4000	0.0670	1.0318
E7 Party floor between dwellings (in blocks of flats)	15.4000	0.0320	0.4928
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	10.8000	0.0560	0.6048
E18 Party wall between dwellings	2.5200	0.2400	0.6048
E25 Staggered party wall between dwellings	5.0400	0.0560	0.2822

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		5.4886 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	18.0224 (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	6.6919	6.6184	6.5448	6.1772	6.1037	5.7361	5.7361	5.6626	5.8832	6.1037	6.2508	6.3978	(38)
Heat transfer coeff	24.7143	24.6408	24.5673	24.1997	24.1261	23.7585	23.7585	23.6850	23.9056	24.1261	24.2732	24.4202	(39)
Average = Sum(39)m / 12 =												24.1813	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6509	0.6490	0.6470	0.6373	0.6354	0.6257	0.6257	0.6238	0.6296	0.6354	0.6393	0.6431	(40)
HLP (average)												0.6369	
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	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)

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	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	15.4239	13.6994	11.1411	8.4345	6.3049	5.3229	5.7515	7.4761	10.0344	12.7409	14.8705	15.8526	(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

	328.5318	326.8640	316.3941	296.6319	277.7677	260.5810	250.4379	252.7556	262.6697	280.2949	301.7131	320.3472 (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)

Solar gains	43.6046	72.8247	96.9648	117.5754	130.7383	129.7432	125.0797	115.0218	103.9362	79.6516	51.9358	37.5212	(83)
Total gains	372.1364	399.6888	413.3589	414.2073	408.5060	390.3242	375.5175	367.7774	366.6059	359.9465	353.6489	357.8684	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	59.2837	59.4606	59.6385	60.5445	60.7290	61.6686	61.6686	61.8600	61.2893	60.7290	60.3611	59.9976	
alpha	4.9522	4.9640	4.9759	5.0363	5.0486	5.1112	5.1112	5.1240	5.0860	5.0486	5.0241	4.9998	
util living area	0.8720	0.8292	0.7653	0.6657	0.5369	0.3876	0.2781	0.2958	0.4456	0.6586	0.8138	0.8847	(86)
MIT	20.5534	20.6693	20.7979	20.9132	20.9743	20.9962	20.9994	20.9992	20.9920	20.9295	20.7480	20.5248	(87)
Th 2	20.3844	20.3861	20.3879	20.3965	20.3982	20.4069	20.4069	20.4086	20.4034	20.3982	20.3948	20.3913	(88)
util rest of house	0.8582	0.8125	0.7441	0.6390	0.5049	0.3523	0.2407	0.2580	0.4084	0.6275	0.7936	0.8720	(89)
MIT 2	19.8769	20.0167	20.1694	20.3082	20.3748	20.4040	20.4066	20.4082	20.3971	20.3294	20.1207	19.8487	(90)
Living area fraction										fLA = Living area / (4) =		0.4772	(91)
MIT	20.1997	20.3281	20.4693	20.5970	20.6609	20.6866	20.6895	20.6902	20.6810	20.6158	20.4201	20.1714	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.1997	20.3281	20.4693	20.5970	20.6609	20.6866	20.6895	20.6902	20.6810	20.6158	20.4201	20.1714	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8538	0.8108	0.7470	0.6480	0.5190	0.3690	0.2585	0.2760	0.4258	0.6389	0.7945	0.8670	(94)
Useful gains	317.7299	324.0740	308.7844	268.4165	212.0058	144.0386	97.0890	101.5136	156.0998	229.9730	280.9749	310.2814	(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	392.9511	380.1614	343.1876	283.0624	216.1916	144.6089	97.1608	101.6146	157.3223	241.6427	323.3201	390.0239	(97)
Space heating kWh	55.9646	37.6907	25.5959	10.5450	3.1142	0.0000	0.0000	0.0000	0.0000	8.6822	30.4885	59.3284	(98a)
Space heating requirement - total per year (kWh/year)												231.4097	
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	55.9646	37.6907	25.5959	10.5450	3.1142	0.0000	0.0000	0.0000	0.0000	8.6822	30.4885	59.3284	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												231.4097	
Space heating per m2											(98c) / (4) =	6.0945	(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	55.9646	37.6907	25.5959	10.5450	3.1142	0.0000	0.0000	0.0000	0.0000	8.6822	30.4885	59.3284	(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)	55.9646	37.6907	25.5959	10.5450	3.1142	0.0000	0.0000	0.0000	0.0000	8.6822	30.4885	59.3284	(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	13.5004	10.8306	9.7517	7.1445	5.5186	4.5088	5.0343	6.5438	8.4997	11.1521	12.5962	13.8757	(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	231.4097	(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)	108.9563	(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	1021.5703	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	231.4097	16.4900	38.1595	(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	108.9563	16.4900	17.9669	(250)
Additional standing charges			0.0000	(251)
Total energy cost			168.4569	(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] =	0.7309	(257)
SAP value		88.1518	
SAP rating (Section 12)		88	(258)
SAP band		B	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	231.4097	0.1575	36.4430	(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			113.7545	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	108.9563	0.1443	15.7258	(268)
Total CO2, kg/year			147.9506	(272)
CO2 emissions per m2			3.9000	(273)
EI value			97.6105	
EI rating			98	(274)
EI band			A	

