Full SAP Calculation Printout

Property Reference	St James' Road 83	**Issued on Date**	30/11/2023
Assessment Reference	Rear Of 83 Be Clean	**Prop Type Ref**	
Property	Rear Of, 83, St James' Road, Sutton, SM1 2TJ		

SAP Rating	82 B	**DER**	22.18	**TER**	14.61
Environmental	84 B	**% DER < TER**			-51.81
CO_2 Emissions (t/year)	0.94	**DFEE**	88.62	**TFEE**	54.28
Compliance Check	See BREL	**% DFEE < TFEE**			-63.28
% DPER < TPER	-59.28	**DPER**	124.39	**TPER**	78.10

Assessor Details	Mr. Damian Selim	**Assessor ID**	L673-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	51.8600	(1b)	x 2.4000	(2b) =	124.4640	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.8600					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		124.4640	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1607 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		8.0000 (17)
Infiltration rate		0.5607 (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) =	0.5186 (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	0.6613	0.6483	0.6353	0.5705	0.5575	0.4927	0.4927	0.4797	0.5186	0.5575	0.5835	0.6094	(22b)
Effective ac	0.7186	0.7101	0.7018	0.6627	0.6554	0.6214	0.6214	0.6151	0.6345	0.6554	0.6702	0.6857	(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	
Window (Uw = 1.40)			6.3000	1.3258	8.3523			(27)
Solid Door			1.8900	3.0000	5.6700			(26)
Glazed Door (Uw = 1.40)			5.0400	1.3258	6.6818			(27)
Bath Velux			0.5700	1.3258	0.7557			(27a)
Ground Floor			51.8600	0.1200	6.2232	110.0000	5704.6000	(28a)
New Walls	50.0000	13.2300	36.7700	0.1800	6.6186	60.0000	2206.2000	(29a)
Existing Walls	50.0000		50.0000	0.1800	9.0000	17.0000	850.0000	(29a)
Roof	50.0000	0.5700	49.4300	0.1100	5.4373	9.0000	444.8700	(30)
Total net area of external elements Aum(A, m2)			201.8600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		48.7389			(33)
Internal Wall			67.0000			9.0000	603.0000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9808.6700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		189.1375 (35)
Thermal bridges (Default value 0.200 * total exposed area)		40.3720 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	89.1109 (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	29.5165	29.1678	28.8260	27.2206	26.9203	25.5220	25.5220	25.2631	26.0606	26.9203	27.5279	28.1632	(38)
Heat transfer coeff													
	118.6274	118.2787	117.9369	116.3315	116.0311	114.6329	114.6329	114.3739	115.1715	116.0311	116.6388	117.2740	(39)
Average = Sum(39)m / 12 =												116.3301	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.2875	2.2807	2.2741	2.2432	2.2374	2.2104	2.2104	2.2054	2.2208	2.2374	2.2491	2.2614	(40)
HLP (average)												2.2432	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7449	(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													
	23.1198	22.7765	22.2930	21.4014	20.7338	19.9936	19.5938	20.0739	20.5967	21.3888	22.2987	23.0417	(42b)
Hot water usage for other uses													
	32.4999	31.3181	30.1363	28.9545	27.7727	26.5909	26.5909	27.7727	28.9545	30.1363	31.3181	32.4999	(42c)
Average daily hot water use (litres/day)												50.9811	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	55.6198	54.0946	52.4293	50.3559	48.5065	46.5845	46.1846	47.8466	49.5512	51.5251	53.6168	55.5416	(44)
Energy conte	88.0881	77.0300	80.5818	68.9347	65.2991	57.2810	55.8563	59.2441	61.1016	69.9191	76.3870	86.9647	(45)
Energy content (annual)										Total = Sum(45)m =		846.6876	
Distribution loss (46)m = 0.15 x (45)m													
	13.2132	11.5545	12.0873	10.3402	9.7949	8.5922	8.3784	8.8866	9.1652	10.4879	11.4580	13.0447	(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	2.7894	2.5156	2.7793	2.6804	2.7634	2.6683	2.7546	2.7584	2.6737	2.7699	2.6897	2.7884	(61)
Total heat required for water heating calculated for each month													
	90.8775	79.5456	83.3611	71.6151	68.0625	59.9494	58.6109	62.0025	63.7753	72.6890	79.0767	89.7531	(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													
	90.8775	79.5456	83.3611	71.6151	68.0625	59.9494	58.6109	62.0025	63.7753	72.6890	79.0767	89.7531	(64)
										Total per year (kWh/year) = Sum(64)m =		879.3187	(64)
12Total per year (kWh/year)												879	(64)
Electric shower(s)													
	42.8257	38.1581	41.6671	39.7624	40.5086	38.6412	39.9293	40.5086	39.7624	41.6671	40.8836	42.8257	(64a)
						Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =						487.1398	(64a)
Heat gains from water heating, kWh/month													
	40.6931	35.7809	37.9051	33.5315	32.5299	29.3733	29.2432	30.5154	30.9253	34.3574	36.2920	40.3193	(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	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	76.6982	84.9159	76.6982	79.2548	76.6982	79.2548	76.6982	76.6982	79.2548	76.6982	79.2548	76.6982	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	152.0628	153.6407	149.6644	141.1992	130.5134	120.4703	113.7609	112.1830	116.1593	124.6245	135.3103	145.3534	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	(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)													
	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	(71)
Water heating gains (Table 5)													
	54.6950	53.2454	50.9477	46.5715	43.7230	40.7963	39.3054	41.0153	42.9518	46.1792	50.4056	54.1926	(72)
Total internal gains													
	335.6301	343.9761	329.4843	319.1996	303.1088	289.6956	278.9386	279.0706	287.5401	299.6761	317.1447	328.4183	(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	1.8000	11.2829	0.6300	0.7000	0.7700	6.2068	(75)
Southeast	2.7000	36.7938	0.6300	0.7000	0.7700	30.3606	(77)
Northwest	1.8000	11.2829	0.6300	0.7000	0.7700	6.2068	(81)
Northeast	2.5200	11.2829	0.6300	0.7000	0.7700	8.6895	(75)
Northwest	2.5200	11.2829	0.6300	0.7000	0.7700	8.6895	(81)
Northeast	0.5700	19.8164	0.6300	0.7000	1.0000	4.4831	(82)

