

Property Reference	Unit 1		Issued on Date	28/08/2024	
Assessment Reference	Chalgrove Road	Prop Type Ref	Chalgrove Road		
Property					

SAP Rating	95 A	DER	0.42	TER	14.42
Environmental	100 A	% DER < TER		97.09	
CO ₂ Emissions (t/year)	0	DFEE	30.78	TFEE	37.97
Compliance Check	See BREL	% DFEE < TFEE		18.93	
% DPER < TPER	79.84	DPER	15.35	TPER	76.17

Assessor Name	Mr. Neil Ingham	Assessor ID	AV35-0001
Client			

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	59.6000 (1b)	x 2.5500 (2b)	= 151.9800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	59.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 151.9800 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	1.0000 (17)
Infiltration rate	0.0500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.0463 (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	0.0590	0.0578	0.0567	0.0509	0.0497	0.0439	0.0439	0.0428	0.0463	0.0497	0.0520	0.0543 (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) =												71.2000 (23c)
Effective ac	0.2030	0.2018	0.2007	0.1949	0.1937	0.1879	0.1879	0.1868	0.1902	0.1937	0.1960	0.1983 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
G (Uw = 1.20)			11.9200	1.1450	13.6489		(27)
GF			59.6000	0.1400	8.3440	110.0000	6556.0000 (28a)
EW	49.5500	11.9200	37.6300	0.1500	5.6445	60.0000	2257.8000 (29a)
SW	7.2700		7.2700	0.1700	1.2359	60.0000	436.2000 (29a)
Total net area of external elements Aum(A, m ²)			116.4200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	28.8733		(33)
PW			28.9000	0.0000	0.0000	45.0000	1300.5000 (32)
PC			59.6000			30.0000	1788.0000 (32b)
IW			46.2100			9.0000	415.8900 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12754.3900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							213.9998 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				6.9600	0.0540	0.3758	

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

[illegible]

Annual totals kWh/year	
Space heating fuel - main system 1	187.6615 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	175.6711
Water heating fuel used	1059.4922 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7375)	
mechanical ventilation fans (SFP = 0.7375)	136.7440 (230a)
Total electricity for the above, kWh/year	136.7440 (231)
Electricity for lighting (calculated in Appendix L)	165.4066 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1519.9707 (233)
Hydro electric generation (Appendix N)	0.0000 (234)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235a)
Appendix Q - special features	0.0000 (235)
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	29.3337 (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	187.6615	0.1586	29.7613 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1059.4922	0.1406	148.9201 (264)
Space and water heating			178.6814 (265)
Pumps, fans and electric keep-hot	136.7440	0.1387	18.9681 (267)
Energy for lighting	165.4066	0.1443	23.8733 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-729.7269	0.1339	-97.7340
PV Unit electricity exported	-790.2437	0.1250	-98.7620
Total			-196.4961 (269)
Total CO2, kg/year			25.0267 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.4200 (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	187.6615	1.5870	297.8213 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1059.4922	1.5197	1610.1263 (278)
Space and water heating			1907.9475 (279)
Pumps, fans and electric keep-hot	136.7440	1.5128	206.8663 (281)
Energy for lighting	165.4066	1.5338	253.7062 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-729.7269	1.4950	-1090.9083
PV Unit electricity exported	-790.2437	0.4587	-362.5036
Total			-1453.4119 (283)
Total Primary energy kWh/year			915.1082 (286)
Dwelling Primary energy Rate (DPER)			15.3500 (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	59.6000 (1b)	x 2.5500 (2b)	= 151.9800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	59.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 151.9800 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1316 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)

Infiltration rate
Number of sides sheltered
Shelter factor
Infiltration rate adjusted to include shelter factor

(20) = 1 - [0.075 x (19)] =
(21) = (18) x (20) =

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Effective ac	0.4500	0.4412	0.4324	0.3883	0.3794	0.3353	0.3353	0.3265	0.3530	0.3794	0.3971	0.4147	(22b)
	0.6013	0.5973	0.5935	0.5754	0.5720	0.5562	0.5562	0.5533	0.5623	0.5720	0.5788	0.5860	(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 Opening Type (Uw = 1.20)			11.9200	1.1450	13.6489			(27)
GF			59.6000	0.1300	7.7480			(28a)
EW	49.5500	11.9200	37.6300	0.1800	6.7734			(29a)
SW	7.2700		7.2700	0.1800	1.3086			(29a)
Total net area of external elements Aum(A, m2)			116.4200					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	29.4789			(33)
PW			28.9000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
List of Thermal Bridges