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

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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		2.3400	(17)
Infiltration rate		0.1170	(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) =	0.0994	(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	0.1144	0.1119	0.1119	0.1019	0.1044	0.0920	0.0870	0.0870	0.0920	0.1019	0.1019	0.1044	(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	0.2139	0.2114	0.2114	0.2014	0.2039	0.1915	0.1865	0.1865	0.1915	0.2014	0.2014	0.2039	(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								
Door			2.1500	0.7800	1.6770			(26)
Window			4.4700	0.7282	3.2549			(27)
GF			37.9700	0.0900	3.4173	75.0000	2847.7500	(28a)
Main	38.8100	6.6200	32.1900	0.1300	4.1847	9.0000	289.7100	(29a)
Total net area of external elements Aum(A, m2)			76.7800					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		12.5339			(33)
Main dwelling								
Party Wall 1			27.2200	0.0000	0.0000	20.0000	544.4000	(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) = 5274.5600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	138.9139 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.1000	0.1150	0.5865
E3 Sill	5.1000	0.0170	0.0867
E4 Jamb	10.8000	0.0940	1.0152
E5 Ground floor (normal)	15.4000	0.0670	1.0318
E7 Party floor between dwellings (in blocks of flats)	15.4000	0.0320	0.4928
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	10.8000	0.0560	0.6048
E18 Party wall between dwellings	2.5200	0.2400	0.6048
E25 Staggered party wall between dwellings	5.0400	0.0560	0.2822

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	5.4886 (36)
Point Thermal bridges	(36a) = 0.0000
Total fabric heat loss	(33) + (36) + (36a) = 18.0224 (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	6.3243	6.2508	6.2508	5.9567	6.0302	5.6626	5.5156	5.5156	5.6626	5.9567	5.9567	6.0302	(38)
Heat transfer coeff	24.3467	24.2732	24.2732	23.9791	24.0526	23.6850	23.5380	23.5380	23.6850	23.9791	23.9791	24.0526	(39)
Average = Sum(39)m / 12 =												23.9485	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6412	0.6393	0.6393	0.6315	0.6335	0.6238	0.6199	0.6199	0.6238	0.6315	0.6315	0.6335	(40)
HLP (average)												0.6307	
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	
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

	15.4239	13.6994	11.1411	8.4345	6.3049	5.3229	5.7515	7.4761	10.0344	12.7409	14.8705	15.8526	(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

	328.5318	326.8640	316.3941	296.6319	277.7677	260.5810	250.4379	252.7556	262.6697	280.2949	301.7131	320.3472	(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)

