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DOCUMENT CONTROL

Project	Croxlea, Parsonage Lane, Winford
Reference Number	8549

Document Checking:

Prepared By:	**Owain Morgan**	Signed:	[redacted]
Checked By:	**Owain Morgan**	Signed:	
Verified By:	**Daryl Fisher**	Signed:	

Issue	Date	Status
1	08/03/2024	First Issue

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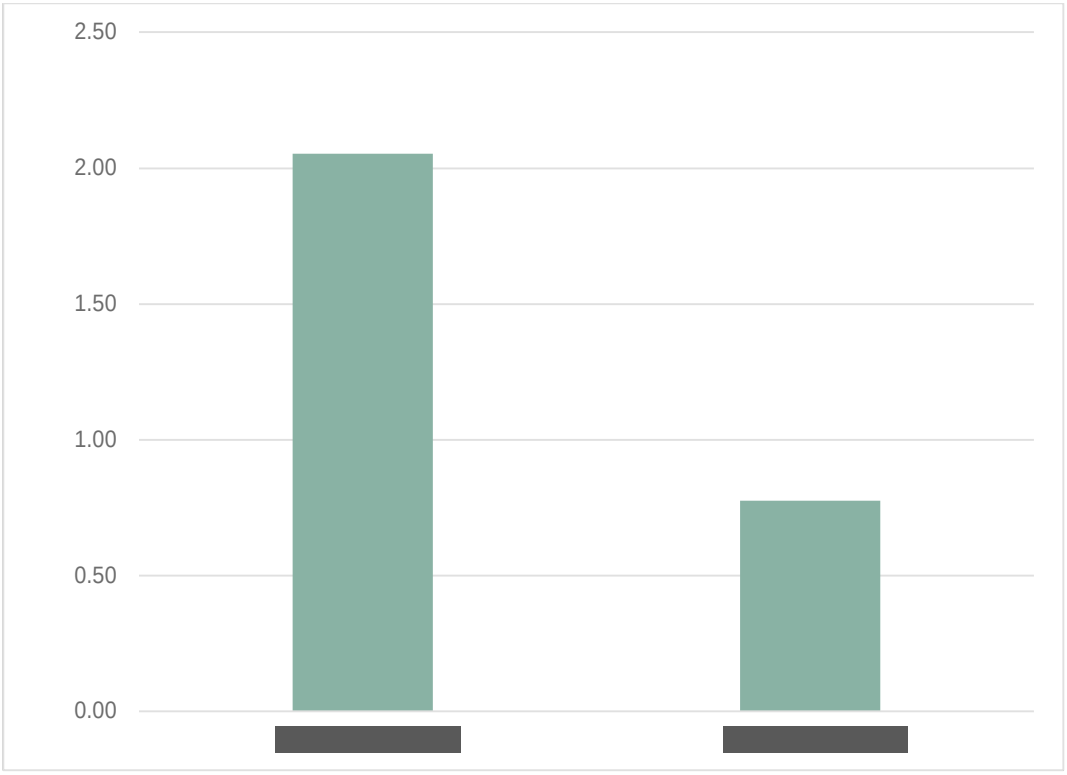
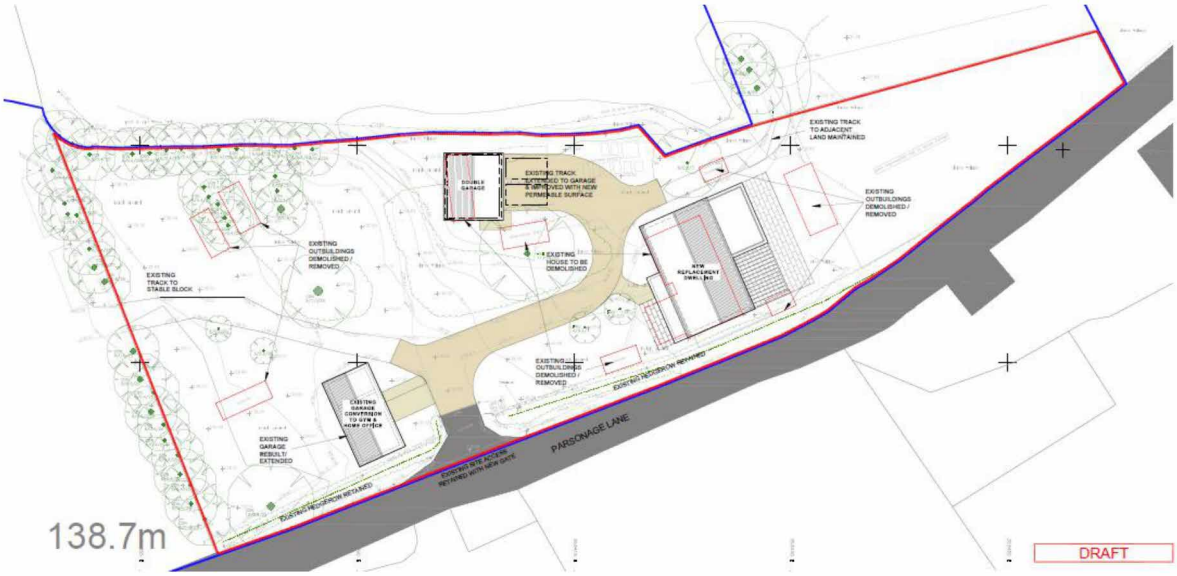


2. SITE PROPOSALS

2.1 The development comprises of a proposed new 5-bedroom detached dwelling along with associated outbuildings to include a newly built double garage and conversion of the existing garage to form a home office and gym space.

Figure 2: Site Location Plan (Courtesy of Angus Meek Architects, 2024)



2.2 The site is accessed via a gated driveway off to the north of Parsonage Lane which forms the southern boundary of the site. The site is surrounded to its northern and western boundaries by hedgerows and mature trees.

Figure 3: Proposed dwelling at Croxlea, Parsonage Lane (Courtesy of Angus Meek Architects, 2024)

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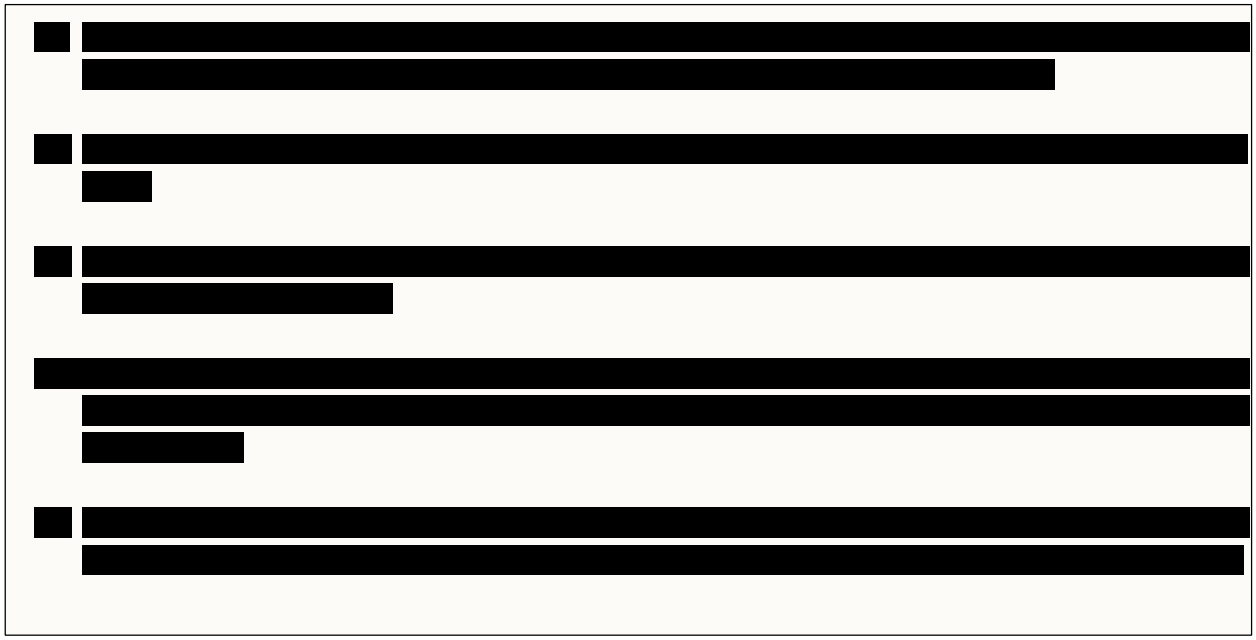

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4. ENERGY ASSESSMENT

4.1 The following section details aspects of the design which contribute towards lower carbon emissions and the sustainability objectives of the local planning policy.

