

Full SAP Calculation Printout



Property Reference	Flat 02_04 mid N				Issued on Date	25/01/2024
Assessment Reference	Flat 02_04 mid N BE LEAN		Prop Type Ref	SE_01_009 exposed floor W		
Property						
SAP Rating	86 B	DER	10.54	TER	11.38	
Environmental	91 B	% DER < TER				7.38
CO ₂ Emissions (t/year)	0.85	DFEE	26.06	TFEE	26.20	
Compliance Check	See BREL	% DFEE < TFEE				0.55
% DPER < TPER	1.81	DPER	60.57	TPER	61.69	
Assessor Details	Miss Amy Webb				Assessor ID	V831-0001
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	86.4700 (1b)	2.5300 (2b)	218.7691 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.4700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	218.7691 (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	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1162 (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	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (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) =												73.6000 (23c)
Effective ac	0.2802	0.2773	0.2744	0.2599	0.2570	0.2424	0.2424	0.2395	0.2482	0.2570	0.2628	0.2686 (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
Window (Uw = 1.20)			16.9700	1.1450	19.4313		(27)
Int door			1.7000	1.1000	1.8700		(26)
External Wall 1	65.3800	18.6700	46.7100	0.1500	7.0065	14.0000	653.9400 (29a)
stair wall	28.4100		28.4100	0.1800	5.1138	14.0000	397.7400 (29a)
Total net area of external elements Aum(A, m ²)			93.7900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4216		(33)
Party Wall 1			23.0600	0.0000	0.0000	20.0000	461.2000 (32)
Party Floor 1			86.4700			40.0000	3458.8000 (32d)
Party Ceiling 1			86.4700			90.0000	7782.3000 (32b)
Internal Wall 1			186.9700			9.0000	1682.7300 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14436.7100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							166.9563 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E7 Party floor between dwellings (in blocks of flats)	62.9300	0.0400	2.5172
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.2200	0.0000	0.0000
E16 Corner (normal)	10.1200	0.0900	0.9108
E18 Party wall between dwellings	5.0600	0.0600	0.3036
E17 Corner (inverted - internal area greater than external area)	5.0600	0.0000	0.0000
E3 Sill	7.0000	0.0500	0.3500
E9 Balcony between dwellings, wall insulation continuous	11.2100	0.1000	1.1210
E1 Steel lintel with perforated steel base plate	10.4400	0.1000	1.0440
E4 Jamb	30.2000	0.0500	1.5100