223.9998 (35)

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	6.9600	0.0500	0.3480	
E3 Sill	6.9600	0.0500	0.3480	
E4 Jamb	16.5300	0.0500	0.8265	
E5 Ground floor (normal)	33.6200	0.1600	5.3792	
E6 Intermediate floor within a dwelling	33.6200	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000	
E24 Eaves (insulation at ceiling level - inverted)	0.0000	0.2400	0.0000	
E11 Eaves (insulation at rafter level)	0.0000	0.0400	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000	
E13 Gable (insulation at rafter level)	0.0000	0.0800	0.0000	
E14 Flat roof	0.0000	0.0800	0.0000	
E16 Corner (normal)	0.0000	0.0900	0.0000	
E17 Corner (inverted - internal area greater than external area)	0.0000	-0.0900	-0.0000	
E18 Party wall between dwellings	12.7500	0.0600	0.7650	
E1 Steel lintel with perforated steel base plate	0.0100	0.0500	0.0005	
E21 Exposed floor (inverted)	0.0000	0.3200	0.0000	
E7 Party floor between dwellings (in blocks of flats)	0.0000	0.0700	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
Total fabric heat loss

(33a) =
(33) + (36) + (36a) =

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
30.1557	29.9585	29.7652	28.8572	28.6873	27.8964	27.8964	27.7500	28.2011	28.6873	29.0310	29.3903	(38)
67.3018	67.1046	66.9113	66.0032	65.8334	65.0425	65.0425	64.8960	65.3471	65.8334	66.1770	66.5363	(39)
Average = Sum(39)m / 12 =												66.0024

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1.1292	1.1259	1.1227	1.1074	1.1046	1.0913	1.0913	1.0889	1.0964	1.1046	1.1104	1.1164	(40)
31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.9703 (42)
Hot water usage for mixer showers	57.2551	56.3946	55.1408	52.7419	50.9715	48.9972	47.8750	49.1193	50.4833	52.6031	55.0536	57.0357	(42a)
Hot water usage for baths	24.7448	24.3773	23.8598	22.9056	22.1911	21.3988	20.9709	21.4848	22.0443	22.8921	23.8659	24.6611	(42b)
Hot water usage for other uses	34.8079	33.5421	32.2764	31.0106	29.7449	28.4792	28.4792	29.7449	31.0106	32.2764	33.5421	34.8079	(42c)
Average daily hot water use (litres/day)													107.3731 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
116.8077	114.3140	111.2770	106.6581	102.9075	98.8752	97.3251	100.3490	103.5383	107.7716	112.4616	116.5047	(44)
184.9948	162.7817	171.0285	146.0096	138.5332	121.5786	117.7062	124.2530	127.6731	146.2450	160.2222	182.4182	(45)
Total = Sum(45)m =												1783.4442
27.7492	24.4172	25.6543	21.9014	20.7800	18.2368	17.6559	18.6380	19.1510	21.9368	24.0333	27.3627	(46)

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

210.0000 (47)
1.7016 (48)
0.5400 (49)
0.9188 (55)

28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842	(56)
28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842	(57)
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)
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)

236.7414	209.5205	222.7751	196.0869	190.2798	171.6559	169.4528	175.9996	177.7504	197.9916	210.2996	234.1648	(62)
-26.1746	-23.1490	-24.2404	-20.0720	-18.7064	-16.0072	-15.0042	-15.9554	-16.5616	-19.5243	-22.1187	-25.6899	(63a)
-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)
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)
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)
210.5668	186.3715	198.5348	176.0149	171.5735	155.6488	154.4486	160.0442	161.1888	178.4673	188.1809	208.4749	(64)
Total per year (kWh/year) = Sum(64)m =												2149.5149 (64)
Electric shower(s)												2150 (64)

12Total per year (kWh/year)
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)