4.2 As part of the Energy Assessment we have undertaken the relevant SAP calculations to establish a route to demonstrating the enhanced energy efficiency credentials of the design and a route to meeting Building Regulations Part L1 2010 (2021 edition) compliance for the proposed project a as detailed in the Approved Document L1 2021.

SITING AND LOCATION

4.3 As described elsewhere, the dwelling is in a rural area near the village of Winford, North Somerset.

4.4 Dwellings in cities and built-up areas generally are surrounded by hard surfaces which store and reflect heat rising average air temperatures. This effect is also exacerbated by other factors including hear rejection from vehicles and air conditioning equipment. Combined this is known as the Urban Heat Island effect. Rural areas are less exposed to these impacts and therefore are more resistant to rising temperatures and the overheating risk posed by this.

4.5 The dwelling is oriented in a North-West to South-East axis, with the front elevation facing South-West. Orienting the building in this way takes advantage of the natural sunlight in the afternoon and early evening.

Figure 4: Proposed Dwelling at Croxlea, Parsonage Lane (Courtesy of Angus Meek Architects, 2024)

4.6 This orientation maximises the availability of natural daylight whilst also limiting the overheating risk, considering the mature trees situated to the south-western boundary of the site.

SHELTER AND PLANTING

4.7 As described elsewhere the new dwelling is surrounded to most sides by mature trees and hedgerows, which shelter the home and offer a degree of overshadowing. These features act as a natural means of reducing incoming solar irradiation to the windows and reduce solar heat absorbed by the building fabric therefore reducing overheating risk.

INTERNAL LAYOUT OF ROOMS, NATURAL VENTILATION AND DAYLIGHT ACCESS

4.8 Building layout influences the energy use within the home. By accounting for this within the design process, passive design measures can be adopted to reduce energy demand and ensure a comfortable environment for the occupants.

4.9 Proposed floor plans indicating room layouts are illustrated below;

Figure 5: Ground Floor Layout (Courtesy of Angus Meek Architects, 2024)

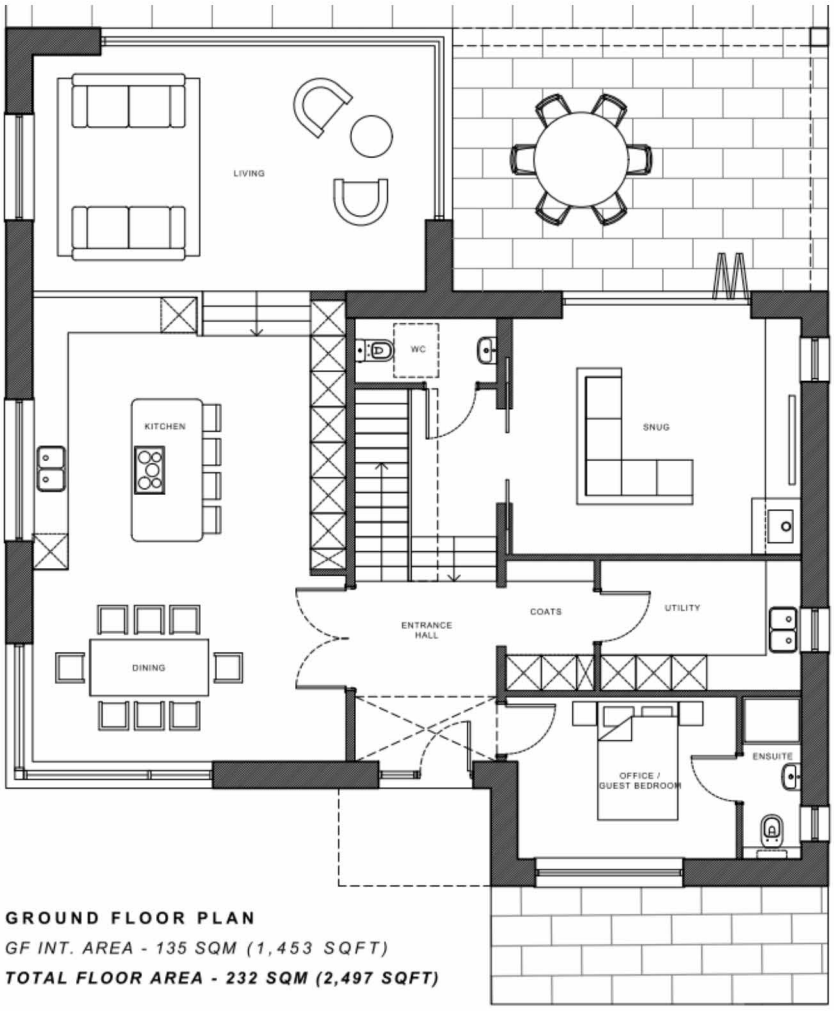
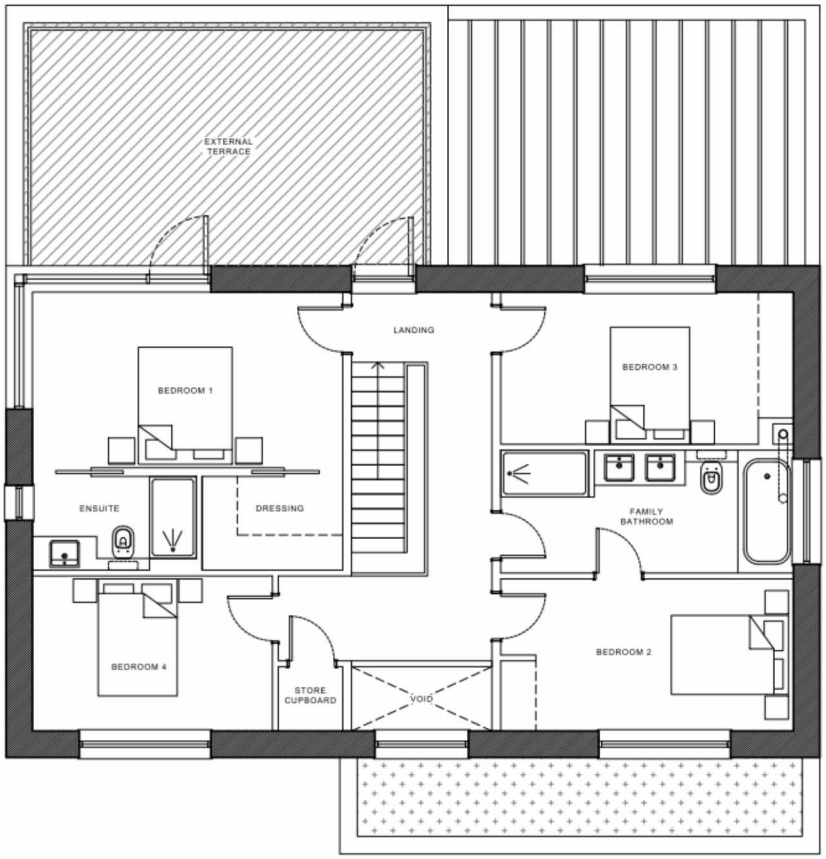


Figure 6: First Floor Layout (Courtesy of Angus Meek Architects, 2024)



FIRST FLOOR PLAN

FF INT. AREA - 97 SQM (1,044 SQFT)

4.10 Access to natural daylight and good air quality are essential when designing for the health and wellbeing of the occupants.

4.11 The home is designed to be dual aspect to make the best use of natural daylight and the opportunity for cross ventilation though openable windows. This is particularly apparent within the open plan living, kitchen and dining space which is dual aspect.

4.12 Each occupied room benefits from large windows providing good levels of natural daylight. Openable windows will assist with maintaining comfortable internal temperatures though purge ventilation during summer months.