Solar gains	64.6363	121.8340	197.6838	296.5753	379.1022	396.9382	374.1316	309.4554	231.4598	143.0247	79.5608	53.9271	(83)
Total gains	400.2664	465.8101	527.1681	615.7749	682.2110	686.6337	653.0702	588.5260	518.9999	442.7008	396.7056	382.3454	(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	22.9680	23.0357	23.1024	23.4213	23.4819	23.7683	23.7683	23.8221	23.6572	23.4819	23.3596	23.2330	
alpha	2.5312	2.5357	2.5402	2.5614	2.5655	2.5846	2.5846	2.5881	2.5771	2.5655	2.5573	2.5489	
util living area													
	0.9860	0.9786	0.9646	0.9286	0.8591	0.7445	0.6230	0.6798	0.8521	0.9503	0.9792	0.9876	(86)
MIT	17.7684	18.0459	18.5465	19.2837	19.9866	20.5404	20.7985	20.7394	20.2733	19.3843	18.4713	17.7405	(87)

Th 2	19.1486	19.1527	19.1568	19.1761	19.1798	19.1967	19.1967	19.1999	19.1902	19.1798	19.1724	19.1648	(88)
util rest of house	0.9817	0.9720	0.9528	0.9021	0.7997	0.6205	0.4212	0.4863	0.7628	0.9265	0.9715	0.9838	(89)
MIT 2	15.5714	15.9258	16.5618	17.4900	18.3297	18.9293	19.1368	19.1095	18.6866	17.6358	16.4806	15.5437	(90)
Living area fraction										fLA = Living area / (4) =		0.2700	(91)
MIT	16.1645	16.4981	17.0976	17.9742	18.7770	19.3643	19.5854	19.5495	19.1149	18.1078	17.0180	16.1368	(92)
Temperature adjustment												-0.1500	
adjusted MIT	16.0145	16.3481	16.9476	17.8242	18.6270	19.2143	19.4354	19.3995	18.9649	17.9578	16.8680	15.9868	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9691	0.9551	0.9303	0.8736	0.7757	0.6220	0.4528	0.5126	0.7474	0.9012	0.9551	0.9724	(94)
Useful gains	387.9088	444.9133	490.4468	537.9187	529.1750	427.0725	295.7325	301.7068	387.9224	398.9603	378.8743	371.7829	(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	1389.6639	1354.0656	1232.1544	1038.1701	803.7460	528.9453	325.0298	343.0692	560.3025	853.7328	1139.3313	1382.2800	(97)
Space heating kWh	745.3058	610.9503	551.8304	360.1809	204.2808	0.0000	0.0000	0.0000	0.0000	338.3507	547.5291	751.8099	(98a)
Space heating requirement - total per year (kWh/year)												4110.2380	
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	745.3058	610.9503	551.8304	360.1809	204.2808	0.0000	0.0000	0.0000	0.0000	338.3507	547.5291	751.8099	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4110.2380	
Space heating per m2											(98c) / (4) =	79.2564	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	745.3058	610.9503	551.8304	360.1809	204.2808	0.0000	0.0000	0.0000	0.0000	338.3507	547.5291	751.8099	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	837.4222	686.4610	620.0342	404.6977	229.5290	0.0000	0.0000	0.0000	0.0000	380.1693	615.2012	844.7302	(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	90.8775	79.5456	83.3611	71.6151	68.0625	59.9494	58.6109	62.0025	63.7753	72.6890	79.0767	89.7531	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.8120	88.8008	88.7731	88.7135	88.5690	87.3000	87.3000	87.3000	87.3000	88.6946	88.7818	88.8155	(217)