Metabolic gains (Table 5), Watts

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	98.5151	98.5151	98.5151	98.5151	98.5151	98.5151	98.5151	98.5151	98.5151	98.5151	98.5151	98.5151 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	87.3334	96.6905	87.3334	90.2445	87.3334	90.2445	87.3334	87.3334	90.2445	87.3334	90.2445	87.3334 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	171.9370	173.7212	169.2251	159.6536	147.5712	136.2155	128.6292	126.8450	131.3411	140.9126	152.9950	164.3507 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (69)
Water heating gains (Table 5)	-78.8121	-78.8121	-78.8121	-78.8121	-78.8121	-78.8121	-78.8121	-78.8121	-78.8121	-78.8121	-78.8121	-78.8121 (71)
Water heating gains (Table 5)	138.3173	136.1845	132.0756	123.0695	117.5532	111.7872	108.2454	111.1712	114.6016	120.9996	129.6330	137.1657 (72)
Total internal gains	453.1422	462.1507	444.1886	428.5221	408.0123	390.8016	376.7625	377.9041	388.7417	404.8001	428.4270	444.4043 (73)

[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
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Southeast	4.7900	36.7938	0.6300	0.7000	0.7700	53.8620 (77)
Southwest	0.8500	36.7938	0.6300	0.7000	0.7700	9.5580 (79)
Northwest	6.2800	11.2829	0.6300	0.7000	0.7700	21.6548 (81)

Solar gains	85.0747	152.1066	227.2244	313.5657	380.4495	390.5554	371.1866	319.3226	256.8149	173.2615	103.2098	71.9587 (83)
Total gains	538.2169	614.2573	671.4130	742.0878	788.4618	781.3571	747.9490	697.2268	645.5566	578.0617	531.6368	516.3630 (84)

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

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	55.1017	55.2636	55.4233	56.1858	56.3307	57.0157	57.0157	57.1443	56.7499	56.3307	56.0382	55.7356
alpha	4.6734	4.6842	4.6949	4.7457	4.7554	4.8010	4.8010	4.8096	4.7833	4.7554	4.7359	4.7157
util living area	0.9831	0.9681	0.9376	0.8548	0.7085	0.5203	0.3803	0.4240	0.6552	0.8882	0.9671	0.9857 (86)
MIT	19.8294	20.0435	20.3287	20.6753	20.8940	20.9807	20.9965	20.9942	20.9447	20.6613	20.1986	19.7989 (87)
Th 2	20.4354	20.4370	20.4387	20.4463	20.4477	20.4543	20.4543	20.4556	20.4518	20.4477	20.4448	20.4418 (88)
util rest of house	0.9807	0.9637	0.9292	0.8368	0.6775	0.4793	0.3340	0.3753	0.6129	0.8700	0.9619	0.9837 (89)
MIT 2	19.3371	19.5497	19.8303	20.1673	20.3653	20.4419	20.4526	20.4526	20.4133	20.1602	19.7106	19.3119 (90)
Living area fraction									fIA = Living area / (4)			0.8881 (91)
MIT	19.7743	19.9883	20.2730	20.6185	20.8348	20.9204	20.9356	20.9336	20.8852	20.6052	20.1440	19.7444 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7743	19.9883	20.2730	20.6185	20.8348	20.9204	20.9356	20.9336	20.8852	20.6052	20.1440	19.7444 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9774	0.9598	0.9265	0.8426	0.6995	0.5144	0.3749	0.4181	0.6466	0.8755	0.9588	0.9807 (94)
Useful gains	526.0358	589.5656	622.0824	625.2853	551.5364	401.9523	280.3699	291.5139	417.4102	506.0793	509.7102	506.4038 (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	1041.4507	1012.4909	921.5665	773.4571	601.3771	411.0968	282.0007	294.2135	443.3934	658.6785	863.2141	1034.2656 (97)
Space heating kWh	383.4687	284.2058	222.8162	106.6837	37.0815	0.0000	0.0000	0.0000	0.0000	113.5338	254.5228	392.7292 (98a)
Space heating requirement - total per year (kWh/year)												1795.0416
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	383.4687	284.2058	222.8162	106.6837	37.0815	0.0000	0.0000	0.0000	0.0000	113.5338	254.5228	392.7292 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1795.0416
Space heating per m2											(98c) / (4) =	30.1181 (99)

Fraction of space heat from secondary/supplementary system (Table 11)

[illegible]