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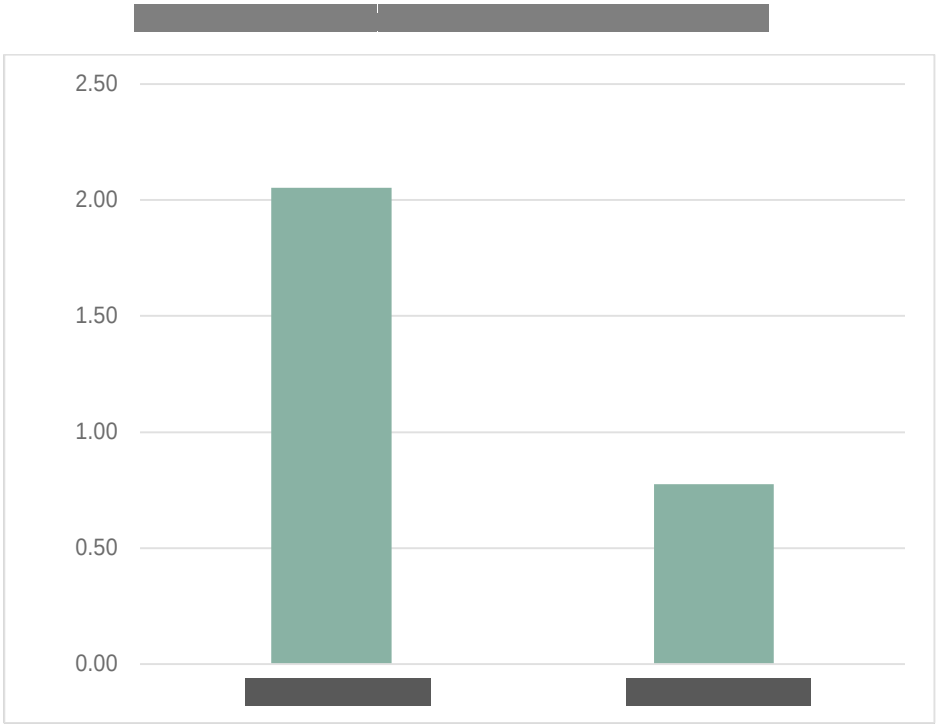
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Full SAP Calculation Printout

Property Reference	8549 - Croxlea	**Issued on Date**	08/03/2024
Assessment Reference	8549	**Prop Type Ref**	Baseline
Property			

SAP Rating	82 B	**DER**	3.33	**TER**	8.81
Environmental	96 A	**% DER < TER**			62.20
CO Emissions (t/year)	0.73	**DFEE**	45.91	**TFEE**	46.30
Compliance Check	See BREL	**% DFEE < TFEE**			0.85
% DPER < TPER	26.44	**DPER**	34.60	**TPER**	47.04

Assessor Details	Mr. Owain Morgan	**Assessor ID**	AV11-0001
Client	Angus Meek Architects, Angus Meek Architects		

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)	
Ground floor	135.3500 (1b)	x	2.8000 (2b)	=	378.9800 (1b) - (3b)	
First floor	97.5000 (1c)	x	2.5000 (2c)	=	243.7500 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	232.8500					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		622.7300	(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	1 * 10 =	10.0000	(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) =	10.0000 / (5) =	0.0161	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.0000	(17)
Infiltration rate		0.1661	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1661	(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	0.2117	0.2076	0.2034	0.1827	0.1785	0.1578	0.1578	0.1536	0.1661	0.1785	0.1868	0.1951	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation	0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	79.2000	(23c)

Effective ac	0.3157	0.3116	0.3074	0.2867	0.2825	0.2618	0.2618	0.2576	0.2701	0.2825	0.2908	0.2991	(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	
Glazing (Uw = 1.30)			89.5700	1.2357	110.6854			(27)
Entrance Door			3.6000	1.0000	3.6000			(26)
Ground Floor			135.3500	0.1200	16.2420	75.0000	10151.2500	(28a)
EX WALLS	251.7400	93.1700	158.5700	0.1400	22.1998	9.0000	1427.1300	(29a)
Pitched Roof	97.5000		97.5000	0.1100	10.7250	9.0000	877.5000	(30)
Flat Roof 1	29.9300		29.9300	0.1300	3.8909	9.0000	269.3700	(30)
Flat Roof 2	7.9200		7.9200	0.1300	1.0296	9.0000	71.2800	(30)
Total net area of external elements Aum(A, m2)			522.4400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		168.3727			(33)
Internal Wall 1F			183.8000			75.0000	13785.0000	(32c)
Internal Wall 0F			197.0000			75.0000	14775.0000	(32c)
Internal Floor 1			97.5000			18.0000	1755.0000	(32d)
Internal Ceiling 1			97.5000			9.0000	877.5000	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 43989.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 188.9157 (35)
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	45.5500	0.0500	2.2775
E3 Sill	14.5500	0.0500	0.7275
E4 Jamb	77.8000	0.0500	3.8900
E5 Ground floor (normal)	53.3000	0.1600	8.5280
E6 Intermediate floor within a dwelling	41.0000	0.0000	0.0000
E16 Corner (normal)	26.8000	0.0900	2.4120
E10 Eaves (insulation at ceiling level)	26.0000	0.0600	1.5600
E12 Gable (insulation at ceiling level)	15.0000	0.0600	0.9000
E14 Flat roof	23.7500	0.0800	1.9000
E17 Corner (inverted – internal area greater than external area)	5.6000	-0.0900	-0.5040

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 21.6910 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 190.0637 (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	64.8816	64.0285	63.1754	58.9097	58.0566	53.7910	53.7910	52.9378	55.4972	58.0566	59.7629	61.4691	(38)
Heat transfer coeff	254.9453	254.0922	253.2390	248.9734	248.1203	243.8546	243.8546	243.0015	245.5609	248.1203	249.8265	251.5328	(39)

Average = Sum(39)m / 12 = 248.7601

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0949	1.0912	1.0876	1.0692	1.0656	1.0473	1.0473	1.0436	1.0546	1.0656	1.0729	1.0802	(40)
HLP (average)												1.0683	
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 3.0446 (42)
Hot water usage for mixer showers

75.2684	74.1373	72.4890	69.3353	67.0079	64.4125	62.9372	64.5730	66.3662	69.1529	72.3743	74.9800	(42a)

Hot water usage for baths

32.4911	32.0086	31.3290	30.0761	29.1380	28.0977	27.5358	28.2106	28.9453	30.0584	31.3371	32.3813	(42b)

Hot water usage for other uses

45.8101	44.1443	42.4785	40.8126	39.1468	37.4810	37.4810	39.1468	40.8126	42.4785	44.1443	45.8101	(42c)

Average daily hot water use (litres/day) 141.1648 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	153.5696	150.2901	146.2965	140.2240	135.2927	129.9912	127.9540	131.9304	136.1241	141.6897	147.8557	153.1714	(44)
Energy conte	243.2167	214.0111	224.8522	191.9597	182.1300	159.8393	154.7493	163.3574	167.8546	192.2716	210.6476	239.8293	(45)

Energy content (annual) Total = Sum(45)m = 2344.7188

Distribution loss (46)m = 0.15 x (45)m												
36.4825	32.1017	33.7278	28.7940	27.3195	23.9759	23.2124	24.5036	25.1782	28.8407	31.5971	35.9744	(46)

Water storage loss:
Store volume 250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.4000 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 0.7560 (55)
Total storage loss

23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360	(56)

If cylinder contains dedicated solar storage

23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360	(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

289.9151	256.1903	271.5506	237.1517	228.8284	205.0313	201.4477	210.0558	213.0466	238.9700	255.8396	286.5277	(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

289.9151	256.1903	271.5506	237.1517	228.8284	205.0313	201.4477	210.0558	213.0466	238.9700	255.8396	286.5277	(64)

Total per year (kWh/year) = Sum(64)m = 2894.5548 (64)
12Total per year (kWh/year) 2895 (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

118.2283	104.9020	112.1221	99.9802	97.9169	89.3002	88.8129	91.6751	91.9653	101.2890	106.1939	117.1020	(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	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	202.4026	224.0886	202.4026	209.1493	202.4026	209.1493	202.4026	202.4026	209.1493	202.4026	209.1493	202.4026	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	401.2857	405.4498	394.9564	372.6173	344.4181	317.9149	300.2091	296.0450	306.5384	328.8775	357.0767	383.5799	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	(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)	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	(71)
Water heating gains (Table 5)	158.9090	156.1042	150.7017	138.8614	131.6088	124.0280	119.3721	123.2192	127.7295	136.1412	147.4916	157.3951	(72)
Total internal gains	831.2668	854.3121	816.7303	789.2975	747.0990	719.7618	690.6533	690.3363	712.0868	736.0908	782.3871	812.0472	(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	
Northeast	36.6800	11.2829	0.6300	0.8000	0.7700	144.5491	(75)

