

Full SAP Calculation Printout



Plot Reference	UNIT 13			Issued on Date	08/07/2026
Assessment Reference	001	Plot Type Ref	UNIT 13		
Plot Address	UNIT 13, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS			SAP Version	10.2
SAP Rating	79 C	DER	4.42	TER	16.22
Environmental	96 A	% DER < TER			72.75
CO ₂ Emissions (t/year)	0.37	DFEE	50.10	TFEE	52.66
Compliance Check	See BREL	% DFEE < TFEE			4.86
% DPER < TPER	46.05	DPER	46.62	TPER	86.40
Assessor Details	Mr. Ondrej Gajdos			Assessor ID	W452-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	93.2000 (1b)	2.9000 (2b)	270.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.2000		270.2800 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	270.2800 (5)

2. Ventilation rate

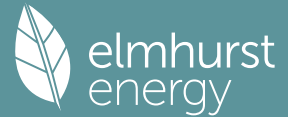
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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) = 0.1110 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2610 (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) = 0.2023 (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 infiltr rate	0.2579	0.2528	0.2478	0.2225	0.2174	0.1922	0.1922	0.1871	0.2023	0.2174	0.2276	0.2377 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5333	0.5320	0.5307	0.5248	0.5236	0.5185	0.5185	0.5175	0.5205	0.5236	0.5259	0.5282 (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
Main dwelling							
dl			1.8900	1.0000	1.8900		(26)
1			46.8700	0.7940	37.2128		(27)
corridor below			0.7000	0.0900	0.0630	75.0000	52.5000 (28b)
exposed wall	90.4800	46.8700	43.6100	0.1500	6.5415	60.0000	2616.6002 (29a)
corridor wall	15.3700	1.8900	13.4800	0.2500	3.3700	9.0000	121.3200 (29a)
stair wall	18.8500		18.8500	0.1700	3.2045	9.0000	169.6500 (29a)
flat roof	93.2000		93.2000	0.1000	9.3200	9.0000	838.8000 (30)
Total net area of external elements Aum(A, m ²)			218.6000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 61.6018		(33)
Main dwelling							
pw			31.6100	0.0000	0.0000	110.0000	3477.1001 (32)
pf			92.5000			40.0000	3700.0000 (32d)
iw			204.1600			9.0000	1837.4400 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 12813.4103 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							137.4829 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E2 Other lintels (including other steel lintels)						18.4600	0.0500	0.9230				
E3 Sill						17.5600	0.0500	0.8780				
E4 Jamb						61.2000	0.0500	3.0600				
E7 Party floor between dwellings (in blocks of flats)						28.0000	0.0700	1.9600				
E23 Balcony within or between dwellings, balcony support penetrates wall insulation						4.1000	0.0200	0.0820				
E24 Eaves (insulation at ceiling level - inverted)						10.7000	0.0800	0.8560				
E15 Flat roof with parapet						31.4000	0.5600	17.5840				
E16 Corner (normal)						11.6000	0.0900	1.0440				
E17 Corner (inverted - internal area greater than external area)						11.6000	-0.0900	-1.0440				
E18 Party wall between dwellings						11.6000	0.0600	0.6960				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												26.0390 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 87.6408 (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	47.5623	47.4471	47.3342	46.8040	46.7048	46.2429	46.2429	46.1574	46.4208	46.7048	46.9055	47.1153 (38)
Average = Sum(39)m / 12 =	135.2031	135.0880	134.9751	134.4448	134.3456	133.8837	133.8837	133.7982	134.0616	134.3456	134.5463	134.7561 (39)
												134.4443
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4507	1.4494	1.4482	1.4425	1.4415	1.4365	1.4365	1.4356	1.4384	1.4415	1.4436	1.4459 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.4425
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.6670 (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												
	29.7685	29.3264	28.7038	27.5559	26.6963	25.7432	25.2284	25.8466	26.5198	27.5396	28.7112	29.6678 (42b)
Hot water usage for other uses												
	41.9431	40.4179	38.8927	37.3675	35.8423	34.3171	34.3171	35.8423	37.3675	38.8927	40.4179	41.9431 (42c)
Average daily hot water use (litres/day)												65.7302 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	71.7116	69.7443	67.5965	64.9234	62.5386	60.0603	59.5455	61.6889	63.8873	66.4323	69.1291	71.6110 (44)
Energy content (annual)	113.5736	99.3149	103.8933	88.8769	84.1890	73.8512	72.0151	76.3838	78.7794	90.1480	98.4871	112.1255 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1091.6379
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	96.5376	84.4177	88.3093	75.5453	71.5607	62.7735	61.2129	64.9262	66.9625	76.6258	83.7140	95.3066 (62)
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 (63a)
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 (63b)
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 (63c)
Output from w/h	96.5376	84.4177	88.3093	75.5453	71.5607	62.7735	61.2129	64.9262	66.9625	76.6258	83.7140	95.3066 (64)
12Total per year (kWh/year)												927.8922 (64)
Electric shower(s)	55.2072	49.1901	53.7137	51.2583	52.2202	49.8130	51.4734	52.2202	51.2583	53.7137	52.7037	55.2072 (64a)
												627.9788 (64a)
Heat gains from water heating, kWh/month	37.9362	33.4019	35.5058	31.7009	30.9452	28.1466	28.1716	29.2866	29.5552	32.5849	34.1044	37.6285 (65)
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	123.4953	136.7270	123.4953	127.6118	123.4953	127.6118	123.4953	123.4953	127.6118	123.4953	127.6118	123.4953 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	244.8433	247.3840	240.9815	227.3513	210.1457	193.9748	183.1717	180.6310	187.0335	200.6636	217.8693	234.0402 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352 (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)												
	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815 (71)
Water heating gains (Table 5)												
	50.9895	49.7053	47.7228	44.0290	41.5930	39.0925	37.8650	39.3637	41.0489	43.7969	47.3672	50.5759 (72)
Total internal gains	482.3337	496.8218	475.2051	461.9978	438.2396	423.6847	407.5376	406.4956	418.6998	430.9614	455.8539	471.1169 (73)
6. Solar gains												
[Jan]												
North		7.2700		10.6334		0.5300		0.7000		0.7700		19.8753 (74)
Northeast		25.5700		11.2829		0.5300		0.7000		0.7700		74.1754 (75)
Southeast		10.7900		36.7938		0.5300		0.7000		0.7700		102.0713 (77)
Northwest		3.2400		11.2829		0.5300		0.7000		0.7700		9.3988 (81)
Solar gains	205.5209	381.9657	608.9301	901.7862	1146.4189	1198.6092	1130.3805	938.2912	708.6577	445.2690	251.9347	172.1717 (83)
Total gains	687.8545	878.7875	1084.1352	1363.7840	1584.6585	1622.2939	1537.9180	1344.7868	1127.3574	876.2304	707.7886	643.2887 (84)