	0.0000	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	210.5668	186.3715	198.5348	176.0149	171.5735	155.6488	154.4486	160.0442	161.1888	178.4673	188.1809	208.4749	(64)	
Efficiency of water heater														
(217)m	85.3865	85.0032	84.3192	82.9735	81.2637	79.8000	79.8000	79.8000	79.8000	83.0737	84.7376	85.4579	(216)	
Fuel for water heating, kWh/month														
(217)m	246.6045	219.2524	235.4563	212.1338	211.1317	195.0486	193.5447	200.5566	201.9910	214.8302	222.0747	243.9504	(217)	
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	7.3041	7.0685	7.3041	7.0685	(231)	
Lighting	18.1461	14.5575	13.1074	9.6031	7.4177	6.0603	6.7667	8.7956	11.4246	14.9896	16.9308	18.6505	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-20.3984	-29.7525	-44.2372	-51.5201	-57.1194	-53.9063	-53.2648	-49.5198	-43.1621	-34.8277	-22.7829	-17.5227	(233a)	
Electricity generated by wind turbines (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	(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	-8.6903	-18.5443	-37.3431	-56.7936	-75.7756	-76.3661	-75.4491	-63.5569	-46.1700	-26.7327	-11.6730	-6.8513	(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												1944.7905	(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												2596.5749	(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)												146.4498	(232)	
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation												-981.9598	(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												3791.8555	(238)	

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

	Energy	Emission factor	Emissions
	kWh/year	kg CO2/kWh	kg CO2/year
Space heating - main system 1	1944.7905	0.2100	408.4060 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2596.5749	0.2100	545.2807 (264)
Space and water heating			953.6867 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	146.4498	0.1443	21.1372 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-478.0139	0.1339	-63.9869
PV Unit electricity exported	-503.9459	0.1255	-63.2634
Total			-127.2503 (269)
Total CO2, kg/year			859.5030 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.4200 (273)

13a. Primary energy - Individual heating systems including micro-CHP			

	Energy	Primary energy factor	Primary energy
	kWh/year	kg CO2/kWh	kWh/year
Space heating - main system 1	1944.7905	1.1300	2197.6133 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2596.5749	1.1300	2934.1297 (278)
Space and water heating			5131.7429 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	146.4498	1.5338	224.6296 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-478.0139	1.4947	-714.4789
PV Unit electricity exported	-503.9459	0.4608	-232.2119
Total			-946.6908 (283)
Total Primary energy kWh/year			4539.7826 (286)
Target Primary Energy Rate (TPER)			76.1700 (287)

[illegible]