Southeast				13.0300	36.7938	0.6300	0.8000	0.7700	167.4493 (77)				
Southwest				23.5100	36.7938	0.6300	0.8000	0.7700	302.1283 (79)				
Northwest				16.3500	11.2829	0.6300	0.8000	0.7700	64.4323 (81)				
Solar gains	678.5590	1225.2521	1860.8227	2614.6972	3210.7632	3311.6241	3141.1228	2677.4613	2118.9006	1403.8781	825.3984	572.5253 (83)	
Total gains	1509.8258	2079.5643	2677.5530	3403.9947	3957.8622	4031.3859	3831.7761	3367.7976	2830.9873	2139.9689	1607.7855	1384.5725 (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	47.9286	48.0895	48.2515	49.0782	49.2470	50.1084	50.1084	50.2844	49.7603	49.2470	48.9106	48.5789	
alpha	4.1952	4.2060	4.2168	4.2719	4.2831	4.3406	4.3406	4.3523	4.3174	4.2831	4.2607	4.2386	
util living area	0.9916	0.9706	0.9115	0.7578	0.5574	0.3832	0.2792	0.3301	0.5705	0.8781	0.9795	0.9940	(86)
Living	19.4051	19.8016	20.2873	20.7484	20.9411	20.9909	20.9982	20.9964	20.9537	20.5920	19.8979	19.3482	
Non living	18.1442	18.6466	19.2455	19.7853	19.9819	20.0387	20.0435	20.0457	20.0070	19.6325	18.7837	18.0798	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	15	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	16	28	18	0	0	0	0	0	0	0	0	31	
MIT	20.5338	20.3212	20.4667	20.7484	20.9411	20.9909	20.9982	20.9964	20.9537	20.5920	19.8979	20.0644	(87)
Th 2	20.0050	20.0080	20.0110	20.0260	20.0290	20.0441	20.0441	20.0472	20.0381	20.0290	20.0230	20.0170	(88)
util rest of house	0.9895	0.9637	0.8929	0.7189	0.5062	0.3275	0.2189	0.2626	0.5004	0.8450	0.9736	0.9925	(89)
MIT 2	19.5811	19.4071	19.4938	19.7853	19.9819	20.0387	20.0435	20.0457	20.0070	19.6325	18.7837	19.1619	(90)
Living area fraction										fLA = Living area / (4) =		0.2950	(91)
MIT	19.8622	19.6768	19.7808	20.0694	20.2649	20.3197	20.3251	20.3262	20.2863	19.9156	19.1125	19.4282	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8622	19.6768	19.7808	20.0694	20.2649	20.3197	20.3251	20.3262	20.2863	19.9156	19.1125	19.4282	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9892	0.9610	0.8879	0.7208	0.5189	0.3437	0.2367	0.2825	0.5190	0.8406	0.9662	0.9914	(94)
Useful gains	1493.4753	1998.5222	2377.4958	2453.5153	2053.8755	1385.6277	907.0525	951.2421	1469.4014	1798.8086	1553.4911	1372.6750	(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	3967.5043	3754.6757	3363.2264	2780.8892	2125.1318	1394.7647	908.3939	954.0696	1519.1204	2311.3919	3001.0311	3830.3959	(97)
Space heating kWh	1840.6776	1180.1352	733.3836	235.7092	53.0147	0.0000	0.0000	0.0000	0.0000	381.3620	1042.2288	1828.5443	(98a)
Space heating requirement - total per year (kWh/year)												7295.0554	
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	1840.6776	1180.1352	733.3836	235.7092	53.0147	0.0000	0.0000	0.0000	0.0000	381.3620	1042.2288	1828.5443	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7295.0554	
Space heating per m2											(98c) / (4) =	31.3294	(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 %)												275.3540	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												65.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1840.6776	1180.1352	733.3836	235.7092	53.0147	0.0000	0.0000	0.0000	0.0000	381.3620	1042.2288	1828.5443	(98)
Space heating efficiency (main heating system 1)	275.3540	275.3540	275.3540	275.3540	275.3540	0.0000	0.0000	0.0000	0.0000	275.3540	275.3540	275.3540	(210)
Space heating fuel (main heating system)	668.4767	428.5883	266.3421	85.6022	19.2533	0.0000	0.0000	0.0000	0.0000	138.4988	378.5050	664.0703	(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	289.9151	256.1903	271.5506	237.1517	228.8284	205.0313	201.4477	210.0558	213.0466	238.9700	255.8396	286.5277	(64)
Efficiency of water heater												279.6347	(216)
(217)m	279.6347	279.6347	279.6347	279.6347	279.6347	279.6347	279.6347	279.6347	279.6347	279.6347	279.6347	279.6347	(217)
Fuel for water heating, kWh/month	103.6764	91.6161	97.1091	84.8077	81.8312	73.3211	72.0396	75.1179	76.1875	85.4579	91.4906	102.4650	(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	97.5619	88.1204	97.5619	94.4147	97.5619	94.4147	97.5619	97.5619	94.4147	97.5619	94.4147	97.5619	(231)
Lighting	44.4717	35.6769	32.1231	23.5347	18.1789	14.8523	16.5834	21.5557	27.9988	36.7359	41.4931	45.7077	(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	2649.3367 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	279.6347
Water heating fuel used	1035.1200 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.5120)	
mechanical ventilation fans (SFP = 1.5120)	1148.7127 (230a)
Total electricity for the above, kWh/year	1148.7127 (231)
Electricity for lighting (calculated in Appendix L)	358.9124 (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	5192.0818 (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	2649.3367	0.1575	417.3023	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1035.1200	0.1410	145.9869	(264)
Space and water heating			563.2892	(265)
Pumps, fans and electric keep-hot	1148.7127	0.1387	159.3406	(267)
Energy for lighting	358.9124	0.1443	51.8021	(268)
Total CO2, kg/year			774.4319	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3300	(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	2649.3367	1.5831	4194.0481	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1035.1200	1.5215	1574.9335	(278)
Space and water heating			5768.9816	(279)
Pumps, fans and electric keep-hot	1148.7127	1.5128	1737.7725	(281)
Energy for lighting	358.9124	1.5338	550.5118	(282)
Total Primary energy kWh/year			8057.2659	(286)
Dwelling Primary energy Rate (DPER)			34.6000	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	135.3500 (1b)	x	2.8000 (2b)	=	378.9800 (1b) - (3b)	
First floor	97.5000 (1c)	x	2.5000 (2c)	=	243.7500 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 232.8500						(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		622.7300	(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) =	0.0642 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3142 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3142 (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

	0.4006	0.3928	0.3849	0.3457	0.3378	0.2985	0.2985	0.2907	0.3142	0.3378	0.3535	0.3692 (22b)
Effective ac	0.5803	0.5771	0.5741	0.5597	0.5571	0.5446	0.5446	0.5422	0.5494	0.5571	0.5625	0.5682 (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	
TER Opaque door			3.6000	1.0000	3.6000			(26)
TER Opening Type (Uw = 1.20)			54.6500	1.1450	62.5763			(27)
Ground Floor			135.3500	0.1300	17.5955			(28a)
EX WALLS	251.7400	58.2500	193.4900	0.1800	34.8282			(29a)
Pitched Roof	97.5000		97.5000	0.1100	10.7250			(30)
Flat Roof 1	29.9300		29.9300	0.1100	3.2923			(30)
Flat Roof 2	7.9200		7.9200	0.1100	0.8712			(30)
Total net area of external elements Aum(A, m2)			522.4400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		133.4885			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 188.9157 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	45.5500	0.0500	2.2775
E3 Sill	14.5500	0.0500	0.7275
E4 Jamb	77.8000	0.0500	3.8900
E5 Ground floor (normal)	53.3000	0.1600	8.5280
E6 Intermediate floor within a dwelling	41.0000	0.0000	0.0000
E16 Corner (normal)	26.8000	0.0900	2.4120
E10 Eaves (insulation at ceiling level)	26.0000	0.0600	1.5600
E12 Gable (insulation at ceiling level)	15.0000	0.0600	0.9000
E14 Flat roof	23.7500	0.0800	1.9000
E17 Corner (inverted – internal area greater than external area)	5.6000	-0.0900	-0.5040

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 21.6910 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 155.1795 (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	119.2438	118.6033	117.9756	115.0269	114.4752	111.9071	111.9071	111.4315	112.8963	114.4752	115.5913	116.7581	(38)
Heat transfer coeff	274.4233	273.7829	273.1551	270.2065	269.6548	267.0866	267.0866	266.6110	268.0758	269.6548	270.7708	271.9376	(39)
Average = Sum(39)m / 12 =												270.2038	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1785	1.1758	1.1731	1.1604	1.1581	1.1470	1.1470	1.1450	1.1513	1.1581	1.1629	1.1679	(40)
HLP (average)												1.1604	
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 3.0446 (42)

Hot water usage for mixer showers

	75.2684	74.1373	72.4890	69.3353	67.0079	64.4125	62.9372	64.5730	66.3662	69.1529	72.3743	74.9800 (42a)

Hot water usage for baths

	32.4911	32.0086	31.3290	30.0761	29.1380	28.0977	27.5358	28.2106	28.9453	30.0584	31.3371	32.3813 (42b)

Hot water usage for other uses

	45.8101	44.1443	42.4785	40.8126	39.1468	37.4810	37.4810	39.1468	40.8126	42.4785	44.1443	45.8101 (42c)