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal Bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 41.1782 (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	20.2301	20.0202	19.8104	18.7614	18.5516	17.5025	17.5025	17.2927	17.9221	18.5516	18.9712	19.3908 (38)
Average = Sum(39)m / 12 =	61.4083	61.1984	60.9886	59.9396	59.7297	58.6807	58.6807	58.4709	59.1003	59.7297	60.1494	60.5690 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7102	0.7077	0.7053	0.6932	0.6908	0.6786	0.6786	0.6762	0.6835	0.6908	0.6956	0.7005 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5743 (42)
Hot water usage for mixer showers	67.3815	66.3689	64.8934	62.0701	59.9866	57.6631	56.3425	57.8069	59.4121	61.9069	64.7907	67.1234 (42a)
Hot water usage for baths	29.0995	28.6673	28.0587	26.9366	26.0964	25.1647	24.6615	25.2658	25.9238	26.9207	28.0660	29.0011 (42b)
Hot water usage for other uses	40.9930	39.5023	38.0116	36.5210	35.0303	33.5397	33.5397	35.0303	36.5210	38.0116	39.5023	40.9930 (42c)
Average daily hot water use (litres/day)												126.3697 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	137.4740	134.5386	130.9637	125.5277	121.1134	116.3675	114.5436	118.1030	121.8569	126.8392	132.3590	137.1175 (44)
Distribution loss (46)m = 0.15 x (45)m	217.7252	191.5811	201.2864	171.8412	163.0419	143.0875	138.5306	146.2362	150.2618	172.1196	188.5697	214.6928 (45)
Water storage loss:	32.6588	28.7372	30.1930	25.7762	24.4563	21.4631	20.7796	21.9354	22.5393	25.8179	28.2854	32.2039 (46)
Store volume												110.0000 (47)
b) If manufacturer declared loss factor is not known :												0.0152 (51)
Hot water storage loss factor from Table 2 (kWh/litre/day)												1.0294 (52)
Volume factor from Table 2a												0.6000 (53)
Temperature factor from Table 2b												1.0327 (55)
Enter (49) or (54) in (55)												1.0327 (55)
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (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	273.0020	241.5086	256.5632	225.3349	218.3187	196.5811	193.8074	201.5130	203.7555	227.3964	242.0633	269.9696 (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	273.0020	241.5086	256.5632	225.3349	218.3187	196.5811	193.8074	201.5130	203.7555	227.3964	242.0633	269.9696 (64)
12Total per year (kWh/year)												2749.8136 (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	2750 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	116.6151	103.6427	111.1492	99.9321	98.4329	90.3715	90.2829	92.8450	92.7570	101.4512	105.4944	115.6068 (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	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.2350	129.7959	117.2350	121.1429	117.2350	121.1429	117.2350	117.2350	121.1429	117.2350	121.1429	117.2350 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	232.4315	234.8435	228.7655	215.8263	199.4929	184.1417	173.8862	171.4743	177.5523	190.4915	206.8249	222.1760 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713 (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)	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702 (71)
Water heating gains (Table 5)	156.7407	154.2302	149.3940	138.7946	132.3022	125.5160	121.3479	124.7916	128.8291	136.3592	146.5199	155.3855 (72)
Total internal gains	568.0211	580.4834	557.0084	537.3776	510.6439	492.4144	474.0830	475.1148	489.1381	505.6995	536.1015	556.4104 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	2.8000	10.6334	0.4000	0.8500	0.7700	7.0152 (74)
South	14.1700	46.7521	0.4000	0.8500	0.7700	156.0928 (78)