Fuel for water heating, kWh/month	102.3257	89.5775	93.9035	80.7263	76.8469	68.6705	67.1374	71.0224	73.0530	81.9543	89.0686	101.0556	(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	16.3055	13.0809	11.7779	8.6290	6.6653	5.4456	6.0803	7.9034	10.2657	13.4692	15.2134	16.7587	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-19.1066	-28.8602	-44.6444	-53.7654	-60.8929	-58.0945	-57.5342	-52.9314	-44.8911	-34.6738	-21.6735	-16.2669	(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	-7.3422	-16.4811	-35.2582	-56.3601	-77.1694	-78.3106	-76.7975	-63.2151	-44.0416	-24.0688	-9.9490	-5.6906	(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	4618.2449	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	995.3417	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	131.5950	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-988.0192	(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	5330.3022	(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	4618.2449	0.2100	969.8314	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	995.3417	0.2100	209.0218	(264)
Energy for instantaneous electric shower(s)	487.1398	0.1391	67.7719	(264a)
Space and water heating			1178.8532	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	131.5950	0.1443	18.9932	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-493.3349	0.1332	-65.6914	
PV Unit electricity exported	-494.6844	0.1244	-61.5324	
Total			-127.2239	(269)
Total CO2, kg/year			1150.3237	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			22.1800	(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	4618.2449	1.1300	5218.6167	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	995.3417	1.1300	1124.7362	(278)
Energy for instantaneous electric shower(s)	487.1398	1.5143	737.6925	(278a)
Space and water heating			6343.3529	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	131.5950	1.5338	201.8448	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-493.3349	1.4920	-736.0797	
PV Unit electricity exported	-494.6844	0.4565	-225.8363	
Total			-961.9160	(283)
Total Primary energy kWh/year			6451.0750	(286)
Dwelling Primary energy Rate (DPER)			124.3900	(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	51.8600	(1b)	x 2.4000	(2b) =	124.4640	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.8600					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		124.4640	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 = 0.0000	(6a)
Number of open flues	0 * 20 = 0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000	(6d)
Number of flues attached to other heater	0 * 35 = 0.0000	(6e)
Number of blocked chimneys	0 * 20 = 0.0000	(6f)
Number of intermittent extract fans	2 * 10 = 20.0000	(7a)
Number of passive vents	0 * 10 = 0.0000	(7b)
Number of flueless gas fires	0 * 40 = 0.0000	(7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1607	(8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4107	(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) = 0.3799	(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	0.4844	0.4749	0.4654	0.4179	0.4084	0.3609	0.3609	0.3514	0.3799	0.4084	0.4274	0.4464	(22b)
Effective ac	0.6173	0.6127	0.6083	0.5873	0.5834	0.5651	0.5651	0.5617	0.5722	0.5834	0.5913	0.5996	(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			1.8900	1.0000	1.8900			(26)
TER Opening Type (Uw = 1.20)			10.5300	1.1450	12.0573			(27)
Bath Velux			0.5300	1.5918	0.8436			(27a)
Ground Floor			51.8600	0.1300	6.7418			(28a)