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7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	26.3254	26.3479	26.3699	26.4739	26.4935	26.5849	26.5849	26.6019	26.5496	26.4935	26.4539	26.4128
alpha	2.7550	2.7565	2.7580	2.7649	2.7662	2.7723	2.7723	2.7735	2.7700	2.7662	2.7636	2.7609
util living area	0.9734	0.9493	0.9019	0.7954	0.6423	0.4815	0.3661	0.4277	0.6585	0.8761	0.9565	0.9776 (86)
MIT	18.3863	18.7931	19.3873	20.1061	20.6181	20.8750	20.9569	20.9334	20.6985	19.9615	19.0329	18.3061 (87)
Th 2	19.7247	19.7256	19.7266	19.7309	19.7317	19.7354	19.7354	19.7361	19.7340	19.7317	19.7300	19.7283 (88)
util rest of house	0.9679	0.9393	0.8828	0.7580	0.5828	0.4003	0.2675	0.3214	0.5764	0.8432	0.9461	0.9730 (89)
MIT 2	17.3886	17.7877	18.3628	19.0342	19.4752	19.6724	19.7216	19.7126	19.5598	18.9268	18.0326	17.3119 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.6755	18.0768	18.6574	19.3425	19.8038	20.0182	20.0768	20.0637	19.8873	19.2243	18.3202	17.5978 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.6755	18.0768	18.6574	19.3425	19.8038	20.0182	20.0768	20.0637	19.8873	19.2243	18.3202	17.5978 (93)

8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9556	0.9222	0.8630	0.7450	0.5864	0.4193	0.2949	0.3501	0.5873	0.8271	0.9305	0.9619 (94)
Useful gains	657.3231	810.3844	935.5605	1015.9532	929.3136	680.1720	453.5380	470.8007	662.1224	724.7154	658.6030	618.8099 (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	1808.4076	1780.0285	1640.9509	1403.9331	1088.7160	725.4104	465.4844	490.1941	775.8504	1158.6426	1509.6410	1805.4384 (97)
Space heating kWh	856.4068	651.6008	524.8105	279.3456	118.5954	0.0000	0.0000	0.0000	0.0000	322.8418	612.7474	882.8516 (98a)
Space heating requirement - total per year (kWh/year)	4249.1999											
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	856.4068	651.6008	524.8105	279.3456	118.5954	0.0000	0.0000	0.0000	0.0000	322.8418	612.7474	882.8516 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4249.1999											
Space heating per m2	(98c) / (4) = 45.5923 (99)											

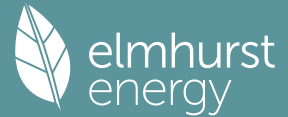
8c. Space cooling requirement												
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1258.5070	990.7396	1016.8663	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8562	0.8987	0.8622	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1077.5685	890.3315	876.7717	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1847.3943	1751.1651	1527.8525	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	554.2746	640.4602	484.4041	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	138.5687	160.1150	121.1010	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	419.7847 (107)											
Energy for space heating	45.5923 (99)											
Energy for space cooling	4.5041 (108)											
Total	50.0964 (109)											
Fabric Energy Efficiency (DFEE)	50.1 (109)											