Full SAP Calculation Printout



Solar gains	163.1080	269.0462	348.4205	404.6354	432.8168	421.8590	409.8900	389.3020	367.5591	291.6901	193.6774	140.7268 (83)
Total gains	731.1291	849.5296	905.4290	942.0131	943.4607	914.2735	883.9730	864.4168	856.6972	797.3896	729.7789	697.1371 (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	65.3039	65.5278	65.7532	66.9040	67.1390	68.3393	68.3393	68.5845	67.8541	67.1390	66.6706	66.2087
alpha	5.3536	5.3685	5.3835	5.4603	5.4759	5.5560	5.5560	5.5723	5.5236	5.4759	5.4447	5.4139
util living area	0.9469	0.8983	0.8332	0.7178	0.5750	0.4090	0.2919	0.3108	0.4718	0.7243	0.8961	0.9554 (86)
MIT	20.3715	20.5806	20.7547	20.9070	20.9754	20.9970	20.9996	20.9995	20.9932	20.9173	20.6551	20.3353 (87)
Th 2	20.3319	20.3340	20.3361	20.3469	20.3490	20.3598	20.3598	20.3619	20.3555	20.3490	20.3447	20.3404 (88)
util rest of house	0.9384	0.8840	0.8122	0.6881	0.5382	0.3688	0.2495	0.2679	0.4292	0.6897	0.8794	0.9481 (89)
MIT 2	19.6096	19.8653	20.0733	20.2547	20.3276	20.3577	20.3596	20.3616	20.3505	20.2704	19.9682	19.5719 (90)
Living area fraction	19.8593	20.0997	20.2966	20.4685	20.5399	20.5672	20.5693	20.5707	20.5611	20.4824	20.1934	0.3277 (91)
MIT	19.8593	20.0997	20.2966	20.4685	20.5399	20.5672	20.5693	20.5707	20.5611	20.4824	20.1934	19.8221 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8593	20.0997	20.2966	20.4685	20.5399	20.5672	20.5693	20.5707	20.5611	20.4824	20.1934	19.8221 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9314	0.8786	0.8109	0.6938	0.5491	0.3818	0.2634	0.2819	0.4429	0.6971	0.8751	0.9414 (94)
Useful gains	681.0043	746.3697	734.1818	653.5590	518.0891	349.1140	232.8201	243.7118	379.4038	555.8255	638.6509	656.2705 (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	955.4714	930.2008	841.4358	693.4085	528.0036	350.1601	232.9239	243.8634	381.8555	590.2734	787.5581	946.2158 (97)
Space heating kWh	204.2036	123.5345	79.7969	28.6917	7.3764	0.0000	0.0000	0.0000	0.0000	25.6292	107.2132	215.7193 (98a)
Space heating requirement - total per year (kWh/year)												792.1648
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	204.2036	123.5345	79.7969	28.6917	7.3764	0.0000	0.0000	0.0000	0.0000	25.6292	107.2132	215.7193 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												792.1648
Space heating per m2										(98c) / (4) =		9.1612 (99)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (301)
Fraction of space heat from community system												1.0000 (302)
Fraction of heat from community Boilers-Space and Water												1.0000 (303a)
Factor for control and charging method (Table 4c(3)) for space heating												1.0000 (305)
Factor for charging method (Table 4c(3)) for water heating												1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system												1.0500 (306)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating:												
Space heating requirement	204.2036	123.5345	79.7969	28.6917	7.3764	0.0000	0.0000	0.0000	0.0000	25.6292	107.2132	215.7193 (98)
Space heat from Boilers = (98) x 1.00 x 1.00 x 1.05												
307a	214.4137	129.7112	83.7868	30.1263	7.7452	0.0000	0.0000	0.0000	0.0000	26.9107	112.5739	226.5053
Space heating requirement	214.4137	129.7112	83.7868	30.1263	7.7452	0.0000	0.0000	0.0000	0.0000	26.9107	112.5739	226.5053 (307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)												0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)
Water heating												
Annual water heating requirement												
	273.0020	241.5086	256.5632	225.3349	218.3187	196.5811	193.8074	201.5130	203.7555	227.3964	242.0633	269.9696 (64)
Water heat from Boilers = (64) x 1.00 x 1.00 x 1.05												
310a	286.6521	253.5840	269.3914	236.6016	229.2346	206.4102	203.4978	211.5886	213.9432	238.7663	254.1665	283.4681
Water heating fuel	286.6521	253.5840	269.3914	236.6016	229.2346	206.4102	203.4978	211.5886	213.9432	238.7663	254.1665	283.4681 (310)
Cooling System Energy Efficiency Ratio	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (314)
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (315)
Pumps and Fa	17.4544	15.7653	17.4544	16.8914	17.4544	16.8914	17.4544	17.4544	16.8914	17.4544	16.8914	17.4544 (331)
Lighting	24.3591	19.5418	17.5952	12.8910	9.9574	8.1353	9.9835	11.8070	15.3362	20.1219	22.7276	25.0361 (332)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335a)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (333b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335b)
Annual totals kWh/year												
Space heating fuel - community heating												831.7731 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												2887.3043 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												8.3177 (313)
Space cooling fuel												0.0000 (321)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7700)												
mechanical ventilation fans (SFP = 0.7700)												205.5117 (330a)
Total electricity for the above, kWh/year												205.5117 (331)
Electricity for lighting (calculated in Appendix L)												196.5921 (332)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (333)
Wind generation												0.0000 (334)

Full SAP Calculation Printout



Hydro-electric generation (Appendix N)	0.0000 (335a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (335)
Appendix Q - special features	
Energy saved or generated	-0.0000 (336)
Energy used	0.0000 (337)
Total delivered energy for all uses	4121.1811 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Boilers			92.0000 (367)
Space and Water heating from Boilers	4042.4754	0.2100	189.8612 (367)
Electrical energy for heat distribution (space & water)	8.3177	0.0000	5.3825 (372)
Overall CO2 factor for heat network			0.2297 (386)
Total CO2 associated with community systems			854.3024 (373)
Space and water heating			854.3024 (376)
Pumps, fans and electric keep-hot	205.5117	0.1387	28.5070 (378)
Energy for lighting	196.5921	0.1443	28.3743 (379)
Total CO2, kg/year			911.1837 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.5400 (384)