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	14.4500	0.0540	0.7803
E3 Sill	14.4500	0.0340	0.4913
E4 Jamb	31.1800	0.0390	1.2160
E5 Ground floor (normal)	31.7700	0.0730	2.3192
E6 Intermediate floor within a dwelling	25.1800	-0.0100	-0.2518
E10 Eaves (insulation at ceiling level)	0.0000	0.1230	0.0000
E24 Eaves (insulation at ceiling level - inverted)	0.0000	0.0000	0.0000
E11 Eaves (insulation at rafter level)	0.0000	0.0070	0.0000
E12 Gable (insulation at ceiling level)	0.0000	0.0730	0.0000
E13 Gable (insulation at rafter level)	0.0000	0.0720	0.0000
E14 Flat roof	38.3200	0.0490	1.8777
E16 Corner (normal)	19.5000	0.0420	0.8190
E17 Corner (inverted - internal area greater than external area)	2.6000	-0.0790	-0.2054
E18 Party wall between dwellings	10.4000	0.0250	0.2600
E19 Party wall between dwellings	0.0100	0.0000	0.0000
E21 Exposed floor (inverted)	0.0000	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	0.0000	0.0980	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.3063 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 58.1303 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.6046	15.5242	15.4438	15.0417	14.9613	14.5593	14.5593	14.4789	14.7201	14.9613	15.1222	15.2830 (38)
Average = Sum(39)m / 12 =	73.7349	73.6545	73.5741	73.1720	73.0916	72.6895	72.6895	72.6091	72.8504	73.0916	73.2524	73.4133 (39)
												73.1519
HLP	0.8658	0.8649	0.8640	0.8592	0.8583	0.8536	0.8536	0.8526	0.8555	0.8583	0.8602	0.8621 (40)
HLP (average)												0.8590
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.5535 (42)											
Hot water usage for mixer showers	66.7770 (42a)											
Hot water usage for baths	28.8521 (42b)											
Hot water usage for other uses	40.7806 (42c)											
Average daily hot water use (litres/day)	125.7173 (43)											
Daily hot water use	136.7643	133.8440	130.2877	124.8797	120.4882	115.7668	113.9523	117.4933	121.2279	126.1844	131.6757	136.4096 (44)
Energy content (annual)	216.6012	190.5921	200.2473	170.9541	162.2002	142.3488	137.8155	145.4813	149.4861	171.2311	187.5962	213.5845 (45)
Distribution loss (46)m = 0.15 x (45)m	32.4902	28.5888	30.0371	25.6431	24.3300	21.3523	20.6723	21.8222	22.4229	25.6847	28.1394	32.0377 (46)
Water storage loss:	210.0000 (47)											
Store volume	1.4100 (48)											
a) If manufacturer declared loss factor is known (kWh/day):	0.5400 (49)											
Temperature factor from Table 2b	0.7614 (55)											
Enter (49) or (54) in (55)	0.7614 (55)											
Total storage loss	23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034 (56)
If cylinder contains dedicated solar storage	23.6034	21.3192	23.6034	22.8420	23.6034	22.8420	23.6034	23.6034	22.8420	23.6034	22.8420	23.6034 (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	263.4670	232.9225	247.1131	216.3081	209.0660	187.7028	184.6813	192.3471	194.8401	218.0969	232.9502	260.4503 (62)
WWHRS	-59.7304	-52.8261	-55.3164	-45.8042	-42.6878	-36.5283	-34.2395	-36.4102	-37.7936	-44.5545	-50.4748	-58.6243 (63a)
PV diverter	-8.6511	-18.7447	-38.3858	-59.5091	-80.2096	-81.1329	-79.9389	-66.4961	-47.6035	-27.0786	-11.6365	-6.7772 (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	195.0855	161.3517	153.4110	110.9948	86.1685	70.0417	70.5029	89.4408	109.4430	146.4638	170.8389	195.0488 (64)
12Total per year (kWh/year)	1558.7915 (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	109.5126	97.2362	104.0749	93.1254	91.4242	83.6142	83.3163	85.8652	85.9873	94.4270	98.6589	108.5095 (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	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	118.4695	131.1627	118.4695	122.4185	118.4695	122.4185	118.4695	118.4695	122.4185	118.4695	122.4185	118.4695 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.8866	232.2721	226.2607	213.4632	197.3086	182.1255	171.9823	169.5968	175.6082	188.4058	204.5604	219.7434 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676 (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)	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406 (71)
Water heating gains (Table 5)	147.1943	144.6967	139.8856	129.3409	122.8820	116.1308	111.9843	115.4102	119.4268	126.9180	137.0263	145.8461 (72)
Total internal gains	556.8532	569.4343	545.9186	526.5253	499.9628	481.9776	463.7388	464.7793	478.7563	495.0960	525.3079	545.3617 (73)

6. Solar gains

[illegible]

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	(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	(235d)
Annual totals kWh/year											
Space heating fuel - main system 1										502.5249	(211)
Space heating fuel - main system 2										0.0000	(213)
Space heating fuel - secondary										0.0000	(215)
Efficiency of water heater										176.7000	
Water heating fuel used										882.1684	(219)
Space cooling fuel										0.0000	(221)
Electricity for pumps and fans:											
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.9625)											
mechanical ventilation fans (SFP = 0.9625)										269.3007	(230a)
Total electricity for the above, kWh/year										269.3007	(231)
Total electricity for the above, kWh/year										203.6039	(232)
Energy saving/generation technologies (Appendices M ,N and Q)											
PV generation										-935.3439	(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										922.2540	(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	502.5249	0.1571	78.9420 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	882.1684	0.1446	127.5849 (264)
Space and water heating			206.5269 (265)
Pumps, fans and electric keep-hot	269.3007	0.1387	37.3553 (267)
Energy for lighting	203.6039	0.1443	29.3863 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-773.6172	0.1341	-103.7211
PV Unit electricity exported	-161.7267	0.1202	-19.4405
Total			-123.1615 (269)
Total CO2, kg/year			150.1070 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			1.7600 (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	502.5249	1.5815	794.7526 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	882.1684	1.5350	1354.0873 (278)
Space and water heating			2148.8399 (279)
Pumps, fans and electric keep-hot	269.3007	1.5128	407.3981 (281)
Energy for lighting	203.6039	1.5338	312.2945 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-773.6172	1.4955	-1156.9359
PV Unit electricity exported	-161.7267	0.4410	-71.3191
Total			-1228.2550 (283)
Total Primary energy kWh/year			1640.2776 (286)
Dwelling Primary energy Rate (DPER)			19.2600 (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	53.4700 (1b)	x 2.6000 (2b)	= 139.0220 (1b) - (3b)
First floor	31.6900 (1c)	x 2.8500 (2c)	= 90.3165 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.1600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	229.3385 (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	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Shelter factor
Infiltration rate adjusted to include shelter factor