Average daily hot water use (litres/day) 141.1648 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	153.5696	150.2901	146.2965	140.2240	135.2927	129.9912	127.9540	131.9304	136.1241	141.6897	147.8557	153.1714	(44)
Energy conte	243.2167	214.0111	224.8522	191.9597	182.1300	159.8393	154.7493	163.3574	167.8546	192.2716	210.6476	239.8293	(45)
Energy content (annual)										Total = Sum(45)m =		2344.7188	
Distribution loss (46)m = 0.15 x (45)m	36.4825	32.1017	33.7278	28.7940	27.3195	23.9759	23.2124	24.5036	25.1782	28.8407	31.5971	35.9744	(46)
Water storage loss:													
Store volume												250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8903	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												1.0208	(55)
Total storage loss	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444	(56)
If cylinder contains dedicated solar storage	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444	(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	298.1235	263.6043	279.7590	245.0953	237.0368	212.9749	209.6561	218.2642	220.9902	247.1784	263.7832	294.7361	(62)
WWHRS	-34.4096	-30.4321	-31.8667	-26.3869	-24.5917	-21.0433	-19.7247	-20.9752	-21.7722	-25.6670	-29.0776	-33.7724	(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	263.7139	233.1722	247.8923	218.7084	212.4451	191.9316	189.9314	197.2890	199.2180	221.5115	234.7056	260.9638	(64)
										Total per year (kWh/year) = Sum(64)m =		2671.4827	(64)
12Total per year (kWh/year)												2671	(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	124.7950	110.8333	118.6888	106.3351	104.4837	95.6551	95.3796	98.2418	98.3201	107.8558	112.5488	123.6687	(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	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	202.4026	224.0886	202.4026	209.1493	202.4026	209.1493	202.4026	202.4026	209.1493	202.4026	209.1493	202.4026	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	401.2857	405.4498	394.9564	372.6173	344.4181	317.9149	300.2091	296.0450	306.5384	328.8775	357.0767	383.5799	(68)

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

	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232 (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)												
	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854 (71)
Water heating gains (Table 5)												
	167.7352	164.9305	159.5280	147.6876	140.4350	132.8542	128.1983	132.0454	136.5557	144.9674	156.3178	166.2214 (72)
Total internal gains												
	843.0930	866.1384	828.5565	801.1238	758.9252	728.5880	699.4795	699.1625	720.9130	747.9170	794.2133	823.8734 (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	
Northeast	22.3600	11.2829	0.6300	0.7000	0.7700	77.1021	(75)
Southeast	7.9600	36.7938	0.6300	0.7000	0.7700	89.5076	(77)
Southwest	14.3400	36.7938	0.6300	0.7000	0.7700	161.2486	(79)
Northwest	9.9900	11.2829	0.6300	0.7000	0.7700	34.4477	(81)

Solar gains	362.3059	654.1933	993.5134	1395.9741	1714.1778	1768.0127	1676.9906	1429.4709	1131.2902	749.5589	440.7066	305.6922	(83)
Total gains	1205.3989	1520.3316	1822.0699	2197.0979	2473.1031	2496.6007	2376.4702	2128.6334	1852.2032	1497.4759	1234.9199	1129.5656	(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	44.5267	44.6309	44.7335	45.2216	45.3141	45.7499	45.7499	45.8315	45.5810	45.3141	45.1274	44.9337	
alpha	3.9684	3.9754	3.9822	4.0148	4.0209	4.0500	4.0500	4.0554	4.0387	4.0209	4.0085	3.9956	
util living area													
	0.9963	0.9904	0.9750	0.9230	0.8064	0.6301	0.4797	0.5483	0.8010	0.9609	0.9923	0.9972	(86)
MIT	19.0827	19.3537	19.7601	20.2933	20.7075	20.9221	20.9798	20.9662	20.7912	20.2223	19.5559	19.0438	(87)
Th 2	19.9372	19.9394	19.9416	19.9518	19.9537	19.9626	19.9626	19.9643	19.9592	19.9537	19.9498	19.9458	(88)
util rest of house													
	0.9953	0.9879	0.9681	0.9019	0.7566	0.5463	0.3733	0.4369	0.7306	0.9461	0.9898	0.9964	(89)
MIT 2	17.6883	18.0355	18.5521	19.2178	19.6945	19.9124	19.9546	19.9494	19.8000	19.1458	18.3021	17.6441	(90)
Living area fraction									fLA = Living area / (4) =			0.2950	(91)
MIT	18.0997	18.4244	18.9085	19.5351	19.9934	20.2103	20.2571	20.2494	20.0925	19.4634	18.6720	18.0571	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.0997	18.4244	18.9085	19.5351	19.9934	20.2103	20.2571	20.2494	20.0925	19.4634	18.6720	18.0571	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9927	0.9827	0.9591	0.8917	0.7586	0.5673	0.4043	0.4688	0.7408	0.9370	0.9854	0.9943	(94)
Useful gains	1196.6240	1493.9845	1747.5420	1959.1143	1876.2170	1416.4380	960.8762	997.9957	1372.1258	1403.1144	1216.8389	1123.1296	(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													
	3786.9516	3702.7458	3389.4461	2873.6808	2236.3546	1498.4485	976.7583	1026.2831	1606.4344	2390.0624	3133.3599	3768.2614	(97)
Space heating kWh													
	1927.2038	1484.2876	1221.5767	658.4879	267.9424	0.0000	0.0000	0.0000	0.0000	734.2893	1379.8951	1967.9780	(98a)
Space heating requirement - total per year (kWh/year)												9641.6608	
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													
	1927.2038	1484.2876	1221.5767	658.4879	267.9424	0.0000	0.0000	0.0000	0.0000	734.2893	1379.8951	1967.9780	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9641.6608	
Space heating per m2											(98c) / (4) =	41.4072	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.3000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	1927.2038	1484.2876	1221.5767	658.4879	267.9424	0.0000	0.0000	0.0000	0.0000	734.2893	1379.8951	1967.9780	(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)													
	2087.9781	1608.1122	1323.4850	713.4214	290.2951	0.0000	0.0000	0.0000	0.0000	795.5464	1495.0110	2132.1539	(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													
	263.7139	233.1722	247.8923	218.7084	212.4451	191.9316	189.9314	197.2890	199.2180	221.5115	234.7056	260.9638	(64)
Efficiency of water heater												79.8000	(216)
(217)m	87.6107	87.4608	87.1421	86.3713	84.5814	79.8000	79.8000	79.8000	79.8000	86.5381	87.3677	87.6427	(217)
Fuel for water heating, kWh/month													
	301.0066	266.6020	284.4692	253.2189	251.1724	240.5158	238.0092	247.2293	249.6467	255.9699	268.6413	297.7586	(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	42.0553	33.7383	30.3776	22.2559	17.1911	14.0453	15.6823	20.3845	26.4774	34.7398	39.2385	43.2241	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													

(233a)m	-105.4208	-139.0129	-186.9475	-196.0624	-199.9889	-182.4102	-179.7515	-174.8115	-165.1366	-151.4207	-112.2291	-92.2741 (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	-92.7582	-190.0290	-368.8525	-541.8698	-705.4139	-705.1247	-697.1660	-595.5710	-443.4761	-267.9851	-122.5161	-73.7841 (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	10446.0030 (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	3154.2399 (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)	339.4100 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-6690.0129 (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	7335.6400 (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	10446.0030	0.2100	2193.6606	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3154.2399	0.2100	662.3904	(264)
Space and water heating			2856.0510	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	339.4100	0.1443	48.9874	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1885.4663	0.1361	-256.6118	
PV Unit electricity exported	-4804.5465	0.1266	-608.0154	
Total			-864.6272	(269)
Total CO2, kg/year			2052.3405	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.8100	(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	10446.0030	1.1300	11803.9834	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3154.2399	1.1300	3564.2910	(278)
Space and water heating			15368.2745	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	339.4100	1.5338	520.5984	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1885.4663	1.5031	-2834.0161	
PV Unit electricity exported	-4804.5465	0.4646	-2231.9691	
Total			-5065.9852	(283)
Total Primary energy kWh/year			10952.9885	(286)
Target Primary Energy Rate (TPER)			47.0400	(287)

