Full SAP Calculation Printout

Property Reference	4907-P635-7667-Meadowvale_End	**Issued on Date**	22/04/2025
Assessment Reference	Plot XX	**Prop Type Ref**	Meadowvale End (AS)
Property	Plot XX, Meadowvale End (AS)		

SAP Rating	86 B	**DER**	3.27	**TER**	10.04
Environmental	97 A	**% DER < TER**			67.43
CO_2 Emissions (t/year)	0.3	**DFEE**	34.55	**TFEE**	35.95
Compliance Check	See BREL	**% DFEE < TFEE**			3.89
% DPER < TPER	34.62	**DPER**	34.17	**TPER**	52.26

Assessor Details	Mr. Mitchell Bennellick	**Assessor ID**	P635-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (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	50.9100 (1b)	x	2.3900 (2b)	=	121.6749	(1b) - (3b)
First floor	49.2100 (1c)	x	2.6100 (2c)	=	128.4381	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	100.1200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	250.1130	(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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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								
Front Door			2.1300	1.1000	2.3430			(26)
Windows			16.9000	1.1450	19.3511			(27)
French Doors			3.7800	1.1450	4.3282			(27)
Jetfloor 150/150 Grey			50.9100	0.1100	5.6001	75.0000	3818.2500	(28a)
External Wall - 150mm FF AAC	106.5218	22.8100	83.7118	0.1800	15.0681	60.0000	5022.7081	(29a)
500mm Mineral Wool	49.2100		49.2100	0.0900	4.4289	9.0000	442.8900	(30)
Bay Plane	1.7000		1.7000	0.1000	0.1700	9.0000	15.3000	(30)
Total net area of external elements Aum(A, m2)			208.3418					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.2895			(33)
Main dwelling								
E-WM-28			45.1000	0.0000	0.0000	110.0000	4960.9998	(32)
GF - Masonry			25.3800			75.0000	1903.4999	(32c)
GF - Timber			59.7200			9.0000	537.4800	(32c)
1F - Timber			107.7900			9.0000	970.1100	(32c)
Internal Floor			49.2100			18.0000	885.7800	(32d)

Internal Ceiling	49.2100		9.0000	442.8900 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 18999.9079 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 189.7714 (35)
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.2700	0.0670	0.6211
E2 Other lintels (including other steel lintels)	1.0130	0.0670	0.0679
E1 Steel lintel with perforated steel base plate	2.4800	0.1770	0.4390
E3 Sill	13.8000	0.0380	0.5244
E4 Jamb	4.2000	0.0410	0.1722
E4 Jamb	24.3000	0.0410	0.9963
E5 Ground floor (normal)	11.5100	0.0520	0.5985
E5 Ground floor (normal)	10.6400	0.0450	0.4788
E6 Intermediate floor within a dwelling	18.4300	0.0010	0.0184
E10 Eaves (insulation at ceiling level)	6.9700	0.0530	0.3694
E12 Gable (insulation at ceiling level)	13.5600	0.0770	1.0441
E16 Corner (normal)	21.1000	0.0410	0.8651
E17 Corner (inverted - internal area greater than external area)	11.1000	-0.0860	-0.9546
P1 Party wall - Ground floor	9.0200	0.0580	0.5232
E18 Party wall between dwellings	10.0000	0.0380	0.3800
P2 Party wall - Intermediate floor within a dwelling	9.0200	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.0200	0.0740	0.6675
E4 Jamb	3.0000	0.1000	0.3000
E24 Eaves (insulation at ceiling level - inverted)	2.1000	0.1500	0.3150
E10 Eaves (insulation at ceiling level)	2.1000	0.1200	0.2520
E12 Gable (insulation at ceiling level)	1.6300	0.2500	0.4075

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.0857 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 59.3753 (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	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	(38)
Heat transfer coeff	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	(39)
Average = Sum(39)m / 12 =												100.6439	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	(40)
HLP (average)												1.0052	
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 2.7406 (42)
Hot water usage for mixer showers

70.1712	69.1167	67.5800	64.6399	62.4701	60.0504	58.6751	60.2001	61.8719	64.4699	67.4731	69.9024	(42a)

Hot water usage for baths

30.2991	29.8492	29.2155	28.0471	27.1722	26.2021	25.6781	26.3074	26.9925	28.0305	29.2230	30.1967	(42b)

Hot water usage for other uses

42.6968	41.1442	39.5916	38.0390	36.4864	34.9338	34.9338	36.4864	38.0390	39.5916	41.1442	42.6968	(42c)

Average daily hot water use (litres/day) 131.6029 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.1672	140.1100	136.3871	130.7260	126.1287	121.1864	119.2870	122.9939	126.9034	132.0920	137.8404	142.7959	(44)
Energy conte	226.7418	199.5148	209.6219	178.9573	169.7935	149.0128	144.2673	152.2921	156.4845	179.2476	196.3789	223.5839	(45)
Energy content (annual)										Total = Sum(45)m =		2185.8965	
Distribution loss (46)m = 0.15 x (45)m	34.0113	29.9272	31.4433	26.8436	25.4690	22.3519	21.6401	22.8438	23.4727	26.8871	29.4568	33.5376	(46)
Water storage loss:													
Store volume												180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1800	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6372	(55)
Total storage loss	19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(56)
If cylinder contains dedicated solar storage	19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(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	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(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	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(64)
										Total per year (kWh/year) = Sum(64)m =		2692.3705	(64)
12Total per year (kWh/year)												2692	(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	109.8041	97.4209	104.1118	92.8057	90.8688	82.8491	82.3814	85.0496	85.3335	94.0123	98.5984	108.7541	(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	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	130.1767	144.1242	130.1767	134.5159	130.1767	134.5159	130.1767	130.1767	134.5159	130.1767	134.5159	130.1767	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	256.5216	259.1835	252.4756	238.1953	220.1690	203.2269	191.9085	189.2466	195.9545	210.2347	228.2610	245.2032	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	(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)	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	(71)
Water heating gains (Table 5)	147.5862	144.9716	139.9352	128.8968	122.1355	115.0683	110.7276	114.3140	118.5188	126.3606	136.9422	146.1749	(72)
Total internal gains													

	598.3940	612.3888	586.6970	565.7176	536.5908	516.9205	496.9223	497.8468	513.0986	530.8816	563.8286	585.6643	(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	0.9800	10.6334	0.3100	0.0000	0.7700	2.4874	(74)
East	5.2200	19.6403	0.3100	0.0000	0.7700	24.4720	(76)
South	8.3900	46.7521	0.3100	0.0000	0.7700	93.6300	(78)
West	2.3100	19.6403	0.3100	0.0000	0.7700	10.8296	(80)
West	3.7800	19.6403	0.3500	0.0000	0.7700	20.0077	(80)

Solar gains	151.4268	266.2923	381.5927	493.6122	566.0122	566.1277	544.1714	490.5494	420.9937	299.4368	183.0163	128.4623	(83)
Total gains	749.8208	878.6811	968.2896	1059.3297	1102.6030	1083.0482	1041.0937	988.3962	934.0923	830.3184	746.8450	714.1266	(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	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	
alpha	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	
util living area													
	0.9851	0.9697	0.9406	0.8701	0.7454	0.5700	0.4201	0.4600	0.6809	0.8986	0.9714	0.9879	(86)
Living	19.7121	19.9497	20.2500	20.5952	20.8440	20.9634	20.9925	20.9887	20.9201	20.5891	20.0793	19.6530	
Non living	18.9142	19.1472	19.4379	19.7599	19.9736	20.0607	20.0766	20.0751	20.0345	19.7622	19.2771	18.8558	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.3411	19.9497	20.2500	20.5952	20.8440	20.9634	20.9925	20.9887	20.9201	20.5891	20.0793	19.8414	(87)
Th 2	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	(88)
util rest of house													
	0.9816	0.9629	0.9271	0.8418	0.6949	0.4968	0.3346	0.3718	0.6094	0.8699	0.9636	0.9850	(89)
MIT 2	19.4831	19.1472	19.4379	19.7599	19.9736	20.0607	20.0766	20.0751	20.0345	19.7622	19.2771	19.0269	(90)
Living area fraction										fLA = Living area / (4) =		0.1767	(91)
MIT	19.6347	19.2890	19.5814	19.9075	20.1274	20.2202	20.2384	20.2365	20.1910	19.9083	19.4188	19.1708	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6347	19.2890	19.5814	19.9075	20.1274	20.2202	20.2384	20.2365	20.1910	19.9083	19.4188	19.1708	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9796	0.9555	0.9185	0.8359	0.6978	0.5084	0.3496	0.3872	0.6186	0.8637	0.9566	0.9814	(94)
Useful gains	734.5158	839.6204	889.3534	885.4651	769.3615	550.6522	364.0146	382.6671	577.8235	717.1558	714.4363	700.8171	(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													
	1543.3456	1448.1601	1316.5626	1107.8407	848.1675	565.6415	366.1854	386.1249	613.0174	936.8258	1239.8134	1506.7240	(97)
Space heating kWh													
	601.7693	408.9387	317.8436	160.1104	58.6317	0.0000	0.0000	0.0000	0.0000	163.4345	378.2715	599.5947	(98a)
Space heating requirement - total per year (kWh/year)												2688.5945	
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													
	601.7693	408.9387	317.8436	160.1104	58.6317	0.0000	0.0000	0.0000	0.0000	163.4345	378.2715	599.5947	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2688.5945	
Space heating per m2											(98c) / (4) =	26.8537	(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 %)	261.6872	(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													
	601.7693	408.9387	317.8436	160.1104	58.6317	0.0000	0.0000	0.0000	0.0000	163.4345	378.2715	599.5947	(98)
Space heating efficiency (main heating system 1)													
	261.6872	261.6872	261.6872	261.6872	261.6872	0.0000	0.0000	0.0000	0.0000	261.6872	261.6872	261.6872	(210)
Space heating fuel (main heating system)													
	229.9575	156.2700	121.4594	61.1839	22.4053	0.0000	0.0000	0.0000	0.0000	62.4541	144.5510	229.1265	(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													
	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(64)
Efficiency of water heater												290.3703	(216)
(217)m	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	(217)
Fuel for water heating, kWh/month													
	92.9012	82.0909	87.0053	75.9669	73.2889	65.6544	64.4980	67.2616	68.2275	76.5447	81.9667	91.8136	(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	3.5189	3.1784	3.5189	3.4054	3.5189	3.4054	3.5189	3.5189	3.4054	3.5189	3.4054	3.5189	(231)
Lighting	26.3435	21.1338	19.0286	13.9412	10.7686	8.7980	9.8234	12.7689	16.5855	21.7611	24.5791	27.0757	(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	1027.4078	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	290.3703	
Water heating fuel used	927.2196	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 5.0240, total flow = 37.0000, SFP = 0.1358)		
mechanical ventilation fans (SFP = 0.1358)	41.4328	(230a)
Total electricity for the above, kWh/year	41.4328	(231)
Electricity for lighting (calculated in Appendix L)	212.6073	(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	2208.6675	(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	1027.4078	0.1562	160.4450	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	927.2196	0.1410	130.7742	(264)
Space and water heating			291.2191	(265)
Pumps, fans and electric keep-hot	41.4328	0.1387	5.7472	(267)
Energy for lighting	212.6073	0.1443	30.6858	(268)
Total CO2, kg/year			327.6522	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.2700	(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	1027.4078	1.5781	1621.3669	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	927.2196	1.5215	1410.7814	(278)
Space and water heating			3032.1483	(279)
Pumps, fans and electric keep-hot	41.4328	1.5128	62.6795	(281)
Energy for lighting	212.6073	1.5338	326.1042	(282)
Total Primary energy kWh/year			3420.9321	(286)
Dwelling Primary energy Rate (DPER)			34.1700	(287)

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.9100	(1b) x	2.3900	(2b) =	121.6749	(1b) - (3b)
First floor	49.2100	(1c) x	2.6100	(2c) =	128.4381	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	100.1200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		250.1130	(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	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1599 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4099 (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) =	0.3484 (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	0.4443	0.4355	0.4268	0.3833	0.3746	0.3310	0.3310	0.3223	0.3484	0.3746	0.3920	0.4094	(22b)
Effective ac	0.5987	0.5949	0.5911	0.5735	0.5702	0.5548	0.5548	0.5519	0.5607	0.5702	0.5768	0.5838	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1300	1.0000	2.1300			(26)
TER Opening Type			20.6800	1.1450	23.6794			(27)
Jetfloor 150/150 Grey			50.9100	0.1300	6.6183			(28a)
External Wall - 150mm FF AAC	106.5218	22.8100	83.7118	0.1800	15.0681			(29a)
500mm Mineral Wool	49.2100		49.2100	0.1100	5.4131			(30)
Bay Plane	1.7000		1.7000	0.1100	0.1870			(30)
Total net area of external elements Aum(A, m2)			208.3418					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		53.0959			(33)
Main dwelling								
E-WM-28			45.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 189.7714 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.2700	0.0500	0.4635
E2 Other lintels (including other steel lintels)	1.0130	0.0500	0.0507
E1 Steel lintel with perforated steel base plate	2.4800	0.0500	0.1240
E3 Sill	13.8000	0.0500	0.6900
E4 Jamb	4.2000	0.0500	0.2100
E4 Jamb	24.3000	0.0500	1.2150
E5 Ground floor (normal)	11.5100	0.1600	1.8416
E5 Ground floor (normal)	10.6400	0.1600	1.7024
E6 Intermediate floor within a dwelling	18.4300	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	6.9700	0.0600	0.4182
E12 Gable (insulation at ceiling level)	13.5600	0.0600	0.8136
E16 Corner (normal)	21.1000	0.0900	1.8990
E17 Corner (inverted - internal area greater than external area)	11.1000	-0.0900	-0.9990
P1 Party wall - Ground floor	9.0200	0.0800	0.7216
E18 Party wall between dwellings	10.0000	0.0600	0.6000
P2 Party wall - Intermediate floor within a dwelling	9.0200	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.0200	0.1200	1.0824
E4 Jamb	3.0000	0.0500	0.1500
E24 Eaves (insulation at ceiling level - inverted)	2.1000	0.2400	0.5040
E10 Eaves (insulation at ceiling level)	2.1000	0.0600	0.1260
E12 Gable (insulation at ceiling level)	1.6300	0.0600	0.0978

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		11.7107 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	64.8067 (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	49.4137	49.0974	48.7874	47.3312	47.0588	45.7905	45.7905	45.5557	46.2790	47.0588	47.6099	48.1861	(38)
Heat transfer coeff	114.2203	113.9041	113.5940	112.1379	111.8655	110.5972	110.5972	110.3623	111.0857	111.8655	112.4166	112.9928	(39)
Average = Sum(39)m / 12 =												112.1366	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1408	1.1377	1.1346	1.1200	1.1173	1.1046	1.1046	1.1023	1.1095	1.1173	1.1228	1.1286	(40)
HLP (average)												1.1200	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.7406 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
70.1712	69.1167	67.5800	64.6399	62.4701	60.0504	58.6751	60.2001	61.8719	64.4699	67.4731	69.9024	(42a)