Air changes per hour		
30.0000 / (5) =	0.1308	(8)
	Yes	
Blower Door		
	5.0000	(17)
	0.3808	(18)
	2	(19)
[0.075 x (19)] =	0.8500	(20)
= (18) x (20) =	0.3237	(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)
Add infil rate												
Уб. Скорости ветра												
Effective de	0.7502	0.7819	0.3965	0.3561	0.3480	0.3075	0.3075	0.2994	0.3237	0.3480	0.3642	0.3803 (22b)
			0.5786	0.5634	0.5605	0.5473	0.5473	0.5448	0.5524	0.5605	0.5663	0.5723 (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			1.7600	1.0000	1.7600		(26)
TER Opening Type (Uw = 1.20)			17.4800	1.1450	20.0153		(27)
GF			53.4700	0.1300	6.9511		(28)
EW	120.8700	19.2400	101.6300	0.1800	18.2934		(29)
FR	54.2400		54.2400	0.1100	5.9664		(30)
Total net area of external elements Aum(A, m2)			228.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.9862		(33)
PW			34.2300	0.0000	0.0000		(32)

Thermal mass parameter (TMP = C_m / TFA) in kJ/m²K

180.0989 (35)

List of Thermal Bridges

U-value	U-value	Length	Psi-value	Total
E1 Element		14.4500	0.0500	0.7225
E2 Other lintels (including other steel lintels)		14.4500	0.0500	0.7225
E3 Sill		31.1800	0.0500	1.5590
E4 Jamb		31.7700	0.1600	5.0832
E5 Ground floor (normal)		25.1800	0.0000	0.0000
E6 Intermediate floor within a dwelling		0.0000	0.0600	0.0000
E10 Eaves (insulation at ceiling level)		0.0000	0.2400	0.0000
E24 Eaves (insulation at ceiling level - inverted)		0.0000	0.0400	0.0000
E11 Eaves (insulation at rafter level)		0.0000	0.0600	0.0000
E12 Gable (insulation at ceiling level)		0.0000	0.0800	0.0000
E13 Gable (insulation at rafter level)		38.3200	0.0800	3.0656
E14 Flat roof		19.5000	0.0900	1.7550
E16 Corner (normal)		2.6000	-0.0900	-0.2340
E17 Corner (inverted - internal area greater than external area)		10.4000	0.0600	0.6240
E18 Party wall between dwellings		0.0100	0.0500	0.0005
E1 Steel lintel with perforated steel base plate		0.0000	0.3200	0.0000
E21 Exposed floor (inverted)		0.0000	0.0700	0.0000
E7 Party floor between dwellings (in blocks of flats)				

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

Point Thermal bridges

$$(33) + (36) + (36a) = 66.2845 \quad (37)$$

Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$

[illegible]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2984	1.2954	1.2926	1.2790	1.2765	1.2647	1.2647	1.2625	1.2693	1.2765	1.2816	1.2870 (40)
HLP (average)												1.2790
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.5535 (42)
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[illegible]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1960												
1961												
1962												
1963												
1964												
1965												
1966												
1967												
1968												
1969												
1970												
1971												
1972												
1973												
1974												
1975												
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2017												
2018												
2019												
2020												
2021												
2022												
2023												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	136.7643	133.8440	130.2877	124.8797	120.4882	115.7668	113.9523	117.4933	121.2279	126.1844	131.6757	136.4096 (44)
Energy conte	216.6012	190.5921	200.2473	170.9541	162.2002	142.3488	137.8155	145.4813	149.4861	171.2311	187.5962	213.5845 (45)
Energy content (annual)										Total = Sum(45)m =		2088.1386
Distribution loss (46)m = 0.15 x (45)m												
	32.4902	28.5888	30.0371	25.6431	24.3300	21.3523	20.6723	21.8222	22.4229	25.6847	28.1394	32.0377 (46)