13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Efficiency of heat source Boilers			92.0000 (467a)
Space and Water heating from Boilers	4042.4754	1.1300	1021.6343 (467)
Electrical energy for heat distribution (space & water)	8.3177	0.0000	57.0987 (472)
Overall CO2 factor for heat network			1.2436 (486)
Total CO2 associated with community systems			4625.0959 (473)
Space and water heating			4625.0959 (476)
Pumps, fans and electric keep-hot	205.5117	1.5128	310.8981 (478)
Energy for lighting	196.5921	1.5338	301.5395 (479)
Total Primary energy kWh/year			5237.5334 (483)
Dwelling Primary energy Rate (DPER)			60.5700 (484)

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	86.4700 (1b)	2.5300 (2b)	218.7691 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.4700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	218.7691 (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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1371 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3871 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3000 (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	0.3825	0.3750	0.3675	0.3300	0.3225	0.2850	0.2850	0.2775	0.3000	0.3225	0.3375	0.3525 (22b)
Effective ac	0.5732	0.5703	0.5675	0.5545	0.5520	0.5406	0.5406	0.5385	0.5450	0.5520	0.5570	0.5621 (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			1.7000	1.0000	1.7000		(26)

Full SAP Calculation Printout



TER Opening Type (Uw = 1.20)				16.9700	1.1450	19.4313	(27)
External Wall 1	65.3800	18.6700		46.7100	0.1800	8.4078	(29a)
stair wall	28.4100			28.4100	0.1800	5.1138	(29a)
Total net area of external elements Aum(A, m2)				93.7900			(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =		34.6529	(33)
Party Wall 1				23.0600	0.0000	0.0000	(32)

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

140.9563 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	62.9300	0.0700	4.4051
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.2200	0.0000	0.0000
E16 Corner (normal)	10.1200	0.0900	0.9108
E18 Party wall between dwellings	5.0600	0.0600	0.3036
E17 Corner (inverted - internal area greater than external area)	5.0600	-0.0900	-0.4554
E3 Sill	7.0000	0.0500	0.3500
E9 Balcony between dwellings, wall insulation continuous	11.2100	0.0200	0.2242
E1 Steel lintel with perforated steel base plate	10.4400	0.0500	0.5220
E4 Jamb	30.2000	0.0500	1.5100

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

7.7703 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 42.4232 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	41.3790	41.1739	40.9729	40.0285	39.8519	39.0294	39.0294	38.8771	39.3462	39.8519	40.2093	40.5830	(38)
Heat transfer coeff	83.8022	83.5971	83.3961	82.4517	82.2751	81.4526	81.4526	81.3003	81.7694	82.2751	82.6325	83.0062	(39)
Average = Sum(39)m / 12 =												82.4509	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9691	0.9668	0.9645	0.9535	0.9515	0.9420	0.9420	0.9402	0.9456	0.9515	0.9556	0.9599	(40)
HLP (average)												0.9535	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