Solar gains	36.8962	64.7331	90.9045	112.0885	121.8862	123.2561	116.4763	105.4977	98.5135	73.6174	45.6405	33.9477	(83)
Total gains	365.4280	391.5971	407.2986	408.7205	399.6539	383.8371	366.9142	358.2533	361.1831	353.9123	347.3536	354.2950	(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	60.1788	60.3611	60.3611	61.1014	60.9146	61.8600	62.2465	62.2465	61.8600	61.1014	61.1014	60.9146	
alpha	5.0119	5.0241	5.0241	5.0734	5.0610	5.1240	5.1498	5.1498	5.1240	5.0734	5.0734	5.0610	
util living area	0.8661	0.8225	0.7610	0.6509	0.5140	0.3688	0.2820	0.2953	0.4482	0.6545	0.8046	0.8764	(86)
MIT	20.5920	20.7002	20.8113	20.9261	20.9804	20.9972	20.9994	20.9993	20.9921	20.9340	20.7746	20.5727	(87)
Th 2	20.3931	20.3948	20.3948	20.4017	20.4000	20.4086	20.4121	20.4121	20.4086	20.4017	20.4017	20.4000	(88)
util rest of house	0.8517	0.8051	0.7396	0.6235	0.4808	0.3329	0.2444	0.2569	0.4111	0.6229	0.7835	0.8628	(89)
MIT 2	19.9315	20.0615	20.1914	20.3273	20.3826	20.4066	20.4118	20.4117	20.4024	20.3376	20.1584	19.9145	(90)

Living area fraction fLA = Living area / (4) = 0.4772 (91)

MIT	20.2467	20.3663	20.4872	20.6130	20.6679	20.6884	20.6922	20.6921	20.6838	20.6222	20.4525	20.2286	(92)

Temperature adjustment 0.0000

adjusted MIT	20.2467	20.3663	20.4872	20.6130	20.6679	20.6884	20.6922	20.6921	20.6838	20.6222	20.4525	20.2286	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8480	0.8042	0.7429	0.6333	0.4957	0.3499	0.2623	0.2752	0.4284	0.6347	0.7854	0.8587	(94)
Useful gains	309.8731	314.9331	302.5925	258.8433	198.1160	134.3211	96.2503	98.5802	154.7325	224.6273	272.7963	304.2360	(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

	378.5099	365.7060	334.6597	271.2763	201.2692	134.7309	96.3228	98.6737	155.9373	235.5276	310.5892	375.9081	(97)

Space heating kWh

	51.0658	34.1194	23.8580	8.9518	2.3460	0.0000	0.0000	0.0000	0.0000	8.1099	27.2109	53.3240	(98a)

Space heating requirement - total per year (kWh/year) 208.9857

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

	51.0658	34.1194	23.8580	8.9518	2.3460	0.0000	0.0000	0.0000	0.0000	8.1099	27.2109	53.3240	(98c)

Space heating requirement after solar contribution - total per year (kWh/year) 208.9857

Space heating per m2 (98c) / (4) = 5.5040 (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	51.0658	34.1194	23.8580	8.9518	2.3460	0.0000	0.0000	0.0000	0.0000	8.1099	27.2109	53.3240	(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)	51.0658	34.1194	23.8580	8.9518	2.3460	0.0000	0.0000	0.0000	0.0000	8.1099	27.2109	53.3240	(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	13.5004	10.8306	9.7517	7.1445	5.5186	4.5088	5.0343	6.5438	8.4997	11.1521	12.5962	13.8757	(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	208.9857 (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)	108.9563 (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	999.1463 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	208.9857	28.4300	59.4146	(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	108.9563	28.4300	30.9763	(250)
Additional standing charges			0.0000	(251)
Total energy cost			284.0573	(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	208.9857	0.1576	32.9265	(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			110.2379	(265)
Pumps, fans and electric keep-hot	133.1557	0.1387	18.4703	(267)
Energy for lighting	108.9563	0.1443	15.7258	(268)
Total CO2, kg/year			144.4340	(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	208.9857	1.5833	330.8772	(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			1164.7999	(279)
Pumps, fans and electric keep-hot	133.1557	1.5128	201.4379	(281)
Energy for lighting	108.9563	1.5338	167.1209	(282)
Total Primary energy kWh/year			1533.3587	(286)