Water storage loss:	32.4902	28.3888	30.0371	29.6431	24.3300	21.3523	20.6723	21.8222	22.4229	23.6847	26.1394	32.0377 (40)
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Water storage 1988:	
Store volume	210.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.7016 (48)

Temperature factor from Table 2b	0.5400 (49)
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Enter (49) or (54) in (55) 0.9188 (55)

[illegible]

28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842 (56)
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If cylinder contains dedicated solar storage
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	28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842 (57)
Bedroom 1000	02.0604	01.0110	02.0604	00.5100	02.0604	00.5100	02.0604	02.0604	00.5100	02.0604	00.5100	02.0604 (58)

[illegible]

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												

Total heat required for water heating calculated for each month	268 3478	237 3310	251 9939	221 0315	213 9469	192 4262	189 5621	197 2279	199 5634	222 9777	237 6736	265 3311	462
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268.3478	237.3310	251.9939	221.0315	213.9468	192.4262	189.5621	197.2279	199.5634	222.9777	237.6736	265.3311 (62)
-30.6451	-27.1027	-28.3804	-23.5001	-21.9013	-18.7411	-17.5668	-18.6805	-19.3902	-22.8590	-25.8964	-30.0776 (63)

[illegible][illegible][illegible][illegible]

	237.7028	210.2283	223.6135	197.5314	192.0456	173.6851	171.9953	178.5474	180.1732	200.1187	211.7771	235.2535 (64)
12Total per year (kWh/year)												2412.6719 (64)
Electric shower(s)												2413 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	113.4172	100.7630	107.9795	96.9041	95.3288	87.3929	87.2209	89.7698	89.7660	98.3316	102.4376	112.4141 (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
	758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758	127.6758 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	116.4783	128.9581	116.4783	120.3609	116.4783	120.3609	116.4783	116.4783	120.3609	116.4783	120.3609	116.4783 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	229.8866	232.2721	226.2607	213.4632	197.3086	182.1255	171.9823	169.5968	175.6082	188.4058	204.5604	219.7434 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676	35.7676 (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)												
	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406	-102.1406 (71)
Water heating gains (Table 5)												
	152.4425	149.9449	145.1338	134.5891	128.1302	121.3790	117.2324	120.6583	124.6750	132.1661	142.2745	151.0942 (72)
Total internal gains												
	563.1101	575.4779	552.1755	532.7159	506.2198	485.1682	466.9958	468.0362	481.9469	501.3529	531.4985	551.6187 (73)

6. Solar gains												

[Jan]			Area	Solar flux	g	FF		Access				Gains
			m2	Table 6a	Specific data	Specific data		factor				W
				W/m2	or Table 6b	or Table 6c		Table 6d				
Northeast			7.2400	11.2829	0.6300	0.7000		0.7700				24.9651 (75)
Southeast			4.7500	36.7938	0.6300	0.7000		0.7700				53.4122 (77)
Southwest			4.5100	36.7938	0.6300	0.7000		0.7700				50.7135 (79)
Northwest			0.9800	11.2829	0.6300	0.7000		0.7700				3.3792 (81)

Solar gains	132.4700	235.0602	346.6272	471.4042	566.2714	579.0054	551.2195	477.8715	389.4326	266.5343	160.3830	112.2573 (83)
Total gains	695.5801	810.5381	898.8027	1004.1201	1072.4911	1064.1735	1018.2153	945.9077	871.3795	767.8872	691.8815	663.8760 (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	38.5305	38.6179	38.7040	39.1134	39.1910	39.5562	39.5562	39.6245	39.4147	39.1910	39.0344	38.8720
alpha	3.5687	3.5745	3.5803	3.6076	3.6127	3.6371	3.6371	3.6416	3.6276	3.6127	3.6023	3.5915
util living area												
	0.9807	0.9661	0.9398	0.8750	0.7595	0.5935	0.4496	0.4981	0.7193	0.9047	0.9670	0.9835 (86)
MIT	19.1815	19.4480	19.8249	20.3109	20.6917	20.9091	20.9746	20.9631	20.8128	20.3159	19.6705	19.1392 (87)
Th 2	19.8421	19.8444	19.8467	19.8573	19.8593	19.8686	19.8686	19.8703	19.8650	19.8593	19.8553	19.8510 (88)
util rest of house												
	0.9760	0.9582	0.9253	0.8450	0.7036	0.5065	0.3410	0.3863	0.6385	0.8749	0.9578	0.9795 (89)
MIT 2	17.7587	18.0957	18.5674	19.1628	19.5927	19.8111	19.8587	19.8547	19.7304	19.1852	18.3878	17.7110 (90)
Living area fraction									fLA = Living area / (4) =			0.3120 (91)
MIT	18.2026	18.5176	18.9598	19.5210	19.9356	20.1537	20.2069	20.2005	20.0681	19.5380	18.7880	18.1566 (92)
Temperature adjustment												0.0000
adjusted MIT	18.2026	18.5176	18.9598	19.5210	19.9356	20.1537	20.2069	20.2005	20.0681	19.5380	18.7880	18.1566 (93)