New Walls	50.0000	12.4200	37.5800	0.1800	6.7644	(29a)
Existing Walls	50.0000		50.0000	0.1800	9.0000	(29a)
Roof	50.0000	0.5300	49.4700	0.1100	5.4417	(30)
Total net area of external elements Aum(A, m2)			201.8600			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		42.7388	(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		189.1375 (35)
Thermal bridges (User defined value 0.050 * total exposed area)		10.0930 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	52.8318 (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	25.3545	25.1674	24.9840	24.1227	23.9615	23.2113	23.2113	23.0724	23.5003	23.9615	24.2875	24.6283	(38)
Heat transfer coeff	78.1862	77.9992	77.8158	76.9544	76.7933	76.0431	76.0431	75.9042	76.3321	76.7933	77.1193	77.4601	(39)
Average = Sum(39)m / 12 =												76.9537	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.5076	1.5040	1.5005	1.4839	1.4808	1.4663	1.4663	1.4636	1.4719	1.4808	1.4871	1.4936	(40)
HLP (average)												1.4839	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.7449 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
53.4764	52.6728	51.5017	49.2611	47.6075	45.7635	44.7154	45.8776	47.1516	49.1315	51.4203	53.2715	(42a)

Hot water usage for baths

23.1198	22.7765	22.2930	21.4014	20.7338	19.9936	19.5938	20.0739	20.5967	21.3888	22.2987	23.0417	(42b)

Hot water usage for other uses

32.4999	31.3181	30.1363	28.9545	27.7727	26.5909	26.5909	27.7727	28.9545	30.1363	31.3181	32.4999	(42c)

Average daily hot water use (litres/day)		100.2846 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	109.0962	106.7674	103.9310	99.6170	96.1141	92.3480	90.9000	93.7242	96.7028	100.6566	105.0371	108.8131	(44)
Energy conte	172.7817	152.0353	159.7380	136.3707	129.3880	113.5527	109.9357	116.0502	119.2442	136.5901	149.6446	170.3751	(45)
Energy content (annual)										Total = Sum(45)m =		1665.7062	
Distribution loss (46)m = 0.15 x (45)m	25.9173	22.8053	23.9607	20.4556	19.4082	17.0329	16.4904	17.4075	17.8866	20.4885	22.4467	25.5563	(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	50.9589	46.0274	50.9589	49.1262	48.9787	45.5415	46.3217	47.7608	47.6891	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	223.7406	198.0627	210.6969	185.4968	178.3667	159.0941	156.2574	163.8110	166.9333	187.5490	198.9596	221.3340	(62)
WWHRS	-24.4472	-21.6213	-22.6406	-18.7473	-17.4718	-14.9507	-14.0139	-14.9024	-15.4686	-18.2358	-20.6589	-23.9945	(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	199.2934	176.4414	188.0563	166.7496	160.8949	144.1434	142.2435	148.9086	151.4647	169.3132	178.3007	197.3395	(64)
										Total per year (kWh/year) = Sum(64)m =		2023.1491	(64)
12Total per year (kWh/year)												2023	(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	70.1896	62.0586	65.8526	57.6248	55.2662	49.1416	48.1340	50.5269	51.5710	58.1559	62.0856	69.3894	(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	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	76.7918	85.0195	76.7918	79.3516	76.7918	79.3516	76.7918	76.7918	79.3516	76.7918	79.3516	76.7918	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	152.0628	153.6407	149.6644	141.1992	130.5134	120.4703	113.7609	112.1830	116.1593	124.6245	135.3103	145.3534	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	(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)	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	(71)
Water heating gains (Table 5)	94.3409	92.3491	88.5116	80.0344	74.2825	68.2523	64.6963	67.9125	71.6264	78.1666	86.2300	93.2654	(72)
Total internal gains	375.3696	383.1834	367.1419	352.7593	333.7619	317.2483	304.4232	306.0614	316.3113	331.7570	353.0659	367.5847	(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	4.0100	11.2829	0.6300	0.7000	0.7700	13.8273	(75)
Southeast	2.5100	36.7938	0.6300	0.7000	0.7700	28.2241	(77)
Northwest	4.0100	11.2829	0.6300	0.7000	0.7700	13.8273	(81)
Northeast	0.5300	19.8164	0.6300	0.7000	1.0000	4.1685	(82)