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)	
Ground floor	135.3500 (1b)	x	2.8000 (2b)	=	378.9800	(1b) - (3b)
First floor	97.5000 (1c)	x	2.5000 (2c)	=	243.7500	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 232.8500						(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	622.7300	(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) =	0.0642 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.0000 (17)
Infiltration rate		0.2142 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2142 (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	0.2731	0.2678	0.2624	0.2357	0.2303	0.2035	0.2035	0.1982	0.2142	0.2303	0.2410	0.2517	(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	0.5373	0.5359	0.5344	0.5278	0.5265	0.5207	0.5207	0.5196	0.5229	0.5265	0.5290	0.5317	(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	
Glazing (Uw = 1.30)			89.5700	1.2357	110.6854			(27)
Entrance Door			3.6000	1.0000	3.6000			(26)
Ground Floor			135.3500	0.1200	16.2420	75.0000	10151.2500	(28a)
EX WALLS	251.7400	93.1700	158.5700	0.1400	22.1998	9.0000	1427.1300	(29a)
Pitched Roof	97.5000		97.5000	0.1100	10.7250	9.0000	877.5000	(30)
Flat Roof 1	29.9300		29.9300	0.1300	3.8909	9.0000	269.3700	(30)
Flat Roof 2	7.9200		7.9200	0.1300	1.0296	9.0000	71.2800	(30)
Total net area of external elements Aum(A, m2)			522.4400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		168.3727			(33)
Internal Wall 1F			183.8000			75.0000	13785.0000	(32c)
Internal Wall 0F			197.0000			75.0000	14775.0000	(32c)
Internal Floor 1			97.5000			18.0000	1755.0000	(32d)
Internal Ceiling 1			97.5000			9.0000	877.5000	(32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	43989.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		188.9157 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	45.5500	0.0500	2.2775
E3 Sill	14.5500	0.0500	0.7275
E4 Jamb	77.8000	0.0500	3.8900
E5 Ground floor (normal)	53.3000	0.1600	8.5280
E6 Intermediate floor within a dwelling	41.0000	0.0000	0.0000
E16 Corner (normal)	26.8000	0.0900	2.4120
E10 Eaves (insulation at ceiling level)	26.0000	0.0600	1.5600
E12 Gable (insulation at ceiling level)	15.0000	0.0600	0.9000
E14 Flat roof	23.7500	0.0800	1.9000
E17 Corner (inverted – internal area greater than external area)	5.6000	-0.0900	-0.5040

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		21.6910 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	190.0637 (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	110.4166	110.1189	109.8271	108.4566	108.2002	107.0065	107.0065	106.7854	107.4663	108.2002	108.7189	109.2612	(38)
Heat transfer coeff	300.4803	300.1826	299.8908	298.5203	298.2638	297.0701	297.0701	296.8491	297.5299	298.2638	298.7826	299.3249	(39)
Average = Sum(39)m / 12 =												298.5190	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2904	1.2892	1.2879	1.2820	1.2809	1.2758	1.2758	1.2749	1.2778	1.2809	1.2832	1.2855	(40)
HLP (average)												1.2820	
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		3.0446 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	32.4911	32.0086	31.3290	30.0761	29.1380	28.0977	27.5358	28.2106	28.9453	30.0584	31.3371	32.3813	(42b)
Hot water usage for other uses	45.8101	44.1443	42.4785	40.8126	39.1468	37.4810	37.4810	39.1468	40.8126	42.4785	44.1443	45.8101	(42c)
Average daily hot water use (litres/day)												71.7699	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.3012	76.1528	73.8075	70.8888	68.2848	65.5787	65.0168	67.3574	69.7579	72.5368	75.4814	78.1914	(44)
Energy conte	124.0100	108.4406	113.4394	97.0432	91.9245	80.6367	78.6322	83.4025	86.0185	98.4318	107.5371	122.4288	(45)
Energy content (annual)										Total = Sum(45)m =		1191.9451	
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													

	105.4085	92.1745	96.4235	82.4867	78.1358	68.5412	66.8374	70.8921	73.1157	83.6670	91.4065	104.0645	(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													
	105.4085	92.1745	96.4235	82.4867	78.1358	68.5412	66.8374	70.8921	73.1157	83.6670	91.4065	104.0645	(64)
										Total per year (kWh/year) = Sum(64)m =		1013.1533	(64)
12Total per year (kWh/year)												1013	(64)
Electric shower(s)													
	60.2774	53.7077	58.6467	55.9659	57.0161	54.3878	56.2007	57.0161	55.9659	58.6467	57.5440	60.2774	(64a)
						Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =						685.6523	(64a)
Heat gains from water heating, kWh/month													
	41.4215	36.4706	38.7676	34.6131	33.7880	30.7322	30.7595	31.9770	32.2704	35.5784	37.2376	41.0855	(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	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	202.4026	224.0886	202.4026	209.1493	202.4026	209.1493	202.4026	202.4026	209.1493	202.4026	209.1493	202.4026	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	401.2857	405.4498	394.9564	372.6173	344.4181	317.9149	300.2091	296.0450	306.5384	328.8775	357.0767	383.5799	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	(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)													
	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	(71)
Water heating gains (Table 5)													
	55.6740	54.2717	52.1069	48.0738	45.4139	42.6837	41.3434	42.9799	44.8200	47.8205	51.7189	55.2224	(72)
Total internal gains													
	728.0318	752.4796	718.1355	698.5100	660.9042	638.4174	612.6246	610.0970	629.1772	647.7701	686.6145	709.8744	(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	
Northeast	36.6800	11.2829	0.6300	0.8000	0.7700	144.5491	(75)
Southeast	13.0300	36.7938	0.6300	0.8000	0.7700	167.4493	(77)
Southwest	23.5100	36.7938	0.6300	0.8000	0.7700	302.1283	(79)
Northwest	16.3500	11.2829	0.6300	0.8000	0.7700	64.4323	(81)

Solar gains	678.5590	1225.2521	1860.8227	2614.6972	3210.7632	3311.6241	3141.1228	2677.4613	2118.9006	1403.8781	825.3984	572.5253	(83)
Total gains	1406.5909	1977.7317	2578.9582	3313.2072	3871.6673	3950.0415	3753.7474	3287.5583	2748.0778	2051.6482	1512.0129	1282.3998	(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	40.6655	40.7058	40.7454	40.9325	40.9677	41.1323	41.1323	41.1629	41.0687	40.9677	40.8965	40.8224	
alpha	3.7110	3.7137	3.7164	3.7288	3.7312	3.7422	3.7422	3.7442	3.7379	3.7312	3.7264	3.7215	
util living area													
	0.9936	0.9783	0.9362	0.8212	0.6427	0.4646	0.3438	0.4062	0.6622	0.9157	0.9851	0.9954	(86)
MIT	18.9977	19.3967	19.9298	20.5061	20.8417	20.9634	20.9908	20.9832	20.8707	20.3220	19.5246	18.9226	(87)
Th 2	19.8483	19.8493	19.8503	19.8549	19.8558	19.8598	19.8598	19.8606	19.8583	19.8558	19.8541	19.8522	(88)
util rest of house													
	0.9918	0.9727	0.9206	0.7834	0.5819	0.3880	0.2568	0.3097	0.5785	0.8875	0.9805	0.9941	(89)
MIT 2	18.0361	18.4311	18.9487	19.4810	19.7563	19.8433	19.8573	19.8555	19.7898	19.3350	18.5644	17.9642	(90)
Living area fraction										fLA = Living area / (4) =		0.2950	(91)
MIT	18.3198	18.7160	19.2381	19.7835	20.0765	20.1738	20.1918	20.1882	20.1087	19.6262	18.8477	18.2469	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3198	18.7160	19.2381	19.7835	20.0765	20.1738	20.1918	20.1882	20.1087	19.6262	18.8477	18.2469	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9886	0.9655	0.9105	0.7807	0.5942	0.4096	0.2824	0.3380	0.5981	0.8807	0.9749	0.9916	(94)
Useful gains	1390.5106	1909.5153	2348.2140	2586.7540	2300.6471	1618.0411	1060.0891	1111.1285	1643.7427	1806.8426	1473.9873	1271.6245	(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													
	4212.6715	4147.3201	3820.0530	3248.9365	2498.4133	1655.8099	1067.0027	1124.5385	1787.7726	2692.1900	3510.0086	4204.5990	(97)
Space heating kWh													
	2099.6877	1503.8048	1095.0482	476.7715	147.1380	0.0000	0.0000	0.0000	0.0000	658.6985	1465.9353	2182.1330	(98a)
Space heating requirement - total per year (kWh/year)												9629.2171	
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													
	2099.6877	1503.8048	1095.0482	476.7715	147.1380	0.0000	0.0000	0.0000	0.0000	658.6985	1465.9353	2182.1330	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9629.2171	
Space heating per m2											(98c) / (4) =	41.3537	(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	2792.4593	2198.3191	2256.0531	0.0000	0.0000	0.0000	0.0000	(100)

Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9299	0.9585	0.9350	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	2596.7773	2107.1083	2109.4274	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	4522.8275	4297.1998	3756.4168	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	1386.7562	1629.4281	1225.3601	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	346.6890	407.3570	306.3400	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												1060.3861	(107)
Energy for space heating												41.3537	(99)
Energy for space cooling												4.5539	(108)
Total												45.9077	(109)
Fabric Energy Efficiency (DFEE)												45.9	(109)