8. Space heating requirement												

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9668	0.9461	0.9113	0.8347	0.7077	0.5296	0.3743	0.4202	0.6543	0.8647	0.9463	0.9711 (94)
Useful gains	672.4874	766.8186	819.0672	838.1348	758.9960	563.5336	381.1676	397.4761	570.1793	663.9871	654.7101	644.7116 (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	1537.2176	1502.2999	1371.5075	1156.8710	895.2664	598.1539	388.4732	408.6222	645.0902	971.6200	1275.6647	1529.6351 (97)
Space heating kWh	643.3593	494.2434	411.0156	229.4901	101.3852	0.0000	0.0000	0.0000	0.0000	228.8789	447.0873	658.3831 (98a)
Space heating requirement - total per year (kWh/year)												3213.8428
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	643.3593	494.2434	411.0156	229.4901	101.3852	0.0000	0.0000	0.0000	0.0000	228.8789	447.0873	658.3831 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3213.8428
Space heating per m2										(98c) / (4) =		37.7389 (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	643.3593	494.2434	411.0156	229.4901	101.3852	0.0000	0.0000	0.0000	0.0000	228.8789	447.0873	658.3831 (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)	697.0306	535.4750	445.3040	248.6350	109.8431	0.0000	0.0000	0.0000	0.0000	247.9728	484.3849	713.3078	(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	237.7028	210.2283	223.6135	197.5314	192.0456	173.6851	171.9953	178.5474	180.1732	200.1187	211.7771	235.2535	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.1778	85.9086	85.4060	84.3970	82.6959	79.8000	79.8000	79.8000	79.8000	84.3617	85.6935	86.2395	(217)
Fuel for water heating, kWh/month	275.8283	244.7115	261.8240	234.0503	232.2311	217.6505	215.5330	223.7436	225.7809	237.2152	247.1333	272.7908	(219)
Electricity for pumps and fans													
(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	7.0685	7.3041	7.0685	7.3041	7.0685	(231)
Lighting	24.2019	19.4157	17.4816	12.8078	9.8931	8.0828	9.0248	11.7308	15.2372	19.9920	22.5809	24.8745	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-46.8697	-64.5276	-90.6097	-99.4548	-105.2495	-97.5256	-96.2864	-91.8315	-83.7275	-72.5937	-50.9601	-40.7034	(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	-31.4209	-65.4603	-128.9590	-192.0652	-252.4298	-253.0949	-250.1398	-212.5080	-156.7049	-93.0925	-41.7759	-24.8979	(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												3481.9532	(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												2888.4924	(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)												195.3231	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2642.8887	(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												4008.8800	(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	3481.9532	0.2100	731.2102	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2888.4924	0.2100	606.5834	(264)
Space and water heating			1337.7936	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	195.3231	0.1443	28.1912	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-940.3395	0.1351	-127.0356	
PV Unit electricity exported	-1702.5492	0.1261	-214.7667	
Total			-341.8022	(269)
Total CO2, kg/year			1036.1117	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.1700	(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	3481.9532	1.1300	3934.6071	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2888.4924	1.1300	3263.9964	(278)
Space and water heating			7198.6035	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	195.3231	1.5338	299.5931	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-940.3395	1.4993	-1409.8679	
PV Unit electricity exported	-1702.5492	0.4630	-788.3606	
Total			-2198.2285	(283)
Total Primary energy kWh/year			5430.0690	(286)
Target Primary Energy Rate (TPER)			63.7600	(287)