Solar gains	60.0473	113.1782	183.6244	275.4617	352.0974	368.6566	347.4775	287.4187	214.9913	132.8594	73.9111	50.0992	(83)
Total gains	435.4170	496.3616	550.7663	628.2210	685.8592	685.9049	651.9006	593.4801	531.3026	464.6164	426.9770	417.6839	(84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
tau	34.8480	34.9315	35.0139	35.4058	35.4801	35.8301	35.8301	35.8957	35.6944	35.4801	35.3301	35.1746	
alpha	3.3232	3.3288	3.3343	3.3604	3.3653	3.3887	3.3887	3.3930	3.3796	3.3653	3.3553	3.3450	
util living area	0.9825	0.9720	0.9510	0.8943	0.7863	0.6267	0.4857	0.5440	0.7683	0.9254	0.9721	0.9847	(86)
MIT	18.9206	19.1669	19.5659	20.1208	20.5834	20.8643	20.9571	20.9371	20.7172	20.1218	19.4373	18.8857	(87)
Th 2	19.6818	19.6845	19.6871	19.6996	19.7019	19.7129	19.7129	19.7149	19.7087	19.7019	19.6972	19.6923	(88)
util rest of house	0.9779	0.9647	0.9376	0.8648	0.7269	0.5277	0.3556	0.4104	0.6825	0.8980	0.9635	0.9807	(89)
MIT 2	17.3207	17.6333	18.1355	18.8205	19.3475	19.6306	19.6978	19.6901	19.5080	18.8408	17.9875	17.2829	(90)
Living area fraction										fLA = Living area / (4) =		0.2700	(91)
MIT	17.7526	18.0473	18.5216	19.1715	19.6812	19.9637	20.0377	20.0268	19.8344	19.1866	18.3789	17.7156	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.7526	18.0473	18.5216	19.1715	19.6812	19.9637	20.0377	20.0268	19.8344	19.1866	18.3789	17.7156	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9680	0.9518	0.9218	0.8501	0.7258	0.5485	0.3899	0.4448	0.6921	0.8839	0.9510	0.9717	(94)
Useful gains	421.4970	472.4488	507.7087	534.0472	497.8047	376.2336	254.2059	264.0086	367.6886	410.6699	406.0657	405.8542	(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	1051.8072	1025.4791	935.4717	790.4391	612.8997	407.8706	261.4154	275.2857	437.7206	659.3968	869.8191	1046.9184	(97)
Space heating kWh	468.9508	371.6363	318.2557	184.6021	85.6306	0.0000	0.0000	0.0000	0.0000	185.0528	333.9024	476.9518	(98a)
Space heating requirement - total per year (kWh/year)												2424.9825	
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	468.9508	371.6363	318.2557	184.6021	85.6306	0.0000	0.0000	0.0000	0.0000	185.0528	333.9024	476.9518	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2424.9825	
Space heating per m2											(98c) / (4) =	46.7602	(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 %)	92.4000	(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	468.9508	371.6363	318.2557	184.6021	85.6306	0.0000	0.0000	0.0000	0.0000	185.0528	333.9024	476.9518	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	507.5225	402.2038	344.4326	199.7859	92.6738	0.0000	0.0000	0.0000	0.0000	200.2736	361.3662	516.1816	(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	199.2934	176.4414	188.0563	166.7496	160.8949	144.1434	142.2435	148.9086	151.4647	169.3132	178.3007	197.3395	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.1484	85.9371	85.4989	84.5999	83.0921	80.3000	80.3000	80.3000	80.3000	84.5724	85.7048	86.1982	(217)
Fuel for water heating, kWh/month	231.3374	205.3147	219.9517	197.1037	193.6345	179.5061	177.1400	185.4403	188.6235	200.1991	208.0405	228.9369	(219)
Space cooling fuel requirement	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	15.9558	12.8004	11.5253	8.4439	6.5223	5.3288	5.9499	7.7339	10.0456	13.1803	14.8871	16.3993	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-41.1016	-54.5439	-73.9093	-78.2739	-80.6653	-74.1101	-73.2654	-70.9697	-66.4049	-60.0630	-43.9964	-35.9576	(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	-34.8316	-71.5301	-139.0481	-204.4683	-266.2442	-265.9532	-262.7297	-224.2061	-166.7879	-100.6344	-45.9473	-27.6684	(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	2624.4400	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2415.2284	(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)	128.7727	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2563.3104	(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	2691.1305	(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	2624.4400	0.2100	551.1324	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2415.2284	0.2100	507.1980	(264)
Space and water heating			1058.3303	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	128.7727	0.1443	18.5859	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-753.2611	0.1358	-102.3245	
PV Unit electricity exported	-1810.0493	0.1265	-229.0436	
Total			-331.3681	(269)
Total CO2, kg/year			757.4774	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.6100	(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	2624.4400	1.1300	2965.6172	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2415.2284	1.1300	2729.2080	(278)
Space and water heating			5694.8252	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	128.7727	1.5338	197.5158	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-753.2611	1.5021	-1131.4863	
PV Unit electricity exported	-1810.0493	0.4645	-840.8008	
Total			-1972.2871	(283)
Total Primary energy kWh/year			4050.1547	(286)
Target Primary Energy Rate (TPER)			78.1000	(287)