Hot water usage for baths

30.2991	29.8492	29.2155	28.0471	27.1722	26.2021	25.6781	26.3074	26.9925	28.0305	29.2230	30.1967	(42b)

Hot water usage for other uses

42.6968	41.1442	39.5916	38.0390	36.4864	34.9338	34.9338	36.4864	38.0390	39.5916	41.1442	42.6968	(42c)

Average daily hot water use (litres/day)	131.6029 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.1672	140.1100	136.3871	130.7260	126.1287	121.1864	119.2870	122.9939	126.9034	132.0920	137.8404	142.7959	(44)
Energy conte	226.7418	199.5148	209.6219	178.9573	169.7935	149.0128	144.2673	152.2921	156.4845	179.2476	196.3789	223.5839	(45)
Energy content (annual)										Total = Sum(45)m =		2185.8965	
Distribution loss (46)m = 0.15 x (45)m	34.0113	29.9272	31.4433	26.8436	25.4690	22.3519	21.6401	22.8438	23.4727	26.8871	29.4568	33.5376	(46)

Water storage loss:	
Store volume	180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):	1.5520 (48)
Temperature factor from Table 2b	0.5400 (49)
Enter (49) or (54) in (55)	0.8381 (55)

Total storage loss

25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)

If cylinder contains dedicated solar storage

25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(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

275.9845	243.9921	258.8646	226.6115	219.0362	196.6670	193.5100	201.5348	204.1387	228.4903	244.0331	272.8265	(62)

WWHRS	-32.0793	-28.3712	-29.7087	-24.6000	-22.9263	-19.6182	-18.3889	-19.5548	-20.2978	-23.9288	-27.1084	-31.4853	(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													
	243.9051	215.6209	229.1558	202.0115	196.1099	177.0488	175.1210	181.9800	183.8410	204.5615	216.9246	241.3412	(64)
										Total per year (kWh/year) = Sum(64)m =		2467.6214	(64)
12Total per year (kWh/year)												2468	(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													
	114.7858	101.9205	109.0934	97.6267	95.8505	87.6701	87.3630	90.0313	90.1545	98.9940	103.4193	113.7358	(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	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	129.9046	143.8230	129.9046	134.2348	129.9046	134.2348	129.9046	129.9046	134.2348	129.9046	134.2348	129.9046	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	256.5216	259.1835	252.4756	238.1953	220.1690	203.2269	191.9085	189.2466	195.9545	210.2347	228.2610	245.2032	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	(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)													
	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	(71)
Water heating gains (Table 5)													
	154.2820	151.6674	146.6309	135.5926	128.8313	121.7640	117.4234	121.0098	125.2145	133.0564	143.6380	152.8707	(72)
Total internal gains													
	607.8177	621.7834	596.1207	575.1322	546.0145	523.3352	503.3460	504.2705	519.5133	540.3053	573.2433	595.0880	(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	0.9800	10.6334	0.6300	0.7000	0.7700	3.1847	(74)
East	5.2200	19.6403	0.6300	0.7000	0.7700	31.3321	(76)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)
West	6.0900	19.6403	0.6300	0.7000	0.7700	36.5541	(80)

Solar gains	190.9476	335.2131	479.1302	618.2275	707.8206	707.5693	680.2858	613.9491	528.0385	376.5802	230.6696	162.0657	(83)
Total gains	798.7653	956.9965	1075.2509	1193.3597	1253.8351	1230.9045	1183.6318	1118.2196	1047.5518	916.8855	803.9129	757.1537	(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	46.2068	46.3351	46.4615	47.0648	47.1795	47.7205	47.7205	47.8220	47.5106	47.1795	46.9482	46.7087	
alpha	4.0805	4.0890	4.0974	4.1377	4.1453	4.1814	4.1814	4.1881	4.1674	4.1453	4.1299	4.1139	
util living area													
	0.9831	0.9653	0.9318	0.8533	0.7242	0.5494	0.4052	0.4448	0.6650	0.8882	0.9677	0.9862	(86)
MIT	19.5128	19.7930	20.1436	20.5492	20.8236	20.9579	20.9906	20.9862	20.9068	20.5350	19.9559	19.4696	(87)
Th 2	19.9676	19.9702	19.9727	19.9845	19.9867	19.9970	19.9970	19.9990	19.9931	19.9867	19.9822	19.9776	(88)
util rest of house													
	0.9791	0.9572	0.9161	0.8214	0.6694	0.4725	0.3156	0.3522	0.5887	0.8561	0.9589	0.9828	(89)
MIT 2	18.2542	18.6079	19.0439	19.5356	19.8369	19.9709	19.9934	19.9932	19.9281	19.5335	18.8256	18.2064	(90)
Living area fraction										fLA = Living area / (4) =		0.1767	(91)
MIT	18.4766	18.8173	19.2382	19.7147	20.0113	20.1453	20.1696	20.1686	20.1010	19.7104	19.0253	18.4296	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4766	18.8173	19.2382	19.7147	20.0113	20.1453	20.1696	20.1686	20.1010	19.7104	19.0253	18.4296	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9709	0.9455	0.9024	0.8118	0.6709	0.4843	0.3313	0.3682	0.5974	0.8457	0.9478	0.9756	(94)
Useful gains	775.4814	904.8364	970.3281	968.7553	841.1594	596.1115	392.1101	411.7394	625.8188	775.4398	761.9241	738.6802	(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													
	1619.2544	1585.2351	1446.9855	1212.7329	929.7419	613.2891	394.7875	415.9146	666.6232	1019.1413	1340.6069	1607.8391	(97)
Space heating kWh													
	627.7671	457.2279	354.6331	175.6639	65.9054	0.0000	0.0000	0.0000	0.0000	181.3139	416.6516	646.6542	(98a)
Space heating requirement - total per year (kWh/year)												2925.8171	
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													
	627.7671	457.2279	354.6331	175.6639	65.9054	0.0000	0.0000	0.0000	0.0000	181.3139	416.6516	646.6542	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2925.8171	
Space heating per m2											(98c) / (4) =	29.2231	(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)

Full SAP Calculation Printout

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	627.7671	457.2279	354.6331	175.6639	65.9054	0.0000	0.0000	0.0000	0.0000	181.3139	416.6516	646.6542	(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)													
	680.1377	495.3715	384.2179	190.3184	71.4034	0.0000	0.0000	0.0000	0.0000	196.4398	451.4102	700.6005	(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													
	243.9051	215.6209	229.1558	202.0115	196.1099	177.0488	175.1210	181.9800	183.8410	204.5615	216.9246	241.3412	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.0834	85.7025	85.0354	83.7479	81.8876	79.8000	79.8000	79.8000	79.8000	83.7903	85.4985	86.1590	(217)
Fuel for water heating, kWh/month													
	283.3359	251.5922	269.4827	241.2138	239.4867	221.8656	219.4499	228.0451	230.3772	244.1350	253.7174	280.1113	(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	26.9916	21.6537	19.4967	14.2841	11.0335	9.0145	10.0651	13.0830	16.9935	22.2964	25.1838	27.7418	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-46.3629	-64.7261	-92.1369	-102.5453	-109.6728	-102.0050	-100.6871	-95.4524	-86.1393	-73.4554	-50.7204	-40.1538	(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	-28.1794	-59.0384	-116.9194	-175.0175	-230.8817	-231.8288	-229.1531	-194.3161	-142.7818	-84.2982	-37.5756	-22.3067	(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	3169.8994	(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	2962.8129	(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)	217.8378	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2516.3543	(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	3920.1958	(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	3169.8994	0.2100	665.6789	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2962.8129	0.2100	622.1907	(264)
Space and water heating			1287.8696	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	217.8378	0.1443	31.4407	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-964.0576	0.1348	-129.9614	
PV Unit electricity exported	-1552.2967	0.1260	-195.5740	
Total			-325.5354	(269)
Total CO2, kg/year			1005.7042	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0400	(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	3169.8994	1.1300	3581.9863	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2962.8129	1.1300	3347.9785	(278)
Space and water heating			6929.9648	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	217.8378	1.5338	334.1269	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-964.0576	1.4982	-1444.3849	
PV Unit electricity exported	-1552.2967	0.4625	-717.8970	
Total			-2162.2818	(283)
Total Primary energy kWh/year			5231.9107	(286)
Target Primary Energy Rate (TPER)			52.2600	(287)

Full SAP Calculation Printout

Property Reference	4907-P635-7667-Meadowvale_End	**Issued on Date**	22/04/2025
Assessment Reference	Plot XX	**Prop Type Ref**	Meadowvale End (AS)
Property	Plot XX, Meadowvale End (AS)		

SAP Rating	86 B	**DER**	3.27	**TER**	10.04
Environmental	97 A	**% DER < TER**			67.43
CO_2 Emissions (t/year)	0.3	**DFEE**	34.55	**TFEE**	35.95
Compliance Check	See BREL	**% DFEE < TFEE**			3.89
% DPER < TPER	34.62	**DPER**	34.17	**TPER**	52.26

Assessor Details	Mr. Mitchell Bennellick	**Assessor ID**	P635-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (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	50.9100 (1b)	x	2.3900 (2b)	=	121.6749	(1b) - (3b)
First floor	49.2100 (1c)	x	2.6100 (2c)	=	128.4381	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	100.1200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	250.1130	(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		4 * 10 =	40.0000	(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) =		40.0000 / (5) =	0.1599	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			4.5000	(17)
Infiltration rate			0.3849	(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) =	0.3272	(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	0.4172	0.4090	0.4008	0.3599	0.3517	0.3108	0.3108	0.3026	0.3272	0.3517	0.3681	0.3844	(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	0.5870	0.5836	0.5803	0.5648	0.5619	0.5483	0.5483	0.5458	0.5535	0.5619	0.5677	0.5739	(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								
Front Door			2.1300	1.1000	2.3430			(26)
Windows			16.9000	1.1450	19.3511			(27)
French Doors			3.7800	1.1450	4.3282			(27)
Jetfloor 150/150 Grey			50.9100	0.1100	5.6001	75.0000	3818.2500	(28a)
External Wall - 150mm FF AAC	106.5218	22.8100	83.7118	0.1800	15.0681	60.0000	5022.7081	(29a)
500mm Mineral Wool	49.2100		49.2100	0.0900	4.4289	9.0000	442.8900	(30)
Bay Plane	1.7000		1.7000	0.1000	0.1700	9.0000	15.3000	(30)
Total net area of external elements Aum(A, m2)			208.3418					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.2895			(33)
Main dwelling								
E-WM-28			45.1000	0.0000	0.0000	110.0000	4960.9998	(32)
GF - Masonry			25.3800			75.0000	1903.4999	(32c)
GF - Timber			59.7200			9.0000	537.4800	(32c)
1F - Timber			107.7900			9.0000	970.1100	(32c)
Internal Floor			49.2100			18.0000	885.7800	(32d)
Internal Ceiling			49.2100			9.0000	442.8900	(32e)

Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =	18999.9079 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				189.7714 (35)
List of Thermal Bridges				
K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	9.2700	0.0670	0.6211	
E2 Other lintels (including other steel lintels)	1.0130	0.0670	0.0679	
E1 Steel lintel with perforated steel base plate	2.4800	0.1770	0.4390	
E3 Sill	13.8000	0.0380	0.5244	
E4 Jamb	4.2000	0.0410	0.1722	
E4 Jamb	24.3000	0.0410	0.9963	
E5 Ground floor (normal)	11.5100	0.0520	0.5985	
E5 Ground floor (normal)	10.6400	0.0450	0.4788	
E6 Intermediate floor within a dwelling	18.4300	0.0010	0.0184	
E10 Eaves (insulation at ceiling level)	6.9700	0.0530	0.3694	
E12 Gable (insulation at ceiling level)	13.5600	0.0770	1.0441	
E16 Corner (normal)	21.1000	0.0410	0.8651	
E17 Corner (inverted - internal area greater than external area)	11.1000	-0.0860	-0.9546	
P1 Party wall - Ground floor	9.0200	0.0580	0.5232	
E18 Party wall between dwellings	10.0000	0.0380	0.3800	
P2 Party wall - Intermediate floor within a dwelling	9.0200	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	9.0200	0.0740	0.6675	
E4 Jamb	3.0000	0.1000	0.3000	
E24 Eaves (insulation at ceiling level - inverted)	2.1000	0.1500	0.3150	
E10 Eaves (insulation at ceiling level)	2.1000	0.1200	0.2520	
E12 Gable (insulation at ceiling level)	1.6300	0.2500	0.4075	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				8.0857 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	59.3753 (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	48.4505	48.1716	47.8983	46.6143	46.3741	45.2558	45.2558	45.0487	45.6866	46.3741	46.8601	47.3681	(38)
Heat transfer coeff	107.8258	107.5469	107.2735	105.9896	105.7493	104.6311	104.6311	104.4240	105.0618	105.7493	106.2353	106.7434	(39)
Average = Sum(39)m / 12 =												105.9884	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0770	1.0742	1.0714	1.0586	1.0562	1.0451	1.0451	1.0430	1.0494	1.0562	1.0611	1.0662	(40)
HLP (average)												1.0586	
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												2.7406	(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	30.2991	29.8492	29.2155	28.0471	27.1722	26.2021	25.6781	26.3074	26.9925	28.0305	29.2230	30.1967	(42b)
Hot water usage for other uses	42.6968	41.1442	39.5916	38.0390	36.4864	34.9338	34.9338	36.4864	38.0390	39.5916	41.1442	42.6968	(42c)
Average daily hot water use (litres/day)												66.9074	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	72.9960	70.9934	68.8071	66.0861	63.6586	61.1359	60.6119	62.7938	65.0315	67.6222	70.3672	72.8935	(44)
Energy conte	115.6078	101.0936	105.7539	90.4686	85.6967	75.1737	73.3049	77.7518	80.1904	91.7626	100.2510	114.1337	(45)
Energy content (annual)										Total = Sum(45)m =		1111.1887	
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	98.2666	85.9296	89.8908	76.8983	72.8422	63.8977	62.3091	66.0890	68.1618	77.9982	85.2133	97.0136	(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	98.2666	85.9296	89.8908	76.8983	72.8422	63.8977	62.3091	66.0890	68.1618	77.9982	85.2133	97.0136	(64)
										Total per year (kWh/year) = Sum(64)m =		944.5104	(64)
12Total per year (kWh/year)												945	(64)
Electric shower(s)	56.1954	50.0706	54.6752	52.1759	53.1549	50.7046	52.3948	53.1549	52.1759	54.6752	53.6471	56.1954	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		639.2199	(64a)
Heat gains from water heating, kWh/month	38.6155	34.0000	36.1415	32.2685	31.4993	28.6506	28.6760	29.8110	30.0844	33.1684	34.7151	38.3023	(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	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	130.1767	144.1242	130.1767	134.5159	130.1767	134.5159	130.1767	130.1767	134.5159	130.1767	134.5159	130.1767	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	256.5216	259.1835	252.4756	238.1953	220.1690	203.2269	191.9085	189.2466	195.9545	210.2347	228.2610	245.2032	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	(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)	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	(71)
Water heating gains (Table 5)	51.9026	50.5953	48.5773	44.8174	42.3377	39.7925	38.5430	40.0685	41.7839	44.5811	48.2154	51.4815	(72)
Total internal gains	502.7104	518.0125	495.3391	481.6382	456.7930	441.6447	424.7376	423.6013	436.3638	449.1020	475.1019	490.9709	(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	0.9800	10.6334	0.3100	0.0000	0.7700	2.4874	(74)
East	5.2200	19.6403	0.3100	0.0000	0.7700	24.4720	(76)
South	8.3900	46.7521	0.3100	0.0000	0.7700	93.6300	(78)
West	2.3100	19.6403	0.3100	0.0000	0.7700	10.8296	(80)
West	3.7800	19.6403	0.3500	0.0000	0.7700	20.0077	(80)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	151.4268	266.2923	381.5927	493.6122	566.0122	566.1277	544.1714	490.5494	420.9937	299.4368	183.0163	128.4623	(83)
Total gains	654.1372	784.3048	876.9318	975.2503	1022.8052	1007.7724	968.9090	914.1507	857.3574	748.5388	658.1182	619.4333	(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	48.9470	49.0740	49.1990	49.7950	49.9081	50.4415	50.4415	50.5416	50.2347	49.9081	49.6798	49.4434	
alpha	4.2631	4.2716	4.2799	4.3197	4.3272	4.3628	4.3628	4.3694	4.3490	4.3272	4.3120	4.2962	
util living area	0.9915	0.9811	0.9605	0.9043	0.7960	0.6223	0.4653	0.5100	0.7393	0.9306	0.9828	0.9932	(86)
MIT	19.4508	19.7056	20.0399	20.4591	20.7713	20.9424	20.9870	20.9808	20.8767	20.4553	19.8800	19.4119	(87)
Th 2	20.0197	20.0220	20.0242	20.0348	20.0367	20.0460	20.0460	20.0477	20.0424	20.0367	20.0327	20.0286	(88)
util rest of house	0.9893	0.9765	0.9507	0.8805	0.7475	0.5440	0.3690	0.4113	0.6672	0.9081	0.9778	0.9915	(89)
MIT 2	18.6107	18.8642	19.1934	19.6007	19.8786	20.0167	20.0418	20.0410	19.9716	19.6069	19.0470	18.5789	(90)
Living area fraction										fLA = Living area / (4) =		0.1767	(91)
MIT	18.7591	19.0129	19.3429	19.7524	20.0363	20.1803	20.2088	20.2071	20.1315	19.7568	19.1942	18.7261	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7591	19.0129	19.3429	19.7524	20.0363	20.1803	20.2088	20.2071	20.1315	19.7568	19.1942	18.7261	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9855	0.9703	0.9421	0.8724	0.7475	0.5556	0.3858	0.4283	0.6745	0.9002	0.9719	0.9883	(94)
Useful gains	644.6770	760.9993	826.1491	850.7790	764.5502	559.8840	373.7952	391.5747	578.2933	673.8098	639.6541	612.1576	(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	1559.0666	1517.7990	1377.7065	1150.2360	881.5627	583.8691	377.5959	397.5509	633.6849	968.3249	1284.8261	1550.5598	(97)
Space heating kWh	680.3058	508.5694	410.3587	215.6090	87.0573	0.0000	0.0000	0.0000	0.0000	219.1193	464.5239	698.1713	(98a)
Space heating requirement - total per year (kWh/year)												3283.7147	
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	680.3058	508.5694	410.3587	215.6090	87.0573	0.0000	0.0000	0.0000	0.0000	219.1193	464.5239	698.1713	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3283.7147	
Space heating per m2											(98c) / (4) =	32.7978	(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	983.5320	774.2698	793.6222	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8638	0.9209	0.9001	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	849.6104	712.9886	714.3163	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1125.2109	1082.3224	1020.8901	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	198.4324	274.7843	228.0909	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	49.6081	68.6961	57.0227	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												175.3269	(107)
Energy for space heating												32.7978	(99)
Energy for space cooling												1.7512	(108)
Total												34.5490	(109)
Fabric Energy Efficiency (DFEE)												34.5	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (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	50.9100	(1b) x	2.3900	(2b) =	121.6749	(1b) - (3b)
First floor	49.2100	(1c) x	2.6100	(2c) =	128.4381	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	100.1200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		250.1130	(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	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1599	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4099	(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) =	0.3484	(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	0.4443	0.4355	0.4268	0.3833	0.3746	0.3310	0.3310	0.3223	0.3484	0.3746	0.3920	0.4094	(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	0.5987	0.5949	0.5911	0.5735	0.5702	0.5548	0.5548	0.5519	0.5607	0.5702	0.5768	0.5838	(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			2.1300	1.0000	2.1300			(26)
TER Opening Type			20.6800	1.1450	23.6794			(27)
Jetfloor 150/150 Grey			50.9100	0.1300	6.6183			(28a)
External Wall - 150mm FF AAC	106.5218	22.8100	83.7118	0.1800	15.0681			(29a)
500mm Mineral Wool	49.2100		49.2100	0.1100	5.4131			(30)
Bay Plane	1.7000		1.7000	0.1100	0.1870			(30)
Total net area of external elements Aum(A, m2)			208.3418					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		53.0959			(33)
Main dwelling								
E-WM-28			45.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 189.7714 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	9.2700	0.0500	0.4635
E2 Other lintels (including other steel lintels)	1.0130	0.0500	0.0507
E1 Steel lintel with perforated steel base plate	2.4800	0.0500	0.1240
E3 Sill	13.8000	0.0500	0.6900
E4 Jamb	4.2000	0.0500	0.2100
E4 Jamb	24.3000	0.0500	1.2150
E5 Ground floor (normal)	11.5100	0.1600	1.8416
E5 Ground floor (normal)	10.6400	0.1600	1.7024
E6 Intermediate floor within a dwelling	18.4300	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	6.9700	0.0600	0.4182
E12 Gable (insulation at ceiling level)	13.5600	0.0600	0.8136
E16 Corner (normal)	21.1000	0.0900	1.8990
E17 Corner (inverted - internal area greater than external area)	11.1000	-0.0900	-0.9990
P1 Party wall - Ground floor	9.0200	0.0800	0.7216
E18 Party wall between dwellings	10.0000	0.0600	0.6000
P2 Party wall - Intermediate floor within a dwelling	9.0200	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.0200	0.1200	1.0824
E4 Jamb	3.0000	0.0500	0.1500
E24 Eaves (insulation at ceiling level - inverted)	2.1000	0.2400	0.5040
E10 Eaves (insulation at ceiling level)	2.1000	0.0600	0.1260
E12 Gable (insulation at ceiling level)	1.6300	0.0600	0.0978

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 11.7107 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 64.8067 (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	49.4137	49.0974	48.7874	47.3312	47.0588	45.7905	45.7905	45.5557	46.2790	47.0588	47.6099	48.1861	(38)
Heat transfer coeff	114.2203	113.9041	113.5940	112.1379	111.8655	110.5972	110.5972	110.3623	111.0857	111.8655	112.4166	112.9928	(39)
Average = Sum(39)m / 12 =												112.1366	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1408	1.1377	1.1346	1.1200	1.1173	1.1046	1.1046	1.1023	1.1095	1.1173	1.1228	1.1286	(40)
HLP (average)												1.1200	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.7406 (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

30.2991	29.8492	29.2155	28.0471	27.1722	26.2021	25.6781	26.3074	26.9925	28.0305	29.2230	30.1967	(42b)

Hot water usage for other uses

42.6968	41.1442	39.5916	38.0390	36.4864	34.9338	34.9338	36.4864	38.0390	39.5916	41.1442	42.6968	(42c)

Average daily hot water use (litres/day) 66.9074 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	72.9960	70.9934	68.8071	66.0861	63.6586	61.1359	60.6119	62.7938	65.0315	67.6222	70.3672	72.8935	(44)
Energy conte	115.6078	101.0936	105.7539	90.4686	85.6967	75.1737	73.3049	77.7518	80.1904	91.7626	100.2510	114.1337	(45)
Energy content (annual)										Total = Sum(45)m =		1111.1887	
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													
	98.2666	85.9296	89.8908	76.8983	72.8422	63.8977	62.3091	66.0890	68.1618	77.9982	85.2133	97.0136	(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													
	98.2666	85.9296	89.8908	76.8983	72.8422	63.8977	62.3091	66.0890	68.1618	77.9982	85.2133	97.0136	(64)
										Total per year (kWh/year) = Sum(64)m =		944.5104	(64)
12Total per year (kWh/year)												945	(64)
Electric shower(s)													
	56.1954	50.0706	54.6752	52.1759	53.1549	50.7046	52.3948	53.1549	52.1759	54.6752	53.6471	56.1954	(64a)
						Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =						639.2199	(64a)
Heat gains from water heating, kWh/month													
	38.6155	34.0000	36.1415	32.2685	31.4993	28.6506	28.6760	29.8110	30.0844	33.1684	34.7151	38.3023	(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	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	129.9046	143.8230	129.9046	134.2348	129.9046	134.2348	129.9046	129.9046	134.2348	129.9046	134.2348	129.9046	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	256.5216	259.1835	252.4756	238.1953	220.1690	203.2269	191.9085	189.2466	195.9545	210.2347	228.2610	245.2032	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	(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)													
	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	(71)
Water heating gains (Table 5)													
	51.9026	50.5953	48.5773	44.8174	42.3377	39.7925	38.5430	40.0685	41.7839	44.5811	48.2154	51.4815	(72)
Total internal gains													
	502.4383	517.7113	495.0671	481.3571	456.5210	441.3637	424.4656	423.3293	436.0827	448.8300	474.8208	490.6989	(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	0.9800	10.6334	0.6300	0.7000	0.7700	3.1847	(74)
East	5.2200	19.6403	0.6300	0.7000	0.7700	31.3321	(76)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)
West	6.0900	19.6403	0.6300	0.7000	0.7700	36.5541	(80)

Solar gains	190.9476	335.2131	479.1302	618.2275	707.8206	707.5693	680.2858	613.9491	528.0385	376.5802	230.6696	162.0657	(83)
Total gains	693.3859	852.9244	974.1973	1099.5845	1164.3415	1148.9329	1104.7514	1037.2784	964.1212	825.4102	705.4904	652.7646	(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	46.2068	46.3351	46.4615	47.0648	47.1795	47.7205	47.7205	47.8220	47.5106	47.1795	46.9482	46.7087	
alpha	4.0805	4.0890	4.0974	4.1377	4.1453	4.1814	4.1814	4.1881	4.1674	4.1453	4.1299	4.1139	
util living area													
	0.9897	0.9761	0.9490	0.8797	0.7578	0.5821	0.4324	0.4766	0.7048	0.9155	0.9791	0.9918	(86)
MIT	19.3815	19.6720	20.0410	20.4813	20.7895	20.9479	20.9880	20.9822	20.8839	20.4568	19.8398	19.3377	(87)
Th 2	19.9676	19.9702	19.9727	19.9845	19.9867	19.9970	19.9970	19.9990	19.9931	19.9867	19.9822	19.9776	(88)
util rest of house													
	0.9871	0.9703	0.9365	0.8513	0.7048	0.5028	0.3376	0.3786	0.6288	0.8889	0.9730	0.9898	(89)
MIT 2	18.5030	18.7912	19.1525	19.5759	19.8450	19.9714	19.9934	19.9930	19.9284	19.5653	18.9686	18.4670	(90)
Living area fraction									fLA = Living area / (4) =			0.1767	(91)
MIT	18.6582	18.9469	19.3094	19.7359	20.0119	20.1439	20.1691	20.1678	20.0973	19.7228	19.1225	18.6208	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6582	18.9469	19.3094	19.7359	20.0119	20.1439	20.1691	20.1678	20.0973	19.7228	19.1225	18.6208	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9826	0.9628	0.9267	0.8434	0.7062	0.5149	0.3542	0.3956	0.6373	0.8806	0.9662	0.9860	(94)
Useful gains	681.3006	821.2249	902.7427	927.3473	822.2998	591.6154	391.2875	410.3586	614.4225	726.8479	681.6307	643.5996	(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													
	1640.0011	1599.9953	1455.0764	1215.1102	929.8130	613.1417	394.7351	415.8236	666.2099	1020.5255	1351.5331	1629.4477	(97)
Space heating kWh													
	713.2732	523.3337	410.9363	207.1893	79.9898	0.0000	0.0000	0.0000	0.0000	218.4962	482.3297	733.4710	(98a)
Space heating requirement - total per year (kWh/year)												3369.0192	
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

713.2732	523.3337	410.9363	207.1893	79.9898	0.0000	0.0000	0.0000	0.0000	218.4962	482.3297	733.4710	(98c)

Space heating requirement after solar contribution - total per year (kWh/year) 3369.0192

Space heating per m2 (98c) / (4) = 33.6498 (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	1039.6136	818.4193	838.7537	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8831	0.9325	0.9136	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	918.1325	763.1954	766.2579	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1290.5085	1241.3914	1165.0901	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	268.1107	355.7778	296.7312	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	67.0277	88.9444	74.1828	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												230.1549	(107)
Energy for space heating												33.6498	(99)
Energy for space cooling												2.2988	(108)
Total												35.9486	(109)
Fabric Energy Efficiency (TFEE)												35.9	(109)

Full SAP Calculation Printout

Property Reference	4907-P635-7667-Meadowvale_End	**Issued on Date**	22/04/2025
Assessment Reference	Plot XX	**Prop Type Ref**	Meadowvale End (AS)
Property	Plot XX, Meadowvale End (AS)		

SAP Rating	86 B	**DER**	3.27	**TER**	10.04
Environmental	97 A	**% DER < TER**			67.43
CO_2 Emissions (t/year)	0.3	**DFEE**	34.55	**TFEE**	35.95
Compliance Check	See BREL	**% DFEE < TFEE**			3.89
% DPER < TPER	34.62	**DPER**	34.17	**TPER**	52.26