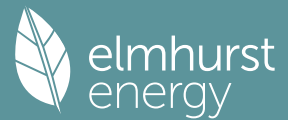
Assumed occupancy													2.5743 (42)
Hot water usage for mixer showers													
67.3815	66.3689	64.8934	62.0701	59.9866	57.6631	56.3425	57.8069	59.4121	61.9069	64.7907	67.1234	67.1234	(42a)
Hot water usage for baths													
29.0995	28.6673	28.0587	26.9366	26.0964	25.1647	24.6615	25.2658	25.9238	26.9207	28.0660	29.0011	29.0011	(42b)
Hot water usage for other uses													
40.9930	39.5023	38.0116	36.5210	35.0303	33.5397	33.5397	35.0303	36.5210	38.0116	39.5023	40.9930	40.9930	(42c)
Average daily hot water use (litres/day)												126.3697	(43)
Daily hot water use													
137.4740	134.5386	130.9637	125.5277	121.1134	116.3675	114.5436	118.1030	121.8569	126.8392	132.3590	137.1175	137.1175	(44)
Energy conte	217.7252	191.5811	201.2864	171.8412	163.0419	143.0875	138.5306	146.2362	150.2618	172.1196	188.5697	214.6928	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
32.6588	28.7372	30.1930	25.7762	24.4563	21.4631	20.7796	21.9354	22.5393	25.8179	28.2854	32.2039	32.2039	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
264.3201	233.6668	247.8813	216.9330	209.6368	188.1793	185.1255	192.8311	195.3536	218.7145	233.6615	261.2877	261.2877	(62)
WWHRS	-30.8040	-27.2433	-28.5277	-23.6220	-22.0149	-18.8383	-17.6579	-18.7774	-19.4908	-22.9775	-26.0307	-30.2336	(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													
233.5161	206.4235	219.3537	193.3110	187.6219	169.3410	167.4676	174.0537	175.8628	195.7370	207.6308	231.0541	231.0541	(64)
12Total per year (kWh/year)												2361.3731	(64)
Electric shower(s)												2361	(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	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													
109.6696	97.3693	104.2036	93.2107	91.4873	83.6501	83.3373	85.8995	86.0355	94.5057	98.7729	108.6613	108.6613	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	128.7128	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
118.3072	130.9830	118.3072	122.2508	118.3072	122.2508	118.3072	118.3072	122.2508	118.3072	122.2508	118.3072	118.3072	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
232.4315	234.8435	228.7655	215.8263	199.4929	184.1417	173.8862	171.4743	177.5523	190.4915	206.8249	222.1760	222.1760	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	35.8713	(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)													
-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	-102.9702	(71)
Water heating gains (Table 5)													
147.4053	144.8948	140.0587	129.4593	122.9669	116.1806	112.0126	115.4563	119.4938	127.0238	137.1846	146.0501	146.0501	(72)
Total internal gains	562.7579	575.3351	551.7453	532.1502	505.3808	484.1870	465.8199	466.8517	480.9107	500.4364	530.8741	551.1472	(73)