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	135.3500 (1b)	x	2.8000 (2b)	=	378.9800 (1b) - (3b)	
First floor	97.5000 (1c)	x	2.5000 (2c)	=	243.7500 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	232.8500					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		622.7300	(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) =	0.0642	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3142	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3142	(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													
	0.4006	0.3928	0.3849	0.3457	0.3378	0.2985	0.2985	0.2907	0.3142	0.3378	0.3535	0.3692	(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	0.5803	0.5771	0.5741	0.5597	0.5571	0.5446	0.5446	0.5422	0.5494	0.5571	0.5625	0.5682	(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	
TER Opaque door			3.6000	1.0000	3.6000			(26)
TER Opening Type (Uw = 1.20)			54.6500	1.1450	62.5763			(27)
Ground Floor			135.3500	0.1300	17.5955			(28a)
EX WALLS	251.7400	58.2500	193.4900	0.1800	34.8282			(29a)
Pitched Roof	97.5000		97.5000	0.1100	10.7250			(30)
Flat Roof 1	29.9300		29.9300	0.1100	3.2923			(30)
Flat Roof 2	7.9200		7.9200	0.1100	0.8712			(30)
Total net area of external elements Aum(A, m2)			522.4400					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	133.4885			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	188.9157	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	45.5500	0.0500	2.2775
E3 Sill	14.5500	0.0500	0.7275
E4 Jamb	77.8000	0.0500	3.8900
E5 Ground floor (normal)	53.3000	0.1600	8.5280
E6 Intermediate floor within a dwelling	41.0000	0.0000	0.0000
E16 Corner (normal)	26.8000	0.0900	2.4120
E10 Eaves (insulation at ceiling level)	26.0000	0.0600	1.5600
E12 Gable (insulation at ceiling level)	15.0000	0.0600	0.9000
E14 Flat roof	23.7500	0.0800	1.9000
E17 Corner (inverted – internal area greater than external area)	5.6000	-0.0900	-0.5040

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	21.6910	(36)
Point Thermal bridges	(36a) = 0.0000	

Total fabric heat loss (33) + (36) + (36a) = 155.1795 (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	119.2438	118.6033	117.9756	115.0269	114.4752	111.9071	111.9071	111.4315	112.8963	114.4752	115.5913	116.7581	(38)
Heat transfer coeff	274.4233	273.7829	273.1551	270.2065	269.6548	267.0866	267.0866	266.6110	268.0758	269.6548	270.7708	271.9376	(39)
Average = Sum(39)m / 12 =												270.2038	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1785	1.1758	1.1731	1.1604	1.1581	1.1470	1.1470	1.1450	1.1513	1.1581	1.1629	1.1679	(40)
HLP (average)												1.1604	
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 3.0446 (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

32.4911	32.0086	31.3290	30.0761	29.1380	28.0977	27.5358	28.2106	28.9453	30.0584	31.3371	32.3813	(42b)

Hot water usage for other uses

45.8101	44.1443	42.4785	40.8126	39.1468	37.4810	37.4810	39.1468	40.8126	42.4785	44.1443	45.8101	(42c)

Average daily hot water use (litres/day) 71.7699 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.3012	76.1528	73.8075	70.8888	68.2848	65.5787	65.0168	67.3574	69.7579	72.5368	75.4814	78.1914	(44)
Energy conte	124.0100	108.4406	113.4394	97.0432	91.9245	80.6367	78.6322	83.4025	86.0185	98.4318	107.5371	122.4288	(45)
Energy content (annual)											Total = Sum(45)m =	1191.9451	

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

105.4085	92.1745	96.4235	82.4867	78.1358	68.5412	66.8374	70.8921	73.1157	83.6670	91.4065	104.0645	(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

105.4085	92.1745	96.4235	82.4867	78.1358	68.5412	66.8374	70.8921	73.1157	83.6670	91.4065	104.0645	(64)

Total per year (kWh/year) = Sum(64)m = 1013.1533 (64)

12Total per year (kWh/year) 1013 (64)

Electric shower(s)

60.2774	53.7077	58.6467	55.9659	57.0161	54.3878	56.2007	57.0161	55.9659	58.6467	57.5440	60.2774	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 685.6523 (64a)

Heat gains from water heating, kWh/month

41.4215	36.4706	38.7676	34.6131	33.7880	30.7322	30.7595	31.9770	32.2704	35.5784	37.2376	41.0855	(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	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	152.2317	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	202.4026	224.0886	202.4026	209.1493	202.4026	209.1493	202.4026	202.4026	209.1493	202.4026	209.1493	202.4026	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	401.2857	405.4498	394.9564	372.6173	344.4181	317.9149	300.2091	296.0450	306.5384	328.8775	357.0767	383.5799	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	38.2232	(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)	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	-121.7854	(71)
Water heating gains (Table 5)	55.6740	54.2717	52.1069	48.0738	45.4139	42.6837	41.3434	42.9799	44.8200	47.8205	51.7189	55.2224	(72)
Total internal gains	728.0318	752.4796	718.1355	698.5100	660.9042	638.4174	612.6246	610.0970	629.1772	647.7701	686.6145	709.8744	(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	
Northeast	22.3600	11.2829	0.6300	0.7000	0.7700	77.1021	(75)
Southeast	7.9600	36.7938	0.6300	0.7000	0.7700	89.5076	(77)
Southwest	14.3400	36.7938	0.6300	0.7000	0.7700	161.2486	(79)
Northwest	9.9900	11.2829	0.6300	0.7000	0.7700	34.4477	(81)

Solar gains	362.3059	654.1933	993.5134	1395.9741	1714.1778	1768.0127	1676.9906	1429.4709	1131.2902	749.5589	440.7066	305.6922	(83)
Total gains	1090.3378	1406.6728	1711.6489	2094.4841	2375.0820	2406.4301	2289.6153	2039.5679	1760.4674	1397.3290	1127.3210	1015.5666	(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	44.5267	44.6309	44.7335	45.2216	45.3141	45.7499	45.7499	45.8315	45.5810	45.3141	45.1274	44.9337	
alpha	3.9684	3.9754	3.9822	4.0148	4.0209	4.0500	4.0500	4.0554	4.0387	4.0209	4.0085	3.9956	
util living area	0.9974	0.9927	0.9796	0.9327	0.8220	0.6477	0.4959	0.5683	0.8208	0.9686	0.9944	0.9981	(86)

MIT	19.0184	19.2916	19.7035	20.2508	20.6836	20.9139	20.9773	20.9616	20.7692	20.1736	19.4965	18.9798	(87)
Th 2	19.9372	19.9394	19.9416	19.9518	19.9537	19.9626	19.9626	19.9643	19.9592	19.9537	19.9498	19.9458	(88)
util rest of house													
	0.9968	0.9907	0.9739	0.9135	0.7740	0.5634	0.3868	0.4544	0.7534	0.9563	0.9926	0.9976	(89)
MIT 2	18.1205	18.3942	18.8037	19.3410	19.7331	19.9189	19.9555	19.9509	19.8198	19.2782	18.6069	18.0882	(90)
Living area fraction										fLA = Living area / (4) =		0.2950	(91)
MIT	18.3854	18.6590	19.0692	19.6095	20.0135	20.2125	20.2570	20.2491	20.0999	19.5424	18.8694	18.3512	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3854	18.6590	19.0692	19.6095	20.0135	20.2125	20.2570	20.2491	20.0999	19.5424	18.8694	18.3512	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9953	0.9874	0.9676	0.9060	0.7771	0.5849	0.4187	0.4872	0.7638	0.9499	0.9899	0.9964	(94)
Useful gains	1085.1704	1388.9824	1656.2403	1897.5347	1845.5832	1407.5255	958.7104	993.7412	1344.6284	1327.2998	1115.9506	1011.9146	(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													
	3865.3718	3766.9771	3433.3277	2893.7647	2241.7847	1499.0272	976.7285	1026.2054	1608.4274	2411.3495	3186.8066	3848.2527	(97)
Space heating kWh													
	2068.4698	1598.0124	1322.1531	717.2856	294.7739	0.0000	0.0000	0.0000	0.0000	806.5330	1491.0164	2110.2356	(98a)
Space heating requirement - total per year (kWh/year)												10408.4797	
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													
	2068.4698	1598.0124	1322.1531	717.2856	294.7739	0.0000	0.0000	0.0000	0.0000	806.5330	1491.0164	2110.2356	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												10408.4797	
Space heating per m2											(98c) / (4) =	44.7004	(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	2510.6141	1976.4409	2026.2438	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8325	0.8931	0.8492	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	2090.1899	1765.2399	1720.6070	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2718.6064	2585.8765	2297.7267	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	452.4599	610.5536	429.3770	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	113.1150	152.6384	107.3443	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												373.0976	(107)
Energy for space heating												44.7004	(99)
Energy for space cooling												1.6023	(108)
Total												46.3027	(109)
Fabric Energy Efficiency (TFEE)												46.3	(109)