Assessor Details	Mr. Mitchell Bennellick	**Assessor ID**	P635-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (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	50.9100 (1b)	x	2.3900 (2b)	=	121.6749	(1b) - (3b)
First floor	49.2100 (1c)	x	2.6100 (2c)	=	128.4381	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	100.1200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	250.1130	(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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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								
Front Door			2.1300	1.1000	2.3430			(26)
Windows			16.9000	1.1450	19.3511			(27)
French Doors			3.7800	1.1450	4.3282			(27)
Jetfloor 150/150 Grey			50.9100	0.1100	5.6001	75.0000	3818.2500	(28a)
External Wall - 150mm FF AAC	106.5218	22.8100	83.7118	0.1800	15.0681	60.0000	5022.7081	(29a)
500mm Mineral Wool	49.2100		49.2100	0.0900	4.4289	9.0000	442.8900	(30)
Bay Plane	1.7000		1.7000	0.1000	0.1700	9.0000	15.3000	(30)
Total net area of external elements Aum(A, m2)			208.3418					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.2895			(33)
Main dwelling								
E-WM-28			45.1000	0.0000	0.0000	110.0000	4960.9998	(32)
GF - Masonry			25.3800			75.0000	1903.4999	(32c)
GF - Timber			59.7200			9.0000	537.4800	(32c)
1F - Timber			107.7900			9.0000	970.1100	(32c)
Internal Floor			49.2100			18.0000	885.7800	(32d)

Internal Ceiling	49.2100		9.0000	442.8900 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 18999.9079 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 189.7714 (35)
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.2700	0.0670	0.6211
E2 Other lintels (including other steel lintels)	1.0130	0.0670	0.0679
E1 Steel lintel with perforated steel base plate	2.4800	0.1770	0.4390
E3 Sill	13.8000	0.0380	0.5244
E4 Jamb	4.2000	0.0410	0.1722
E4 Jamb	24.3000	0.0410	0.9963
E5 Ground floor (normal)	11.5100	0.0520	0.5985
E5 Ground floor (normal)	10.6400	0.0450	0.4788
E6 Intermediate floor within a dwelling	18.4300	0.0010	0.0184
E10 Eaves (insulation at ceiling level)	6.9700	0.0530	0.3694
E12 Gable (insulation at ceiling level)	13.5600	0.0770	1.0441
E16 Corner (normal)	21.1000	0.0410	0.8651
E17 Corner (inverted - internal area greater than external area)	11.1000	-0.0860	-0.9546
P1 Party wall - Ground floor	9.0200	0.0580	0.5232
E18 Party wall between dwellings	10.0000	0.0380	0.3800
P2 Party wall - Intermediate floor within a dwelling	9.0200	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.0200	0.0740	0.6675
E4 Jamb	3.0000	0.1000	0.3000
E24 Eaves (insulation at ceiling level - inverted)	2.1000	0.1500	0.3150
E10 Eaves (insulation at ceiling level)	2.1000	0.1200	0.2520
E12 Gable (insulation at ceiling level)	1.6300	0.2500	0.4075

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.0857 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 59.3753 (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	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	(38)
Heat transfer coeff	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	(39)
Average = Sum(39)m / 12 =												100.6439	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	(40)
HLP (average)												1.0052	
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 2.7406 (42)
Hot water usage for mixer showers

70.1712	69.1167	67.5800	64.6399	62.4701	60.0504	58.6751	60.2001	61.8719	64.4699	67.4731	69.9024	(42a)

Hot water usage for baths

30.2991	29.8492	29.2155	28.0471	27.1722	26.2021	25.6781	26.3074	26.9925	28.0305	29.2230	30.1967	(42b)

Hot water usage for other uses

42.6968	41.1442	39.5916	38.0390	36.4864	34.9338	34.9338	36.4864	38.0390	39.5916	41.1442	42.6968	(42c)

Average daily hot water use (litres/day) 131.6029 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.1672	140.1100	136.3871	130.7260	126.1287	121.1864	119.2870	122.9939	126.9034	132.0920	137.8404	142.7959	(44)
Energy conte	226.7418	199.5148	209.6219	178.9573	169.7935	149.0128	144.2673	152.2921	156.4845	179.2476	196.3789	223.5839	(45)
Energy content (annual)										Total = Sum(45)m =		2185.8965	
Distribution loss (46)m = 0.15 x (45)m	34.0113	29.9272	31.4433	26.8436	25.4690	22.3519	21.6401	22.8438	23.4727	26.8871	29.4568	33.5376	(46)
Water storage loss:													
Store volume												180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1800	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6372	(55)
Total storage loss	19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(56)
If cylinder contains dedicated solar storage	19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(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	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(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	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(64)
										Total per year (kWh/year) = Sum(64)m =		2692.3705	(64)
12Total per year (kWh/year)												2692	(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	109.8041	97.4209	104.1118	92.8057	90.8688	82.8491	82.3814	85.0496	85.3335	94.0123	98.5984	108.7541	(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	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	130.1767	144.1242	130.1767	134.5159	130.1767	134.5159	130.1767	130.1767	134.5159	130.1767	134.5159	130.1767	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	256.5216	259.1835	252.4756	238.1953	220.1690	203.2269	191.9085	189.2466	195.9545	210.2347	228.2610	245.2032	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	(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)	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	(71)
Water heating gains (Table 5)	147.5862	144.9716	139.9352	128.8968	122.1355	115.0683	110.7276	114.3140	118.5188	126.3606	136.9422	146.1749	(72)
Total internal gains													

	598.3940	612.3888	586.6970	565.7176	536.5908	516.9205	496.9223	497.8468	513.0986	530.8816	563.8286	585.6643	(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	0.9800	10.6334	0.3100	0.0000	0.7700	2.4874	(74)
East	5.2200	19.6403	0.3100	0.0000	0.7700	24.4720	(76)
South	8.3900	46.7521	0.3100	0.0000	0.7700	93.6300	(78)
West	2.3100	19.6403	0.3100	0.0000	0.7700	10.8296	(80)
West	3.7800	19.6403	0.3500	0.0000	0.7700	20.0077	(80)

Solar gains	151.4268	266.2923	381.5927	493.6122	566.0122	566.1277	544.1714	490.5494	420.9937	299.4368	183.0163	128.4623	(83)
Total gains	749.8208	878.6811	968.2896	1059.3297	1102.6030	1083.0482	1041.0937	988.3962	934.0923	830.3184	746.8450	714.1266	(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	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	
alpha	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	
util living area													
	0.9851	0.9697	0.9406	0.8701	0.7454	0.5700	0.4201	0.4600	0.6809	0.8986	0.9714	0.9879	(86)
Living	19.7121	19.9497	20.2500	20.5952	20.8440	20.9634	20.9925	20.9887	20.9201	20.5891	20.0793	19.6530	
Non living	18.9142	19.1472	19.4379	19.7599	19.9736	20.0607	20.0766	20.0751	20.0345	19.7622	19.2771	18.8558	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.3411	19.9497	20.2500	20.5952	20.8440	20.9634	20.9925	20.9887	20.9201	20.5891	20.0793	19.8414	(87)
Th 2	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	(88)
util rest of house													
	0.9816	0.9629	0.9271	0.8418	0.6949	0.4968	0.3346	0.3718	0.6094	0.8699	0.9636	0.9850	(89)
MIT 2	19.4831	19.1472	19.4379	19.7599	19.9736	20.0607	20.0766	20.0751	20.0345	19.7622	19.2771	19.0269	(90)
Living area fraction										fLA = Living area / (4) =		0.1767	(91)
MIT	19.6347	19.2890	19.5814	19.9075	20.1274	20.2202	20.2384	20.2365	20.1910	19.9083	19.4188	19.1708	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6347	19.2890	19.5814	19.9075	20.1274	20.2202	20.2384	20.2365	20.1910	19.9083	19.4188	19.1708	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9796	0.9555	0.9185	0.8359	0.6978	0.5084	0.3496	0.3872	0.6186	0.8637	0.9566	0.9814	(94)
Useful gains	734.5158	839.6204	889.3534	885.4651	769.3615	550.6522	364.0146	382.6671	577.8235	717.1558	714.4363	700.8171	(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													
	1543.3456	1448.1601	1316.5626	1107.8407	848.1675	565.6415	366.1854	386.1249	613.0174	936.8258	1239.8134	1506.7240	(97)
Space heating kWh													
	601.7693	408.9387	317.8436	160.1104	58.6317	0.0000	0.0000	0.0000	0.0000	163.4345	378.2715	599.5947	(98a)
Space heating requirement - total per year (kWh/year)												2688.5945	
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													
	601.7693	408.9387	317.8436	160.1104	58.6317	0.0000	0.0000	0.0000	0.0000	163.4345	378.2715	599.5947	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2688.5945	
Space heating per m2											(98c) / (4) =	26.8537	(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 %)	261.6872	(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													
	601.7693	408.9387	317.8436	160.1104	58.6317	0.0000	0.0000	0.0000	0.0000	163.4345	378.2715	599.5947	(98)
Space heating efficiency (main heating system 1)													
	261.6872	261.6872	261.6872	261.6872	261.6872	0.0000	0.0000	0.0000	0.0000	261.6872	261.6872	261.6872	(210)
Space heating fuel (main heating system)													
	229.9575	156.2700	121.4594	61.1839	22.4053	0.0000	0.0000	0.0000	0.0000	62.4541	144.5510	229.1265	(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													
	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(64)
Efficiency of water heater												290.3703	(216)
(217)m	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	(217)
Fuel for water heating, kWh/month													
	92.9012	82.0909	87.0053	75.9669	73.2889	65.6544	64.4980	67.2616	68.2275	76.5447	81.9667	91.8136	(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	3.5189	3.1784	3.5189	3.4054	3.5189	3.4054	3.5189	3.5189	3.4054	3.5189	3.4054	3.5189	(231)
Lighting	26.3435	21.1338	19.0286	13.9412	10.7686	8.7980	9.8234	12.7689	16.5855	21.7611	24.5791	27.0757	(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	1027.4078	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	290.3703	
Water heating fuel used	927.2196	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 5.0240, total flow = 37.0000, SFP = 0.1358)		
mechanical ventilation fans (SFP = 0.1358)	41.4328	(230a)
Total electricity for the above, kWh/year	41.4328	(231)
Electricity for lighting (calculated in Appendix L)	212.6073	(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	2208.6675	(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	1027.4078	0.1562	160.4450	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	927.2196	0.1410	130.7742	(264)
Space and water heating			291.2191	(265)
Pumps, fans and electric keep-hot	41.4328	0.1387	5.7472	(267)
Energy for lighting	212.6073	0.1443	30.6858	(268)
Total CO2, kg/year			327.6522	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.2700	(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	1027.4078	1.5781	1621.3669	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	927.2196	1.5215	1410.7814	(278)
Space and water heating			3032.1483	(279)
Pumps, fans and electric keep-hot	41.4328	1.5128	62.6795	(281)
Energy for lighting	212.6073	1.5338	326.1042	(282)
Total Primary energy kWh/year			3420.9321	(286)
Dwelling Primary energy Rate (DPER)			34.1700	(287)

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.9100	(1b) x	2.3900	(2b) =	121.6749	(1b) - (3b)
First floor	49.2100	(1c) x	2.6100	(2c) =	128.4381	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	100.1200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		250.1130	(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	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1599 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4099 (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) =	0.3484 (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	0.4443	0.4355	0.4268	0.3833	0.3746	0.3310	0.3310	0.3223	0.3484	0.3746	0.3920	0.4094	(22b)
Effective ac	0.5987	0.5949	0.5911	0.5735	0.5702	0.5548	0.5548	0.5519	0.5607	0.5702	0.5768	0.5838	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1300	1.0000	2.1300			(26)
TER Opening Type			20.6800	1.1450	23.6794			(27)
Jetfloor 150/150 Grey			50.9100	0.1300	6.6183			(28a)
External Wall - 150mm FF AAC	106.5218	22.8100	83.7118	0.1800	15.0681			(29a)
500mm Mineral Wool	49.2100		49.2100	0.1100	5.4131			(30)
Bay Plane	1.7000		1.7000	0.1100	0.1870			(30)
Total net area of external elements Aum(A, m2)			208.3418					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		53.0959			(33)
Main dwelling								
E-WM-28			45.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 189.7714 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.2700	0.0500	0.4635
E2 Other lintels (including other steel lintels)	1.0130	0.0500	0.0507
E1 Steel lintel with perforated steel base plate	2.4800	0.0500	0.1240
E3 Sill	13.8000	0.0500	0.6900
E4 Jamb	4.2000	0.0500	0.2100
E4 Jamb	24.3000	0.0500	1.2150
E5 Ground floor (normal)	11.5100	0.1600	1.8416
E5 Ground floor (normal)	10.6400	0.1600	1.7024
E6 Intermediate floor within a dwelling	18.4300	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	6.9700	0.0600	0.4182
E12 Gable (insulation at ceiling level)	13.5600	0.0600	0.8136
E16 Corner (normal)	21.1000	0.0900	1.8990
E17 Corner (inverted - internal area greater than external area)	11.1000	-0.0900	-0.9990
P1 Party wall - Ground floor	9.0200	0.0800	0.7216
E18 Party wall between dwellings	10.0000	0.0600	0.6000
P2 Party wall - Intermediate floor within a dwelling	9.0200	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.0200	0.1200	1.0824
E4 Jamb	3.0000	0.0500	0.1500
E24 Eaves (insulation at ceiling level - inverted)	2.1000	0.2400	0.5040
E10 Eaves (insulation at ceiling level)	2.1000	0.0600	0.1260
E12 Gable (insulation at ceiling level)	1.6300	0.0600	0.0978

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		11.7107 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	64.8067 (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	49.4137	49.0974	48.7874	47.3312	47.0588	45.7905	45.7905	45.5557	46.2790	47.0588	47.6099	48.1861	(38)
Heat transfer coeff	114.2203	113.9041	113.5940	112.1379	111.8655	110.5972	110.5972	110.3623	111.0857	111.8655	112.4166	112.9928	(39)
Average = Sum(39)m / 12 =												112.1366	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1408	1.1377	1.1346	1.1200	1.1173	1.1046	1.1046	1.1023	1.1095	1.1173	1.1228	1.1286	(40)
HLP (average)												1.1200	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.7406 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
70.1712	69.1167	67.5800	64.6399	62.4701	60.0504	58.6751	60.2001	61.8719	64.4699	67.4731	69.9024	(42a)

Hot water usage for baths

30.2991	29.8492	29.2155	28.0471	27.1722	26.2021	25.6781	26.3074	26.9925	28.0305	29.2230	30.1967	(42b)

Hot water usage for other uses

42.6968	41.1442	39.5916	38.0390	36.4864	34.9338	34.9338	36.4864	38.0390	39.5916	41.1442	42.6968	(42c)

Average daily hot water use (litres/day)	131.6029 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.1672	140.1100	136.3871	130.7260	126.1287	121.1864	119.2870	122.9939	126.9034	132.0920	137.8404	142.7959	(44)
Energy conte	226.7418	199.5148	209.6219	178.9573	169.7935	149.0128	144.2673	152.2921	156.4845	179.2476	196.3789	223.5839	(45)
Energy content (annual)										Total = Sum(45)m =		2185.8965	
Distribution loss (46)m = 0.15 x (45)m	34.0113	29.9272	31.4433	26.8436	25.4690	22.3519	21.6401	22.8438	23.4727	26.8871	29.4568	33.5376	(46)