6. Solar gains

Full SAP Calculation Printout



[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b		g	Specific data or Table 6c	FF	Access factor Table 6d		Gains W
North	2.8000				10.6334			0.6300		0.7000	0.7700		9.0992 (74)
South	14.1700				46.7521			0.6300		0.7000	0.7700		202.4615 (78)
Solar gains	211.5607	348.9688	451.9219	524.8360	561.3888	547.1760	531.6515	504.9476	476.7457	378.3392	251.2109	182.5309 (83)	
Total gains	774.3186	924.3039	1003.6672	1056.9862	1066.7696	1031.3630	997.4713	971.7993	957.6564	878.7756	782.0851	733.6781 (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	40.4010	40.5001	40.5977	41.0627	41.1509	41.5664	41.5664	41.6443	41.4054	41.1509	40.9729	40.7884	
alpha	3.6934	3.7000	3.7065	3.7375	3.7434	3.7711	3.7711	3.7763	3.7604	3.7434	3.7315	3.7192	
util living area	0.9465	0.9059	0.8541	0.7656	0.6436	0.4856	0.3544	0.3783	0.5531	0.7785	0.9092	0.9543 (86)	
MIT	19.6719	19.9861	20.2977	20.6228	20.8426	20.9589	20.9902	20.9873	20.9308	20.6565	20.1249	19.6129 (87)	
Th 2	20.1091	20.1111	20.1131	20.1222	20.1240	20.1320	20.1320	20.1335	20.1289	20.1240	20.1205	20.1168 (88)	
util rest of house	0.9378	0.8920	0.8331	0.7336	0.5977	0.4258	0.2865	0.3097	0.4933	0.7418	0.8934	0.9468 (89)	
MIT 2	18.5787	18.9672	19.3474	19.7372	19.9813	20.1026	20.1271	20.1268	20.0759	19.7854	19.1523	18.5108 (90)	
Living area fraction	fLA = Living area / (4) =												0.3277 (91)
MIT	18.9370	19.3011	19.6589	20.0274	20.2636	20.3833	20.4100	20.4088	20.3561	20.0709	19.4710	18.8720 (92)	
Temperature adjustment													0.0000
adjusted MIT	18.9370	19.3011	19.6589	20.0274	20.2636	20.3833	20.4100	20.4088	20.3561	20.0709	19.4710	18.8720 (93)	
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9238	0.8772	0.8212	0.7299	0.6053	0.4435	0.3085	0.3318	0.5094	0.7394	0.8796	0.9335 (94)	
Useful gains	715.2975	810.7815	824.2000	771.4539	645.7080	457.4120	307.7061	322.3997	487.8104	649.7336	687.9216	684.9245 (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	1226.6099	1203.8929	1097.3977	917.4759	704.5711	471.0612	310.3328	325.9179	511.5593	779.2214	1022.2492	1217.8651 (97)	
Space heating kWh	380.4164	264.1708	203.2591	105.1358	43.7942	0.0000	0.0000	0.0000	0.0000	96.3389	240.7159	396.5078 (98a)	
Space heating requirement - total per year (kWh/year)													1730.3390
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	380.4164	264.1708	203.2591	105.1358	43.7942	0.0000	0.0000	0.0000	0.0000	96.3389	240.7159	396.5078 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													1730.3390
Space heating per m2	(98c) / (4) =											20.0109 (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	380.4164	264.1708	203.2591	105.1358	43.7942	0.0000	0.0000	0.0000	0.0000	96.3389	240.7159	396.5078 (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)	412.1521	286.2089	220.2157	113.9066	47.4476	0.0000	0.0000	0.0000	0.0000	104.3759	260.7973	429.5859 (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	233.5161	206.4235	219.3537	193.3110	187.6219	169.3410	167.4676	174.0537	175.8628	195.7370	207.6308	231.0541 (64)	
Efficiency of water heater (217)m	85.1474	84.6140	83.8892	82.7546	81.3605	79.8000	79.8000	79.8000	79.8000	82.5600	84.3922	79.8000 (216)	
Fuel for water heating, kWh/month	274.2493	243.9589	261.4801	233.5953	230.6056	212.2068	209.8591	218.1124	220.3794	237.0846	246.0307	271.0004 (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 (235a)m	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 (234a)m	24.5819	19.7205	17.7561	13.0089	10.0485	8.2097	9.1665	11.9150	15.4764	20.3059	22.9355	25.2651 (232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-9.5033	-14.7128	-23.1950	-28.6828	-33.3005	-31.9636	-31.5722	-28.6011	-23.8381	-17.8987	-10.9024	-8.0701 (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	-2.0066	-4.3975	-9.0849	-14.1751	-19.2839	-19.5830	-19.3578	-16.1415	-11.5091	-6.4598	-2.7313	-1.5743 (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													1874.6901 (211)
Space heating fuel - main system 2													0.0000 (213)

Full SAP Calculation Printout



Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2858.5627 (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)	198.3901 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-388.5451 (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	4629.0978 (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	1874.6901	0.2100	393.6849 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2858.5627	0.2100	600.2982 (264)
Space and water heating			993.9831 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	198.3901	0.1443	28.6338 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-262.2404	0.1327	-34.7968
PV Unit electricity exported	-126.3047	0.1248	-15.7621
Total			-50.5590 (269)
Total CO2, kg/year			983.9872 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3800 (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	1874.6901	1.1300	2118.3999 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2858.5627	1.1300	3230.1759 (278)
Space and water heating			5348.5757 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	198.3901	1.5338	304.2973 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-262.2404	1.4903	-390.8149
PV Unit electricity exported	-126.3047	0.4580	-57.8509
Total			-448.6658 (283)
Total Primary energy kWh/year			5334.3080 (286)
Target Primary Energy Rate (TPER)			61.6900 (287)