Summary for Input Data

Property Reference	8549 - Croxlea	**Issued on Date**	08/03/2024
Assessment Reference	8549	**Prop Type Ref**	Baseline
Property			

SAP Rating	82 B	**DER**	3.33	**TER**	8.81
Environmental	96 A	**% DER < TER**			62.20
CO Emissions (t/year)	0.73	**DFEE**	45.91	**TFEE**	46.30
Compliance Check	See BREL	**% DFEE < TFEE**			0.85
% DPER < TPER	26.44	**DPER**	34.60	**TPER**	47.04

Assessor Details	Mr. Owain Morgan	**Assessor ID**	AV11-0001
Client	Angus Meek Architects, Angus Meek Architects		

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Southwest
Property Tenture	ND
Transaction Type	6
Terrain Type	Rural
1.0 Property Type	House, Detached
2.0 Number of Storeys	2
3.0 Date Built	2024
4.0 Sheltered Sides	0
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	53.30 m	135.35 m²	2.80 m
1st Storey:	41.00 m	97.50 m²	2.50 m

8.0 Living Area 68.70 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
EX WALLS	Timber Frame	Timber framed wall (one layer of plasterboard)	0.14	9.00	251.74	158.57	0.00	None	93.17	Enter Gross Area

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1F	Dense block, plasterboard on dabs	75.00	183.80
Internal Wall 0F	Dense block, plasterboard on dabs	75.00	197.00

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Pitched Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	97.50	97.50	None	0.00	Enter Gross Area	0.00
Flat Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.13	9.00	29.93	29.93	None	0.00	Enter Gross Area	0.00
Flat Roof 2	External Flat Roof	Plasterboard, insulated flat roof	0.13	9.00	7.92	7.92	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	97.50

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	135.35

11.2 Internal Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1		Plasterboard ceiling, carpeted chipboard floor	9.00	97.50

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Glazing	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.80	1.30
Entrance Door	Manufacturer	Solid Door							1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front Windows	Glazing	EX WALLS	South West	23.51	
Rear Windows	Glazing	EX WALLS	North East	36.67	
RH Side Windows	Glazing	EX WALLS	South East	13.03	
LHS Windows	Glazing	EX WALLS	North West	16.35	
Front Door	Entrance Door	EX WALLS	South West	3.60	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Non Gov Approved Schemes	45.55	0.05	0.05	No
E3 Sill	Non Gov Approved Schemes	14.55	0.05	0.05	No
E4 Jamb	Non Gov Approved Schemes	77.80	0.05	0.05	No
E5 Ground floor (normal)	Non Gov Approved Schemes	53.30	0.16	0.16	Yes
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	41.00	0.00	0.00	Yes
E16 Corner (normal)	Non Gov Approved Schemes	26.80	0.09	0.09	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	26.00	0.06	0.06	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	15.00	0.06	0.06	No
E14 Flat roof	Non Gov Approved Schemes	23.75	0.08	0.08	No
E17 Corner (inverted – internal area greater than external area)	Non Gov Approved Schemes	5.60	-0.09	-0.09	No

Y-value	0.04	W/m²K

18.0 Pressure Testing	Yes	
Designed AP	3.00	m³/(h.m²) @ 50 Pa
Test Method	Blower Door	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500498
Configuration	6
Manufacturer SFP	1.08
Duct Type	Rigid
MVHR Efficiency	88.00
Wet Rooms	6
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.15	In Room Fan Kitchen	0
0.15	In Room Fan Other Wet Room	0
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	0
0.11	Through Wall Fan Kitchen	1

0.14	Through Wall Fan Other Wet Room	5

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Light Fittings	95.00	10	950	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	104431	
Fuel Type	Electricity	
In Winter	275.35	
In Summer	279.63	
Model Name	aroTHERM plus 7kW + AI	
Manufacturer	Vaillant Group UK Ltd	
System Type	Heat Pump	
Controls SAP Code	2207	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Enter value	
Flow Temperature Value	55.00	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

27.0 Secondary Heating		
Secondary Heating	SAP table	
SAP Code	633	
SHS efficiency	60.00	%
HETAS Approved System	Yes	
28.0 Water Heating		
Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
Cold Water Source	From mains	
Bath Count	1	
Immersion Only Heating Hot Water	No	

28.1 Showers

Summary for Input Data

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
28.3 Waste Water Heat Recovery System					
29.0 Hot Water Cylinder	Hot Water Cylinder				
Cylinder Stat	Yes				
Cylinder In Heated Space	Yes				
Independent Time Control	Yes				
Insulation Type	Measured Loss				
Cylinder Volume	250.00			L	
Loss	1.40			kWh/day	
Pipes insulation	Fully insulated primary pipework				
In Airing Cupboard	No				
31.0 Thermal Store	None				
34.0 Small-scale Hydro	None				

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

Typical Cost	Typical savings per year	Ratings after improvement	
		SAP rating	Environmental Impact
		B 83	A 96
£3,500 - £5,500	£309	B 87	A 97
£15,000 - £25,000	£692	A 97	A 100

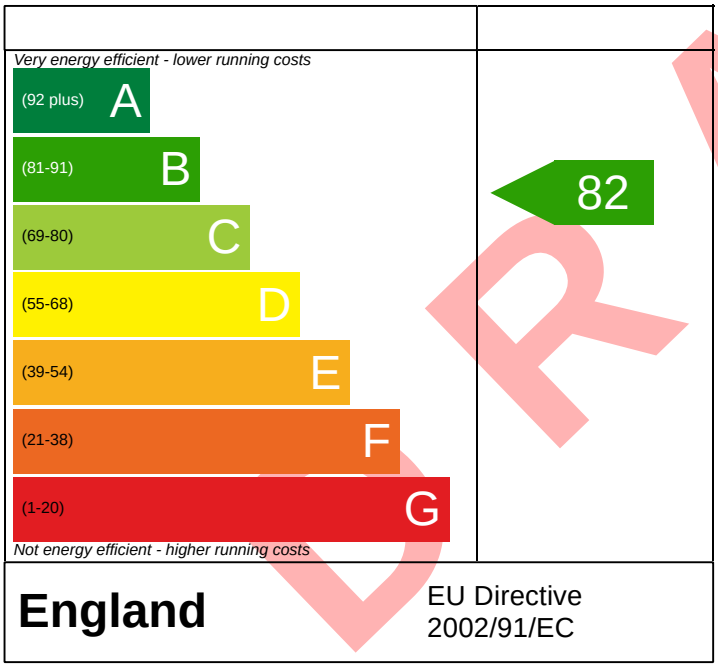
Predicted Energy Assessment

Dwelling type:	House, Detached
Date of assessment:	08/03/2024
Produced by:	Owain Morgan
Total floor area:	232.85 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

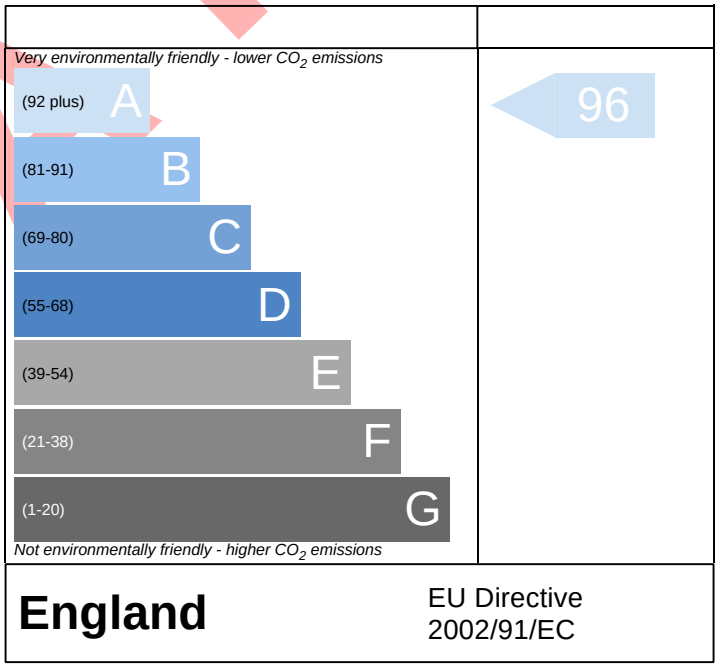
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.