Water storage loss:	
Store volume	180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):	1.5520 (48)
Temperature factor from Table 2b	0.5400 (49)
Enter (49) or (54) in (55)	0.8381 (55)

Total storage loss

25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)

If cylinder contains dedicated solar storage

25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(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

275.9845	243.9921	258.8646	226.6115	219.0362	196.6670	193.5100	201.5348	204.1387	228.4903	244.0331	272.8265	(62)

WWHRS	-32.0793	-28.3712	-29.7087	-24.6000	-22.9263	-19.6182	-18.3889	-19.5548	-20.2978	-23.9288	-27.1084	-31.4853	(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													
	243.9051	215.6209	229.1558	202.0115	196.1099	177.0488	175.1210	181.9800	183.8410	204.5615	216.9246	241.3412	(64)
										Total per year (kWh/year) = Sum(64)m =		2467.6214	(64)
12Total per year (kWh/year)												2468	(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													
	114.7858	101.9205	109.0934	97.6267	95.8505	87.6701	87.3630	90.0313	90.1545	98.9940	103.4193	113.7358	(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	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	137.0317	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	129.9046	143.8230	129.9046	134.2348	129.9046	134.2348	129.9046	129.9046	134.2348	129.9046	134.2348	129.9046	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	256.5216	259.1835	252.4756	238.1953	220.1690	203.2269	191.9085	189.2466	195.9545	210.2347	228.2610	245.2032	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	36.7032	(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)													
	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	(71)
Water heating gains (Table 5)													
	154.2820	151.6674	146.6309	135.5926	128.8313	121.7640	117.4234	121.0098	125.2145	133.0564	143.6380	152.8707	(72)
Total internal gains													
	607.8177	621.7834	596.1207	575.1322	546.0145	523.3352	503.3460	504.2705	519.5133	540.3053	573.2433	595.0880	(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	0.9800	10.6334	0.6300	0.7000	0.7700	3.1847	(74)
East	5.2200	19.6403	0.6300	0.7000	0.7700	31.3321	(76)
South	8.3900	46.7521	0.6300	0.7000	0.7700	119.8766	(78)
West	6.0900	19.6403	0.6300	0.7000	0.7700	36.5541	(80)

Solar gains	190.9476	335.2131	479.1302	618.2275	707.8206	707.5693	680.2858	613.9491	528.0385	376.5802	230.6696	162.0657	(83)
Total gains	798.7653	956.9965	1075.2509	1193.3597	1253.8351	1230.9045	1183.6318	1118.2196	1047.5518	916.8855	803.9129	757.1537	(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	46.2068	46.3351	46.4615	47.0648	47.1795	47.7205	47.7205	47.8220	47.5106	47.1795	46.9482	46.7087	
alpha	4.0805	4.0890	4.0974	4.1377	4.1453	4.1814	4.1814	4.1881	4.1674	4.1453	4.1299	4.1139	
util living area													
	0.9831	0.9653	0.9318	0.8533	0.7242	0.5494	0.4052	0.4448	0.6650	0.8882	0.9677	0.9862	(86)
MIT	19.5128	19.7930	20.1436	20.5492	20.8236	20.9579	20.9906	20.9862	20.9068	20.5350	19.9559	19.4696	(87)
Th 2	19.9676	19.9702	19.9727	19.9845	19.9867	19.9970	19.9970	19.9990	19.9931	19.9867	19.9822	19.9776	(88)
util rest of house													
	0.9791	0.9572	0.9161	0.8214	0.6694	0.4725	0.3156	0.3522	0.5887	0.8561	0.9589	0.9828	(89)
MIT 2	18.2542	18.6079	19.0439	19.5356	19.8369	19.9709	19.9934	19.9932	19.9281	19.5335	18.8256	18.2064	(90)
Living area fraction										fLA = Living area / (4) =		0.1767	(91)
MIT	18.4766	18.8173	19.2382	19.7147	20.0113	20.1453	20.1696	20.1686	20.1010	19.7104	19.0253	18.4296	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4766	18.8173	19.2382	19.7147	20.0113	20.1453	20.1696	20.1686	20.1010	19.7104	19.0253	18.4296	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9709	0.9455	0.9024	0.8118	0.6709	0.4843	0.3313	0.3682	0.5974	0.8457	0.9478	0.9756	(94)
Useful gains	775.4814	904.8364	970.3281	968.7553	841.1594	596.1115	392.1101	411.7394	625.8188	775.4398	761.9241	738.6802	(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													
	1619.2544	1585.2351	1446.9855	1212.7329	929.7419	613.2891	394.7875	415.9146	666.6232	1019.1413	1340.6069	1607.8391	(97)
Space heating kWh													
	627.7671	457.2279	354.6331	175.6639	65.9054	0.0000	0.0000	0.0000	0.0000	181.3139	416.6516	646.6542	(98a)
Space heating requirement - total per year (kWh/year)												2925.8171	
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													
	627.7671	457.2279	354.6331	175.6639	65.9054	0.0000	0.0000	0.0000	0.0000	181.3139	416.6516	646.6542	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2925.8171	
Space heating per m2											(98c) / (4) =	29.2231	(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)

Full SAP Calculation Printout

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	627.7671	457.2279	354.6331	175.6639	65.9054	0.0000	0.0000	0.0000	0.0000	181.3139	416.6516	646.6542	(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)													
	680.1377	495.3715	384.2179	190.3184	71.4034	0.0000	0.0000	0.0000	0.0000	196.4398	451.4102	700.6005	(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													
	243.9051	215.6209	229.1558	202.0115	196.1099	177.0488	175.1210	181.9800	183.8410	204.5615	216.9246	241.3412	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.0834	85.7025	85.0354	83.7479	81.8876	79.8000	79.8000	79.8000	79.8000	83.7903	85.4985	86.1590	(217)
Fuel for water heating, kWh/month													
	283.3359	251.5922	269.4827	241.2138	239.4867	221.8656	219.4499	228.0451	230.3772	244.1350	253.7174	280.1113	(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	26.9916	21.6537	19.4967	14.2841	11.0335	9.0145	10.0651	13.0830	16.9935	22.2964	25.1838	27.7418	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-46.3629	-64.7261	-92.1369	-102.5453	-109.6728	-102.0050	-100.6871	-95.4524	-86.1393	-73.4554	-50.7204	-40.1538	(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	-28.1794	-59.0384	-116.9194	-175.0175	-230.8817	-231.8288	-229.1531	-194.3161	-142.7818	-84.2982	-37.5756	-22.3067	(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	3169.8994	(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	2962.8129	(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)	217.8378	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2516.3543	(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	3920.1958	(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	3169.8994	0.2100	665.6789	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2962.8129	0.2100	622.1907	(264)
Space and water heating			1287.8696	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	217.8378	0.1443	31.4407	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-964.0576	0.1348	-129.9614	
PV Unit electricity exported	-1552.2967	0.1260	-195.5740	
Total			-325.5354	(269)
Total CO2, kg/year			1005.7042	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0400	(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	3169.8994	1.1300	3581.9863	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2962.8129	1.1300	3347.9785	(278)
Space and water heating			6929.9648	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	217.8378	1.5338	334.1269	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-964.0576	1.4982	-1444.3849	
PV Unit electricity exported	-1552.2967	0.4625	-717.8970	
Total			-2162.2818	(283)
Total Primary energy kWh/year			5231.9107	(286)
Target Primary Energy Rate (TPER)			52.2600	(287)

Full SAP Calculation Printout

Property Reference	4907-P635-7667-Meadowvale_End	**Issued on Date**	22/04/2025
Assessment Reference	Plot XX	**Prop Type Ref**	Meadowvale End (AS)
Property	Plot XX, Meadowvale End (AS)		

SAP Rating	86 B	**DER**	3.27	**TER**	10.04
Environmental	97 A	**% DER < TER**			67.43
CO_2 Emissions (t/year)	0.3	**DFEE**	34.55	**TFEE**	35.95
Compliance Check	See BREL	**% DFEE < TFEE**			3.89
% DPER < TPER	34.62	**DPER**	34.17	**TPER**	52.26

Assessor Details	Mr. Mitchell Bennellick	**Assessor ID**	P635-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (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	50.9100 (1b)	x	2.3900 (2b)	=	121.6749	(1b) - (3b)
First floor	49.2100 (1c)	x	2.6100 (2c)	=	128.4381	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	100.1200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	250.1130	(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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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								
Front Door			2.1300	1.1000	2.3430			(26)
Windows			16.9000	1.1450	19.3511			(27)
French Doors			3.7800	1.1450	4.3282			(27)
Jetfloor 150/150 Grey			50.9100	0.1100	5.6001	75.0000	3818.2500	(28a)
External Wall - 150mm FF AAC	106.5218	22.8100	83.7118	0.1800	15.0681	60.0000	5022.7081	(29a)
500mm Mineral Wool	49.2100		49.2100	0.0900	4.4289	9.0000	442.8900	(30)
Bay Plane	1.7000		1.7000	0.1000	0.1700	9.0000	15.3000	(30)
Total net area of external elements Aum(A, m2)			208.3418					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.2895			(33)
Main dwelling								
E-WM-28			45.1000	0.0000	0.0000	110.0000	4960.9998	(32)
GF - Masonry			25.3800			75.0000	1903.4999	(32c)
GF - Timber			59.7200			9.0000	537.4800	(32c)
1F - Timber			107.7900			9.0000	970.1100	(32c)
Internal Floor			49.2100			18.0000	885.7800	(32d)

Internal Ceiling	49.2100		9.0000	442.8900 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 18999.9079 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 189.7714 (35)
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.2700	0.0670	0.6211
E2 Other lintels (including other steel lintels)	1.0130	0.0670	0.0679
E1 Steel lintel with perforated steel base plate	2.4800	0.1770	0.4390
E3 Sill	13.8000	0.0380	0.5244
E4 Jamb	4.2000	0.0410	0.1722
E4 Jamb	24.3000	0.0410	0.9963
E5 Ground floor (normal)	11.5100	0.0520	0.5985
E5 Ground floor (normal)	10.6400	0.0450	0.4788
E6 Intermediate floor within a dwelling	18.4300	0.0010	0.0184
E10 Eaves (insulation at ceiling level)	6.9700	0.0530	0.3694
E12 Gable (insulation at ceiling level)	13.5600	0.0770	1.0441
E16 Corner (normal)	21.1000	0.0410	0.8651
E17 Corner (inverted - internal area greater than external area)	11.1000	-0.0860	-0.9546
P1 Party wall - Ground floor	9.0200	0.0580	0.5232
E18 Party wall between dwellings	10.0000	0.0380	0.3800
P2 Party wall - Intermediate floor within a dwelling	9.0200	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.0200	0.0740	0.6675
E4 Jamb	3.0000	0.1000	0.3000
E24 Eaves (insulation at ceiling level - inverted)	2.1000	0.1500	0.3150
E10 Eaves (insulation at ceiling level)	2.1000	0.1200	0.2520
E12 Gable (insulation at ceiling level)	1.6300	0.2500	0.4075

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.0857 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 59.3753 (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	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	(38)
Heat transfer coeff	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	(39)
Average = Sum(39)m / 12 =												100.6439	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	(40)
HLP (average)												1.0052	
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 2.7406 (42)
Hot water usage for mixer showers

70.1712	69.1167	67.5800	64.6399	62.4701	60.0504	58.6751	60.2001	61.8719	64.4699	67.4731	69.9024	(42a)

Hot water usage for baths

30.2991	29.8492	29.2155	28.0471	27.1722	26.2021	25.6781	26.3074	26.9925	28.0305	29.2230	30.1967	(42b)

Hot water usage for other uses

42.6968	41.1442	39.5916	38.0390	36.4864	34.9338	34.9338	36.4864	38.0390	39.5916	41.1442	42.6968	(42c)

Average daily hot water use (litres/day) 131.6029 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.1672	140.1100	136.3871	130.7260	126.1287	121.1864	119.2870	122.9939	126.9034	132.0920	137.8404	142.7959	(44)
Energy conte	226.7418	199.5148	209.6219	178.9573	169.7935	149.0128	144.2673	152.2921	156.4845	179.2476	196.3789	223.5839	(45)
Energy content (annual)										Total = Sum(45)m =		2185.8965	
Distribution loss (46)m = 0.15 x (45)m	34.0113	29.9272	31.4433	26.8436	25.4690	22.3519	21.6401	22.8438	23.4727	26.8871	29.4568	33.5376	(46)
Water storage loss:													
Store volume												180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1800	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6372	(55)
Total storage loss	19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(56)
If cylinder contains dedicated solar storage	19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(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	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(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	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(64)
										Total per year (kWh/year) = Sum(64)m =		2692.3705	(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	109.8041	97.4209	104.1118	92.8057	90.8688	82.8491	82.3814	85.0496	85.3335	94.0123	98.5984	108.7541	(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	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	30.0968	26.7317	21.7397	16.4583	12.3028	10.3865	11.2230	14.5881	19.5801	24.8615	29.0170	30.9333	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	382.8681	386.8411	376.8293	355.5154	328.6105	303.3237	286.4305	282.4576	292.4693	313.7832	340.6881	365.9749	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	(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)	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	(71)
Water heating gains (Table 5)	147.5862	144.9716	139.9352	128.8968	122.1355	115.0683	110.7276	114.3140	118.5188	126.3606	136.9422	146.1749	(72)
Total internal gains	669.5482	667.5415	647.5012	609.8677	572.0460	537.7756	517.3783	520.3568	539.5653	574.0024	615.6444	652.0802	(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	0.9800	10.6334	0.3100	0.0000	0.7700	2.4874	(74)
East	5.2200	19.6403	0.3100	0.0000	0.7700	24.4720	(76)
South	8.3900	46.7521	0.3100	0.0000	0.7700	93.6300	(78)
West	2.3100	19.6403	0.3100	0.0000	0.7700	10.8296	(80)
West	3.7800	19.6403	0.3500	0.0000	0.7700	20.0077	(80)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	151.4268	266.2923	381.5927	493.6122	566.0122	566.1277	544.1714	490.5494	420.9937	299.4368	183.0163	128.4623	(83)
Total gains	820.9750	933.8338	1029.0939	1103.4798	1138.0582	1103.9033	1061.5497	1010.9062	960.5590	873.4392	798.6607	780.5425	(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	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	
alpha	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	
util living area	0.9792	0.9626	0.9282	0.8559	0.7304	0.5608	0.4123	0.4505	0.6670	0.8836	0.9638	0.9831	(86)
Living	19.8012	20.0137	20.3107	20.6264	20.8567	20.9657	20.9930	20.9896	20.9265	20.6241	20.1398	19.7375	
Non living	19.0016	19.2090	19.4946	19.7868	19.9829	20.0620	20.0768	20.0755	20.0383	19.7923	19.3353	18.9391	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.3868	20.0137	20.3107	20.6264	20.8567	20.9657	20.9930	20.9896	20.9265	20.6241	20.1398	19.9141	(87)
Th 2	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	(88)
util rest of house	0.9744	0.9544	0.9126	0.8259	0.6792	0.4882	0.3283	0.3637	0.5955	0.8522	0.9544	0.9792	(89)
MIT 2	19.5278	19.2090	19.4946	19.7868	19.9829	20.0620	20.0768	20.0755	20.0383	19.7923	19.3353	19.0985	(90)
Living area fraction										fLA = Living area / (4) =		0.1767	(91)
MIT	19.6796	19.3512	19.6388	19.9351	20.1373	20.2216	20.2387	20.2370	20.1953	19.9393	19.4774	19.2426	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6796	19.3512	19.6388	19.9351	20.1373	20.2216	20.2387	20.2370	20.1953	19.9393	19.4774	19.2426	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9720	0.9465	0.9040	0.8207	0.6827	0.4998	0.3431	0.3789	0.6050	0.8467	0.9467	0.9747	(94)
Useful gains	797.9936	883.8577	930.2539	905.5999	776.9327	551.7653	364.2000	382.9990	581.1837	739.5630	756.1201	760.7905	(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	1547.8630	1454.4213	1322.3407	1110.6174	849.1614	565.7826	366.2097	386.1680	613.4505	939.9435	1245.7115	1513.9476	(97)
Space heating kWh	557.9028	383.4187	291.7126	147.6127	53.7382	0.0000	0.0000	0.0000	0.0000	149.0831	352.5059	560.3489	(98a)
Space heating requirement - total per year (kWh/year)												2496.3226	
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	557.9028	383.4187	291.7126	147.6127	53.7382	0.0000	0.0000	0.0000	0.0000	149.0831	352.5059	560.3489	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2496.3226	
Space heating per m2											(98c) / (4) =	24.9333	(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 %) 261.6872 (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	557.9028	383.4187	291.7126	147.6127	53.7382	0.0000	0.0000	0.0000	0.0000	149.0831	352.5059	560.3489	(98)
Space heating efficiency (main heating system 1)	261.6872	261.6872	261.6872	261.6872	261.6872	0.0000	0.0000	0.0000	0.0000	261.6872	261.6872	261.6872	(210)
Space heating fuel (main heating system)	213.1945	146.5180	111.4738	56.4081	20.5353	0.0000	0.0000	0.0000	0.0000	56.9699	134.7051	214.1293	(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	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(64)
Efficiency of water heater												290.3703	(216)
(217)m	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	(217)
Fuel for water heating, kWh/month	92.9012	82.0909	87.0053	75.9669	73.2889	65.6544	64.4980	67.2616	68.2275	76.5447	81.9667	91.8136	(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	3.5189	3.1784	3.5189	3.4054	3.5189	3.4054	3.5189	3.5189	3.4054	3.5189	3.4054	3.5189	(231)
Lighting	26.3435	21.1338	19.0286	13.9412	10.7686	8.7980	9.8234	12.7689	16.5855	21.7611	24.5791	27.0757	(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	953.9339	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	290.3703	
Water heating fuel used	927.2196	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 5.0240, total flow = 37.0000, SFP = 0.1358)		
mechanical ventilation fans (SFP = 0.1358)	41.4328	(230a)
Total electricity for the above, kWh/year	41.4328	(231)
Electricity for lighting (calculated in Appendix L)	212.6073	(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	2135.1936	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	953.9339	16.4900	157.3037	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	927.2196	16.4900	152.8985	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	41.4328	16.4900	6.8323	(249)
Energy for lighting	212.6073	16.4900	35.0589	(250)
Additional standing charges			0.0000	(251)
Total energy cost			352.0934	(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] =	0.8734	(257)
SAP value		85.8415	
SAP rating (Section 12)		86	(258)
SAP band		B	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	953.9339	0.1562	149.0175	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	927.2196	0.1410	130.7742	(264)
Space and water heating			279.7917	(265)
Pumps, fans and electric keep-hot	41.4328	0.1387	5.7472	(267)
Energy for lighting	212.6073	0.1443	30.6858	(268)
Total CO2, kg/year			316.2247	(272)
CO2 emissions per m2			3.1600	(273)
EI value			97.0801	
EI rating			97	(274)
EI band			A	

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.9100	(1b) x	2.3900	(2b) =	121.6749	(1b) - (3b)
First floor	49.2100	(1c) x	2.6100	(2c) =	128.4381	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 100.1200						(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		250.1130	(5)

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2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.9000	4.6000	4.7000	4.3000	4.3000	3.8000	3.8000	3.7000	3.8000	4.3000	4.3000	4.6000	(22)
Wind factor	1.2250	1.1500	1.1750	1.0750	1.0750	0.9500	0.9500	0.9250	0.9500	1.0750	1.0750	1.1500	(22a)
Adj infilt rate	0.2343	0.2199	0.2247	0.2056	0.2056	0.1817	0.1817	0.1769	0.1817	0.2056	0.2056	0.2199	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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								
Front Door			2.1300	1.1000	2.3430			(26)
Windows			16.9000	1.1450	19.3511			(27)
French Doors			3.7800	1.1450	4.3282			(27)
Jetfloor 150/150 Grey			50.9100	0.1100	5.6001	75.0000	3818.2500	(28a)
External Wall - 150mm FF AAC	106.5218	22.8100	83.7118	0.1800	15.0681	60.0000	5022.7081	(29a)
500mm Mineral Wool	49.2100		49.2100	0.0900	4.4289	9.0000	442.8900	(30)
Bay Plane	1.7000		1.7000	0.1000	0.1700	9.0000	15.3000	(30)
Total net area of external elements Aum(A, m2)			208.3418					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.2895			(33)
Main dwelling								
E-WM-28			45.1000	0.0000	0.0000	110.0000	4960.9998	(32)
GF - Masonry			25.3800			75.0000	1903.4999	(32c)
GF - Timber			59.7200			9.0000	537.4800	(32c)
1F - Timber			107.7900			9.0000	970.1100	(32c)
Internal Floor			49.2100			18.0000	885.7800	(32d)
Internal Ceiling			49.2100			9.0000	442.8900	(32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	18999.9079 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		189.7714 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.2700	0.0670	0.6211
E2 Other lintels (including other steel lintels)	1.0130	0.0670	0.0679
E1 Steel lintel with perforated steel base plate	2.4800	0.1770	0.4390
E3 Sill	13.8000	0.0380	0.5244
E4 Jamb	4.2000	0.0410	0.1722
E4 Jamb	24.3000	0.0410	0.9963
E5 Ground floor (normal)	11.5100	0.0520	0.5985
E5 Ground floor (normal)	10.6400	0.0450	0.4788
E6 Intermediate floor within a dwelling	18.4300	0.0010	0.0184
E10 Eaves (insulation at ceiling level)	6.9700	0.0530	0.3694
E12 Gable (insulation at ceiling level)	13.5600	0.0770	1.0441
E16 Corner (normal)	21.1000	0.0410	0.8651
E17 Corner (inverted - internal area greater than external area)	11.1000	-0.0860	-0.9546
P1 Party wall - Ground floor	9.0200	0.0580	0.5232
E18 Party wall between dwellings	10.0000	0.0380	0.3800
P2 Party wall - Intermediate floor within a dwelling	9.0200	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.0200	0.0740	0.6675
E4 Jamb	3.0000	0.1000	0.3000
E24 Eaves (insulation at ceiling level - inverted)	2.1000	0.1500	0.3150
E10 Eaves (insulation at ceiling level)	2.1000	0.1200	0.2520
E12 Gable (insulation at ceiling level)	1.6300	0.2500	0.4075

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		8.0857 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	59.3753 (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	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	(38)
Heat transfer coeff	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	(39)
Average = Sum(39)m / 12 =												100.6439	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	(40)
HLP (average)												1.0052	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.7406 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	70.1712	69.1167	67.5800	64.6399	62.4701	60.0504	58.6751	60.2001	61.8719	64.4699	67.4731	69.9024	(42a)

Hot water usage for baths

	30.2991	29.8492	29.2155	28.0471	27.1722	26.2021	25.6781	26.3074	26.9925	28.0305	29.2230	30.1967	(42b)
Hot water usage for other uses													
	42.6968	41.1442	39.5916	38.0390	36.4864	34.9338	34.9338	36.4864	38.0390	39.5916	41.1442	42.6968	(42c)
Average daily hot water use (litres/day)												131.6029	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	143.1672	140.1100	136.3871	130.7260	126.1287	121.1864	119.2870	122.9939	126.9034	132.0920	137.8404	142.7959	(44)
Energy conte	226.7418	199.5148	209.6219	178.9573	169.7935	149.0128	144.2673	152.2921	156.4845	179.2476	196.3789	223.5839	(45)
Energy content (annual)										Total = Sum(45)m =		2185.8965	
Distribution loss (46)m = 0.15 x (45)m													
	34.0113	29.9272	31.4433	26.8436	25.4690	22.3519	21.6401	22.8438	23.4727	26.8871	29.4568	33.5376	(46)
Water storage loss:													
Store volume												180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1800	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6372	(55)
Total storage loss													
	19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(56)
If cylinder contains dedicated solar storage													
	19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(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													
	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(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													
	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(64)
										Total per year (kWh/year) = Sum(64)m =		2692.3705	(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													
	109.8041	97.4209	104.1118	92.8057	90.8688	82.8491	82.3814	85.0496	85.3335	94.0123	98.5984	108.7541	(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	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	30.0968	26.7317	21.7397	16.4583	12.3028	10.3865	11.2230	14.5881	19.5801	24.8615	29.0170	30.9333	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	382.8681	386.8411	376.8293	355.5154	328.6105	303.3237	286.4305	282.4576	292.4693	313.7832	340.6881	365.9749	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	(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)													
	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	(71)
Water heating gains (Table 5)													
	147.5862	144.9716	139.9352	128.8968	122.1355	115.0683	110.7276	114.3140	118.5188	126.3606	136.9422	146.1749	(72)
Total internal gains													
	669.5482	667.5415	647.5012	609.8677	572.0460	537.7756	517.3783	520.3568	539.5653	574.0024	615.6444	652.0802	(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	0.9800	12.7650	0.3100	0.0000	0.7700	2.9861	(74)
East	5.2200	23.8018	0.3100	0.0000	0.7700	29.6573	(76)
South	8.3900	54.2217	0.3100	0.0000	0.7700	108.5894	(78)
West	2.3100	23.8018	0.3100	0.0000	0.7700	13.1242	(80)
West	3.7800	23.8018	0.3500	0.0000	0.7700	24.2471	(80)

Solar gains	178.6042	279.2561	402.6485	534.7174	580.9072	629.3450	582.6130	533.7633	460.5743	322.7248	21.2651	146.5374	(83)
Total gains	848.1523	946.7976	1050.1497	1144.5851	1152.9532	1167.1206	1099.9913	1054.1201	1000.1396	896.7272	636.9095	798.6176	(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	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	
alpha	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	
util living area													
	0.9733	0.9574	0.9152	0.8295	0.6971	0.5041	0.3898	0.4061	0.6246	0.8583	0.9806	0.9785	(86)
Living	19.9133	20.0790	20.3877	20.6881	20.8879	20.9788	20.9946	20.9936	20.9458	20.6901	20.0376	19.8531	
Non living	19.1119	19.2725	19.5672	19.8406	20.0069	20.0693	20.0773	20.0770	20.0506	19.8503	19.2382	19.0533	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4441	20.0790	20.3877	20.6881	20.8879	20.9788	20.9946	20.9936	20.9458	20.6901	20.0376	20.0135	(87)
Th 2	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	(88)
util rest of house													
	0.9671	0.9480	0.8970	0.7955	0.6420	0.4319	0.3081	0.3213	0.5507	0.8212	0.9747	0.9734	(89)
MIT 2	19.5843	19.2725	19.5672	19.8406	20.0069	20.0693	20.0773	20.0770	20.0506	19.8503	19.2382	19.1967	(90)
Living area fraction										fLA = Living area / (4) =		0.1767	(91)
MIT	19.7362	19.4150	19.7122	19.9903	20.1625	20.2300	20.2394	20.2390	20.2088	19.9987	19.3795	19.3411	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7362	19.4150	19.7122	19.9903	20.1625	20.2300	20.2394	20.2390	20.2088	19.9987	19.3795	19.3411	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9644	0.9397	0.8886	0.7919	0.6473	0.4440	0.3225	0.3362	0.5616	0.8175	0.9689	0.9683	(94)
Useful gains	817.9941	889.7106	933.1939	906.3627	746.2985	518.2093	354.7012	354.3764	561.6933	733.1036	617.0996	773.3039	(95)
Ext temp.	4.9000	5.3000	7.0000	9.3000	12.2000	15.0000	16.7000	16.7000	14.4000	11.1000	7.8000	4.9000	(96)
Heat loss rate W	1493.1713	1420.5921	1279.4057	1075.9179	801.3801	526.3661	356.2185	356.1757	584.6188	895.5959	1165.4021	1453.4037	(97)
Space heating kWh	502.3318	356.7523	257.5816	122.0797	40.9808	0.0000	0.0000	0.0000	0.0000	120.8942	394.7778	505.9942	(98a)
Space heating requirement - total per year (kWh/year)												2301.3925	
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	502.3318	356.7523	257.5816	122.0797	40.9808	0.0000	0.0000	0.0000	0.0000	120.8942	394.7778	505.9942	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2301.3925	
Space heating per m2											(98c) / (4) =	22.9863	(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 %)	261.6872	(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	502.3318	356.7523	257.5816	122.0797	40.9808	0.0000	0.0000	0.0000	0.0000	120.8942	394.7778	505.9942	(98)
Space heating efficiency (main heating system 1)	261.6872	261.6872	261.6872	261.6872	261.6872	0.0000	0.0000	0.0000	0.0000	261.6872	261.6872	261.6872	(210)
Space heating fuel (main heating system)	191.9589	136.3278	98.4311	46.6510	15.6602	0.0000	0.0000	0.0000	0.0000	46.1980	150.8587	193.3584	(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	269.7574	238.3676	252.6375	220.5853	212.8091	190.6408	187.2829	195.3077	198.1125	222.2632	238.0069	266.5995	(64)
Efficiency of water heater												290.3703	(216)
(217)m	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	(217)
Fuel for water heating, kWh/month	92.9012	82.0909	87.0053	75.9669	73.2889	65.6544	64.4980	67.2616	68.2275	76.5447	81.9667	91.8136	(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	3.5189	3.1784	3.5189	3.4054	3.5189	3.4054	3.5189	3.5189	3.4054	3.5189	3.4054	3.5189	(231)
Lighting	26.3435	21.1338	19.0286	13.9412	10.7686	8.7980	9.8234	12.7689	16.5855	21.7611	24.5791	27.0757	(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	879.4441	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	290.3703	
Water heating fuel used	927.2196	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 5.0240, total flow = 37.0000, SFP = 0.1358)		
mechanical ventilation fans (SFP = 0.1358)	41.4328	(230a)
Total electricity for the above, kWh/year	41.4328	(231)
Electricity for lighting (calculated in Appendix L)	212.6073	(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	2060.7038	(238)

10a. Fuel costs - using BEDF prices (568)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	879.4441	26.0600	229.1831	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	927.2196	26.0600	241.6334	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	41.4328	26.0600	10.7974	(249)
Energy for lighting	212.6073	26.0600	55.4055	(250)
Additional standing charges			0.0000	(251)
Total energy cost			537.0194	(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	879.4441	0.1563	137.4800	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	927.2196	0.1410	130.7742	(264)
Space and water heating			268.2541	(265)
Pumps, fans and electric keep-hot	41.4328	0.1387	5.7472	(267)
Energy for lighting	212.6073	0.1443	30.6858	(268)
Total CO2, kg/year			304.6872	(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	879.4441	1.5787	1388.3576	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	927.2196	1.5215	1410.7814	(278)
Space and water heating			2799.1390	(279)
Pumps, fans and electric keep-hot	41.4328	1.5128	62.6795	(281)
Energy for lighting	212.6073	1.5338	326.1042	(282)
Total Primary energy kWh/year			3187.9227	(286)

SAP 10 EPC IMPROVEMENTS

Plot XX

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

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

Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 1.0	-£ 47	-22 kg (7.2%)
U Solar photovoltaic panels	+ 5.7	-£ 223	-115 kg (40.6%)

	Typical annual savings		Energy efficiency	Environmental impact
Recommended measures				
Solar water heating	£47	0.22 kg/m²	B 87	A 97
Solar photovoltaic panels	£223	1.15 kg/m²	A 93	A 98
Total Savings	£270	1.37 kg/m²		

Potential energy efficiency rating: A 93
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 568 TEST (31 Mar 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Severn Valley):

	Current	Potential	Saving
Electricity	£537	£490	£47
Space heating	£240	£261	-£21
Water heating	£242	£173	£68
Lighting	£55	£55	£0
Generated (PV)	-£0	-£223	£223
Total cost of fuels	£537	£267	£270
Total cost of uses	£537	£266	£270
Delivered energy	21 kWh/m²	10 kWh/m²	10 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.2 tonnes	0.1 tonnes
CO2 emissions per m²	3 kg/m²	2 kg/m²	1 kg/m²
Primary energy	32 kWh/m²	16 kWh/m²	15 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Designed) (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	50.9100	(1b) x	2.3900	(2b) =	121.6749	(1b) - (3b)
First floor	49.2100	(1c) x	2.6100	(2c) =	128.4381	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	100.1200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		250.1130	(5)

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2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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								
Front Door			2.1300	1.1000	2.3430			(26)
Windows			16.9000	1.1450	19.3511			(27)
French Doors			3.7800	1.1450	4.3282			(27)
Jetfloor 150/150 Grey			50.9100	0.1100	5.6001	75.0000	3818.2500	(28a)
External Wall - 150mm FF AAC	106.5218	22.8100	83.7118	0.1800	15.0681	60.0000	5022.7081	(29a)
500mm Mineral Wool	49.2100		49.2100	0.0900	4.4289	9.0000	442.8900	(30)
Bay Plane	1.7000		1.7000	0.1000	0.1700	9.0000	15.3000	(30)
Total net area of external elements Aum(A, m2)			208.3418					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.2895			(33)
Main dwelling								
E-WM-28			45.1000	0.0000	0.0000	110.0000	4960.9998	(32)
GF - Masonry			25.3800			75.0000	1903.4999	(32c)
GF - Timber			59.7200			9.0000	537.4800	(32c)
1F - Timber			107.7900			9.0000	970.1100	(32c)
Internal Floor			49.2100			18.0000	885.7800	(32d)
Internal Ceiling			49.2100			9.0000	442.8900	(32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	18999.9079 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		189.7714 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	9.2700	0.0670	0.6211
E2 Other lintels (including other steel lintels)	1.0130	0.0670	0.0679
E1 Steel lintel with perforated steel base plate	2.4800	0.1770	0.4390
E3 Sill	13.8000	0.0380	0.5244
E4 Jamb	4.2000	0.0410	0.1722
E4 Jamb	24.3000	0.0410	0.9963
E5 Ground floor (normal)	11.5100	0.0520	0.5985
E5 Ground floor (normal)	10.6400	0.0450	0.4788
E6 Intermediate floor within a dwelling	18.4300	0.0010	0.0184
E10 Eaves (insulation at ceiling level)	6.9700	0.0530	0.3694
E12 Gable (insulation at ceiling level)	13.5600	0.0770	1.0441
E16 Corner (normal)	21.1000	0.0410	0.8651
E17 Corner (inverted - internal area greater than external area)	11.1000	-0.0860	-0.9546
P1 Party wall - Ground floor	9.0200	0.0580	0.5232
E18 Party wall between dwellings	10.0000	0.0380	0.3800
P2 Party wall - Intermediate floor within a dwelling	9.0200	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.0200	0.0740	0.6675
E4 Jamb	3.0000	0.1000	0.3000
E24 Eaves (insulation at ceiling level - inverted)	2.1000	0.1500	0.3150
E10 Eaves (insulation at ceiling level)	2.1000	0.1200	0.2520
E12 Gable (insulation at ceiling level)	1.6300	0.2500	0.4075

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		8.0857 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	59.3753 (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	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	(38)
Heat transfer coeff	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	(39)

Average = Sum(39)m / 12 = 100.6439

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	(40)
HLP (average)												1.0052	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.7406 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	70.1712	69.1167	67.5800	64.6399	62.4701	60.0504	58.6751	60.2001	61.8719	64.4699	67.4731	69.9024	(42a)

Hot water usage for baths

	30.2991	29.8492	29.2155	28.0471	27.1722	26.2021	25.6781	26.3074	26.9925	28.0305	29.2230	30.1967	(42b)
Hot water usage for other uses													
	42.6968	41.1442	39.5916	38.0390	36.4864	34.9338	34.9338	36.4864	38.0390	39.5916	41.1442	42.6968	(42c)
Average daily hot water use (litres/day)												131.6029	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	143.1672	140.1100	136.3871	130.7260	126.1287	121.1864	119.2870	122.9939	126.9034	132.0920	137.8404	142.7959	(44)
Energy conte	226.7418	199.5148	209.6219	178.9573	169.7935	149.0128	144.2673	152.2921	156.4845	179.2476	196.3789	223.5839	(45)
Energy content (annual)										Total = Sum(45)m =		2185.8965	
Distribution loss (46)m = 0.15 x (45)m													
	34.0113	29.9272	31.4433	26.8436	25.4690	22.3519	21.6401	22.8438	23.4727	26.8871	29.4568	33.5376	(46)
Water storage loss:													
Store volume												180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1800	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6372	(55)
Total storage loss													
	19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(56)
If cylinder contains dedicated solar storage													
	19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	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													
	269.7574	238.3676	251.2417	213.8317	200.0148	178.0340	174.2560	183.2113	192.7097	220.8675	238.0069	266.5995	(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)
Aperture area of solar collector												3.0000	(H1)
Zero-loss collector efficiency												0.8000	(H2)
Collector linear heat loss coefficient												1.8000	(H3)
Collector 2nd order heat loss coefficient												0.0000	(H4)
Collector loop efficiency												0.9000	(H5)
Incidence angle modifier												1.0000	(H6)
Overshading factor												0.8000	(H8)
Overall heat loss coefficient of system												6.5000	(H10)
Heat loss coefficient of collector loop												3.9667	(H11)
Dedicated solar storage volume												75.0000	(H12)
Effective solar volume												75.0000	(H14)
Reference volume												225.0000	(H15)
Storage tank correction coefficient												1.3161	(H16)
Heat delivered to hot water												619.1813	(H24)
Heat delivered to space heating												0.0000	(H29)
Solar input												619.1813	
Solar input	-0.0000	-16.2099	-58.2957	-79.9963	-104.2046	-95.8656	-95.0340	-83.2918	-57.6225	-28.6608	-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													
	269.7574	222.1577	192.9460	133.8355	95.8102	82.1684	79.2220	99.9195	135.0871	192.2067	238.0069	266.5995	(64)
										Total per year (kWh/year) = Sum(64)m =		2007.7168	(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													
	109.8041	97.4209	102.9952	87.4028	80.6334	72.7638	71.9598	75.3725	81.0112	92.8957	98.5984	108.7541	(65)

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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	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	30.0968	26.7317	21.7397	16.4583	12.3028	10.3865	11.2230	14.5881	19.5801	24.8615	29.0170	30.9333	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	382.8681	386.8411	376.8293	355.5154	328.6105	303.3237	286.4305	282.4576	292.4693	313.7832	340.6881	365.9749	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	(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)													
	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	(71)
Water heating gains (Table 5)													
	147.5862	144.9716	138.4344	121.3928	108.3782	101.0608	96.7202	101.3071	112.5156	124.8598	136.9422	146.1749	(72)
Total internal gains													
	669.5482	667.5415	646.0004	602.3637	558.2886	523.7681	503.3708	507.3499	533.5621	572.5016	615.6444	652.0802	(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	0.9800	10.6334	0.3100	0.0000	0.7700	2.4874	(74)
East	5.2200	19.6403	0.3100	0.0000	0.7700	24.4720	(76)
South	8.3900	46.7521	0.3100	0.0000	0.7700	93.6300	(78)
West	2.3100	19.6403	0.3100	0.0000	0.7700	10.8296	(80)
West	3.7800	19.6403	0.3500	0.0000	0.7700	20.0077	(80)

Solar gains	151.4268	266.2923	381.5927	493.6122	566.0122	566.1277	544.1714	490.5494	420.9937	299.4368	183.0163	128.4623	(83)
Total gains	820.9750	933.8338	1027.5931	1095.9758	1124.3008	1089.8958	1047.5423	997.8993	954.5558	871.9384	798.6607	780.5425	(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	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	
alpha	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	
util living area													
	0.9792	0.9626	0.9285	0.8584	0.7362	0.5669	0.4176	0.4559	0.6701	0.8841	0.9638	0.9831	(86)
Living	19.8012	20.0137	20.3093	20.6212	20.8519	20.9642	20.9927	20.9891	20.9251	20.6229	20.1398	19.7375	
Non living	19.0016	19.2090	19.4933	19.7824	19.9794	20.0611	20.0767	20.0753	20.0375	19.7913	19.3353	18.9391	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	

24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.3868	20.0137	20.3093	20.6212	20.8519	20.9642	20.9927	20.9891	20.9251	20.6229	20.1398	19.9141	(87)
Th 2	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	(88)
util rest of house													
	0.9744	0.9544	0.9130	0.8286	0.6853	0.4940	0.3326	0.3683	0.5986	0.8528	0.9544	0.9792	(89)
MIT 2	19.5278	19.2090	19.4933	19.7824	19.9794	20.0611	20.0767	20.0753	20.0375	19.7913	19.3353	19.0985	(90)
Living area fraction									fLA = Living area / (4) =			0.1767	(91)
MIT	19.6796	19.3512	19.6374	19.9306	20.1336	20.2207	20.2385	20.2367	20.1943	19.9383	19.4774	19.2426	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6796	19.3512	19.6374	19.9306	20.1336	20.2207	20.2385	20.2367	20.1943	19.9383	19.4774	19.2426	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9720	0.9465	0.9043	0.8233	0.6885	0.5056	0.3476	0.3836	0.6081	0.8473	0.9467	0.9747	(94)
Useful gains	797.9936	883.8577	929.2764	902.2835	774.0782	551.0273	364.0749	382.8114	580.4499	738.8134	756.1201	760.7905	(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													
	1547.8630	1454.4213	1322.2028	1110.1611	848.7872	565.6890	366.1933	386.1436	613.3560	939.8394	1245.7115	1513.9476	(97)
Space heating kWh													
	557.9028	383.4187	292.3372	149.6719	55.5836	0.0000	0.0000	0.0000	0.0000	149.5634	352.5059	560.3489	(98a)
Space heating requirement - total per year (kWh/year)												2501.3323	
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													
	557.9028	383.4187	292.3372	149.6719	55.5836	0.0000	0.0000	0.0000	0.0000	149.5634	352.5059	560.3489	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2501.3323	
Space heating per m2											(98c) / (4) =	24.9833	(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 %)												261.6872	(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													
	557.9028	383.4187	292.3372	149.6719	55.5836	0.0000	0.0000	0.0000	0.0000	149.5634	352.5059	560.3489	(98)
Space heating efficiency (main heating system 1)													
	261.6872	261.6872	261.6872	261.6872	261.6872	0.0000	0.0000	0.0000	0.0000	261.6872	261.6872	261.6872	(210)
Space heating fuel (main heating system)													
	213.1945	146.5180	111.7125	57.1950	21.2405	0.0000	0.0000	0.0000	0.0000	57.1535	134.7051	214.1293	(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													
	269.7574	222.1577	192.9460	133.8355	95.8102	82.1684	79.2220	99.9195	135.0871	192.2067	238.0069	266.5995	(64)
Efficiency of water heater												290.3703	(216)
(217)m	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	(217)
Fuel for water heating, kWh/month													
	92.9012	76.5084	66.4482	46.0913	32.9959	28.2978	27.2831	34.4111	46.5224	66.1936	81.9667	91.8136	(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	10.3135	9.3154	10.3135	9.9808	10.3135	9.9808	10.3135	10.3135	9.9808	10.3135	9.9808	10.3135	(231)
Lighting	26.3435	21.1338	19.0286	13.9412	10.7686	8.7980	9.8234	12.7689	16.5855	21.7611	24.5791	27.0757	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-37.9258	-56.0399	-83.1839	-94.4624	-100.3035	-91.6781	-90.3720	-84.9358	-75.0344	-63.6152	-42.2453	-32.4355	(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												955.8482	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												290.3703	
Water heating fuel used												691.4332	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 5.0240, total flow = 37.0000, SFP = 0.1358)													
mechanical ventilation fans (SFP = 0.1358)												41.4328	(230a)
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												121.4328	(231)
Electricity for lighting (calculated in Appendix L)												212.6073	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-852.2318	(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												1129.0897	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	955.8482	16.4900	157.6194	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	691.4332	16.4900	114.0173	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	41.4328	16.4900	6.8323	(249)
Pump for solar water heating	80.0000	16.4900	13.1920	(249)
Energy for lighting	212.6073	16.4900	35.0589	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-852.2318	16.4900	-140.5330	
PV Unit electricity exported	0.0000	5.5900	0.0000	
Total			-140.5330	(252)
Total energy cost			186.1869	(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] =	0.4619 (257)
SAP value		92.5130
SAP rating (Section 12)		93 (258)
SAP band		A

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	955.8482	0.1562	149.2846	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	691.4332	0.1458	100.7962	(264)
Space and water heating			250.0808	(265)
Pumps, fans and electric keep-hot	121.4328	0.1387	16.8442	(267)
Energy for lighting	212.6073	0.1443	30.6858	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-852.2318	0.1345	-114.6410	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-114.6410	(269)
Total CO2, kg/year			182.9698	(272)
CO2 emissions per m2			1.8300	(273)
EI value			98.3105	
EI rating			98	(274)
EI band			A	

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.9100	(1b) x	2.3900	(2b) =	121.6749	(1b) - (3b)
First floor	49.2100	(1c) x	2.6100	(2c) =	128.4381	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	100.1200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		250.1130	(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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.9000	4.6000	4.7000	4.3000	4.3000	3.8000	3.8000	3.7000	3.8000	4.3000	4.3000	4.6000	(22)
Wind factor	1.2250	1.1500	1.1750	1.0750	1.0750	0.9500	0.9500	0.9250	0.9500	1.0750	1.0750	1.1500	(22a)
Adj infilt rate	0.2343	0.2199	0.2247	0.2056	0.2056	0.1817	0.1817	0.1769	0.1817	0.2056	0.2056	0.2199	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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								
Front Door			2.1300	1.1000	2.3430			(26)
Windows			16.9000	1.1450	19.3511			(27)
French Doors			3.7800	1.1450	4.3282			(27)
Jetfloor 150/150 Grey			50.9100	0.1100	5.6001	75.0000	3818.2500	(28a)
External Wall - 150mm FF AAC	106.5218	22.8100	83.7118	0.1800	15.0681	60.0000	5022.7081	(29a)
500mm Mineral Wool	49.2100		49.2100	0.0900	4.4289	9.0000	442.8900	(30)
Bay Plane	1.7000		1.7000	0.1000	0.1700	9.0000	15.3000	(30)
Total net area of external elements Aum(A, m2)			208.3418					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.2895			(33)
Main dwelling								
E-WM-28			45.1000	0.0000	0.0000	110.0000	4960.9998	(32)
GF - Masonry			25.3800			75.0000	1903.4999	(32c)
GF - Timber			59.7200			9.0000	537.4800	(32c)
1F - Timber			107.7900			9.0000	970.1100	(32c)
Internal Floor			49.2100			18.0000	885.7800	(32d)
Internal Ceiling			49.2100			9.0000	442.8900	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 18999.9079 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 189.7714 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.2700	0.0670	0.6211
E2 Other lintels (including other steel lintels)	1.0130	0.0670	0.0679
E1 Steel lintel with perforated steel base plate	2.4800	0.1770	0.4390
E3 Sill	13.8000	0.0380	0.5244
E4 Jamb	4.2000	0.0410	0.1722
E4 Jamb	24.3000	0.0410	0.9963
E5 Ground floor (normal)	11.5100	0.0520	0.5985
E5 Ground floor (normal)	10.6400	0.0450	0.4788
E6 Intermediate floor within a dwelling	18.4300	0.0010	0.0184
E10 Eaves (insulation at ceiling level)	6.9700	0.0530	0.3694
E12 Gable (insulation at ceiling level)	13.5600	0.0770	1.0441
E16 Corner (normal)	21.1000	0.0410	0.8651
E17 Corner (inverted - internal area greater than external area)	11.1000	-0.0860	-0.9546
P1 Party wall - Ground floor	9.0200	0.0580	0.5232
E18 Party wall between dwellings	10.0000	0.0380	0.3800
P2 Party wall - Intermediate floor within a dwelling	9.0200	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.0200	0.0740	0.6675
E4 Jamb	3.0000	0.1000	0.3000
E24 Eaves (insulation at ceiling level - inverted)	2.1000	0.1500	0.3150
E10 Eaves (insulation at ceiling level)	2.1000	0.1200	0.2520
E12 Gable (insulation at ceiling level)	1.6300	0.2500	0.4075

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.0857 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 59.3753 (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	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	41.2686	(38)
Heat transfer coeff	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	100.6439	(39)

Average = Sum(39)m / 12 = 100.6439

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	1.0052	(40)
HLP (average)												1.0052	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.7406 (42)

Hot water usage for mixer showers

70.1712	69.1167	67.5800	64.6399	62.4701	60.0504	58.6751	60.2001	61.8719	64.4699	67.4731	69.9024	(42a)

Hot water usage for baths

30.2991	29.8492	29.2155	28.0471	27.1722	26.2021	25.6781	26.3074	26.9925	28.0305	29.2230	30.1967	(42b)

Hot water usage for other uses

42.6968	41.1442	39.5916	38.0390	36.4864	34.9338	34.9338	36.4864	38.0390	39.5916	41.1442	42.6968	(42c)

Average daily hot water use (litres/day) 131.6029 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.1672	140.1100	136.3871	130.7260	126.1287	121.1864	119.2870	122.9939	126.9034	132.0920	137.8404	142.7959	(44)
Energy conte	226.7418	199.5148	209.6219	178.9573	169.7935	149.0128	144.2673	152.2921	156.4845	179.2476	196.3789	223.5839	(45)
Energy content (annual)										Total = Sum(45)m =		2185.8965	
Distribution loss (46)m = 0.15 x (45)m	34.0113	29.9272	31.4433	26.8436	25.4690	22.3519	21.6401	22.8438	23.4727	26.8871	29.4568	33.5376	(46)

Water storage loss:

Store volume 180.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.1800 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.6372 (55)

Total storage loss

19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(56)

If cylinder contains dedicated solar storage

19.7532	17.8416	19.7532	19.1160	19.7532	19.1160	19.7532	19.7532	19.1160	19.7532	19.1160	19.7532	(57)
23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Primary loss / Combi loss

Total heat required for water heating calculated for each month

269.7574	238.3676	251.2417	213.8317	200.0148	178.0340	174.2560	183.2113	192.7097	220.8675	238.0069	266.5995	(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)
Aperture area of solar collector												3.0000	(H1)
Zero-loss collector efficiency												0.8000	(H2)
Collector linear heat loss coefficient												1.8000	(H3)
Collector 2nd order heat loss coefficient												0.0000	(H4)
Collector loop efficiency												0.9000	(H5)
Incidence angle modifier												1.0000	(H6)
Overshading factor												0.8000	(H8)
Overall heat loss coefficient of system												6.5000	(H10)
Heat loss coefficient of collector loop												3.9667	(H11)
Dedicated solar storage volume												75.0000	(H12)
Effective solar volume												75.0000	(H14)
Reference volume												225.0000	(H15)
Storage tank correction coefficient												1.3161	(H16)
Heat delivered to hot water												694.2558	(H24)
Heat delivered to space heating												0.0000	(H29)
Solar input												694.2558	
Solar input	-0.6631	-20.1059	-65.3163	-90.3841	-108.7946	-108.6695	-103.3117	-93.6122	-67.4969	-35.9015	-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													
	269.0943	218.2617	185.9254	123.4476	91.2202	69.3646	70.9443	89.5991	125.2128	184.9659	238.0069	266.5995	(64)
										Total per year (kWh/year) = Sum(64)m =		1932.6423	(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													
	109.8041	97.4209	102.9952	87.4028	80.6334	72.7638	71.9598	75.3725	81.0112	92.8957	98.5984	108.7541	(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	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	164.4380	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	30.0968	26.7317	21.7397	16.4583	12.3028	10.3865	11.2230	14.5881	19.5801	24.8615	29.0170	30.9333	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	382.8681	386.8411	376.8293	355.5154	328.6105	303.3237	286.4305	282.4576	292.4693	313.7832	340.6881	365.9749	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	54.1844	(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)													
	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	-109.6254	(71)
Water heating gains (Table 5)													
	147.5862	144.9716	138.4344	121.3928	108.3782	101.0608	96.7202	101.3071	112.5156	124.8598	136.9422	146.1749	(72)
Total internal gains													
	669.5482	667.5415	646.0004	602.3637	558.2886	523.7681	503.3708	507.3499	533.5621	572.5016	615.6444	652.0802	(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	0.9800	12.7650	0.3100	0.0000	0.7700	2.9861	(74)
East	5.2200	23.8018	0.3100	0.0000	0.7700	29.6573	(76)
South	8.3900	54.2217	0.3100	0.0000	0.7700	108.5894	(78)
West	2.3100	23.8018	0.3100	0.0000	0.7700	13.1242	(80)
West	3.7800	23.8018	0.3500	0.0000	0.7700	24.2471	(80)

Solar gains	178.6042	279.2561	402.6485	534.7174	580.9072	629.3450	582.6130	533.7633	460.5743	322.7248	21.2651	146.5374	(83)
Total gains	848.1523	946.7976	1048.6489	1137.0811	1139.1958	1153.1131	1085.9838	1041.1131	994.1364	895.2264	636.9095	798.6176	(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	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	52.4399	
alpha	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	4.4960	
util living area													
	0.9733	0.9574	0.9156	0.8321	0.7030	0.5097	0.3946	0.4109	0.6276	0.8589	0.9806	0.9785	(86)
Living	19.9133	20.0790	20.3863	20.6836	20.8840	20.9779	20.9943	20.9933	20.9448	20.6891	20.0376	19.8531	
Non living	19.1119	19.2725	19.5660	19.8369	20.0041	20.0688	20.0772	20.0769	20.0500	19.8494	19.2382	19.0533	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4441	20.0790	20.3863	20.6836	20.8840	20.9779	20.9943	20.9933	20.9448	20.6891	20.0376	20.0135	(87)
Th 2	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	20.0790	(88)
util rest of house													
	0.9671	0.9480	0.8974	0.7983	0.6480	0.4369	0.3120	0.3252	0.5536	0.8219	0.9747	0.9734	(89)
MIT 2	19.5843	19.2725	19.5660	19.8369	20.0041	20.0688	20.0772	20.0769	20.0500	19.8494	19.2382	19.1967	(90)
Living area fraction										fLA = Living area / (4) =		0.1767	(91)
MIT	19.7362	19.4150	19.7109	19.9865	20.1596	20.2294	20.2393	20.2388	20.2081	19.9978	19.3795	19.3411	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7362	19.4150	19.7109	19.9865	20.1596	20.2294	20.2393	20.2388	20.2081	19.9978	19.3795	19.3411	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9644	0.9397	0.8890	0.7946	0.6531	0.4490	0.3265	0.3403	0.5645	0.8182	0.9689	0.9683	(94)
Useful gains	817.9941	889.7106	932.2820	903.4969	744.0239	517.7829	354.6090	354.2714	561.1654	732.4538	617.0996	773.3039	(95)
Ext temp.	4.9000	5.3000	7.0000	9.3000	12.2000	15.0000	16.7000	16.7000	14.4000	11.1000	7.8000	4.9000	(96)
Heat loss rate W													
	1493.1713	1420.5921	1279.2775	1075.5277	801.0851	526.3121	356.2064	356.1618	584.5514	895.5066	1165.4021	1453.4037	(97)
Space heating kWh													

	502.3318	356.7523	258.1646	123.8622	42.4535	0.0000	0.0000	0.0000	0.0000	121.3113	394.7778	505.9942 (98a)
Space heating requirement - total per year (kWh/year)												2305.6478
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												
	502.3318	356.7523	258.1646	123.8622	42.4535	0.0000	0.0000	0.0000	0.0000	121.3113	394.7778	505.9942 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2305.6478
Space heating per m2											(98c) / (4) =	23.0288 (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 %)	261.6872 (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													
	502.3318	356.7523	258.1646	123.8622	42.4535	0.0000	0.0000	0.0000	0.0000	121.3113	394.7778	505.9942	(98)
Space heating efficiency (main heating system 1)													
	261.6872	261.6872	261.6872	261.6872	261.6872	0.0000	0.0000	0.0000	0.0000	261.6872	261.6872	261.6872	(210)
Space heating fuel (main heating system)													
	191.9589	136.3278	98.6539	47.3322	16.2230	0.0000	0.0000	0.0000	0.0000	46.3574	150.8587	193.3584	(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													
	269.0943	218.2617	185.9254	123.4476	91.2202	69.3646	70.9443	89.5991	125.2128	184.9659	238.0069	266.5995	(64)
Efficiency of water heater												290.3703	(216)
(217)m	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	290.3703	(217)
Fuel for water heating, kWh/month													
	92.6728	75.1667	64.0304	42.5138	31.4151	23.8883	24.4324	30.8568	43.1218	63.7000	81.9667	91.8136	(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	10.3135	9.3154	10.3135	9.9808	10.3135	9.9808	10.3135	10.3135	9.9808	10.3135	9.9808	10.3135	(231)
Lighting	26.3435	21.1338	19.0286	13.9412	10.7686	8.7980	9.8234	12.7689	16.5855	21.7611	24.5791	27.0757	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-43.8690	-58.5154	-86.4812	-98.7262	-101.3118	-96.3349	-93.4711	-88.9293	-79.5154	-67.1970	-6.2461	-36.5441	(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	881.0702 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	290.3703
Water heating fuel used	665.5784 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(MEVDecentralised, Database: total watage = 5.0240, total flow = 37.0000, SFP = 0.1358)	
mechanical ventilation fans (SFP = 0.1358)	41.4328 (230a)
pump for solar water heating	80.0000 (230g)
Total electricity for the above, kWh/year	121.4328 (231)
Electricity for lighting (calculated in Appendix L)	212.6073 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-857.1416 (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	1023.5472 (238)

10a. Fuel costs - using BEDF prices (568)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	881.0702	26.0600	229.6069	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	665.5784	26.0600	173.4497	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	41.4328	26.0600	10.7974	(249)
Pump for solar water heating	80.0000	26.0600	20.8480	(249)
Energy for lighting	212.6073	26.0600	55.4055	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-857.1416	26.0600	-223.3711	
PV Unit electricity exported	0.0000	5.8100	0.0000	
Total			-223.3711	(252)
Total energy cost			266.7364	(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	881.0702	0.1563	137.7074	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	665.5784	0.1464	97.4565	(264)
Space and water heating			235.1639	(265)
Pumps, fans and electric keep-hot	121.4328	0.1387	16.8442	(267)
Energy for lighting	212.6073	0.1443	30.6858	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-857.1416	0.1340	-114.8708	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-114.8708	(269)
Total CO2, kg/year			167.8231	(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	881.0702	1.5786	1390.8256	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	665.5784	1.5417	1026.0973	(278)
Space and water heating			2416.9229	(279)
Pumps, fans and electric keep-hot	121.4328	1.5128	183.7035	(281)
Energy for lighting	212.6073	1.5338	326.1042	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-857.1416	1.4953	-1281.6977	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-1281.6977	(283)
Total Primary energy kWh/year			1645.0329	(286)