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

1. Overall dwelling characteristics												
Main dwelling	Area (m2)		Storey height (m)		Volume (m3)							
Ground floor	93.2000 (1b)		x 2.9000 (2b)		= 270.2800 (1b) - (3b)							
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	93.2000											
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		270.2800 (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)											

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Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =												Air changes per hour	30.0000 / (5) =	0.1110 (8)
Pressure test													Yes		
Pressure Test Method													Blower Door		
Measured/design AP50													5.0000	(17)	
Infiltration rate													0.3610	(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) =	0.2798	(21)
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)		
	0.3567	0.3497	0.3427	0.3077	0.3008	0.2658	0.2658	0.2588	0.2798	0.3008	0.3147	0.3287	(22b)		
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000	(23b)	
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000	(23c)	
Effective ac	0.5636	0.5612	0.5587	0.5474	0.5452	0.5353	0.5353	0.5335	0.5391	0.5452	0.5495	0.5540	(25)		

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type			21.4200	1.1450	24.5267		(27)
corridor below			0.7000	0.1300	0.0910		(28b)
exposed wall	90.4800	21.4200	69.0600	0.1800	12.4308		(29a)
corridor wall	15.3700	1.8900	13.4800	0.1800	2.4264		(29a)
stair wall	18.8500		18.8500	0.1800	3.3930		(29a)
flat roof	93.2000		93.2000	0.1100	10.2520		(30)
Total net area of external elements Aum(A, m2)			218.6000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	55.0099		(33)
Main dwelling							
pw			31.6100	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							137.4829 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				18.4600	0.0500	0.9230	
E3 Sill				17.5600	0.0500	0.8780	
E4 Jamb				61.2000	0.0500	3.0600	
E7 Party floor between dwellings (in blocks of flats)				28.0000	0.0700	1.9600	
E23 Balcony within or between dwellings, balcony support penetrates wall insulation				4.1000	0.0200	0.0820	
E24 Eaves (insulation at ceiling level - inverted)				10.7000	0.2400	2.5680	
E15 Flat roof with parapet				31.4000	0.5600	17.5840	
E16 Corner (normal)				11.6000	0.0900	1.0440	
E17 Corner (inverted - internal area greater than external area)				11.6000	-0.0900	-1.0440	
E18 Party wall between dwellings				11.6000	0.0600	0.6960	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							27.7510 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 82.7609 (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	50.2707	50.0503	49.8344	48.8199	48.6301	47.7465	47.7465	47.5829	48.0868	48.6301	49.0141	49.4155	(38)		
Average = Sum(39)m / 12 =	133.0316	132.8113	132.5953	131.5808	131.3910	130.5074	130.5074	130.3438	130.8478	131.3910	131.7750	132.1764	(39)		
													131.5799		
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
HLP (average)	1.4274	1.4250	1.4227	1.4118	1.4098	1.4003	1.4003	1.3985	1.4039	1.4098	1.4139	1.4182	(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													2.6670	(42)	
Hot water usage for mixer showers													0.0000	(42a)	
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)		
Hot water usage for other uses	29.7685	29.3264	28.7038	27.5559	26.6963	25.7432	25.2284	25.8466	26.5198	27.5396	28.7112	29.6678	(42c)		
Average daily hot water use (litres/day)	41.9431	40.4179	38.8927	37.3675	35.8423	34.3171	34.3171	35.8423	37.3675	38.8927	40.4179	41.9431	(43)		
													65.7302		
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Energy conte	71.7116	69.7443	67.5965	64.9234	62.5386	60.0603	59.5455	61.6889	63.8873	66.4323	69.1291	71.6110	(44)		
Energy content (annual)	113.5736	99.3149	103.8933	88.8769	84.1890	73.8512	72.0151	76.3838	78.7794	90.1480	98.4871	112.1255	(45)		
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m =	1091.6379	
Water storage loss (or HIU 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	(46)		
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)		
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)		
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)		
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)		
Total heat required for water heating calculated for each month	96.5376	84.4177	88.3093	75.5453	71.5607	62.7735	61.2129	64.9262	66.9625	76.6258	83.7140	95.3066	(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	96.5376	84.4177	88.3093	75.5453	71.5607	62.7735	61.2129	64.9262	66.9625	76.6258	83.7140	95.3066	(64)		
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m =	927.8922	(64)
Electric shower(s)	55.2072	49.1901	53.7137	51.2583	52.2202	49.8130	51.4734	52.2202	51.2583	53.7137	52.7037	55.2072	(64a)		

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Heat gains from water heating, kWh/month
 37.9362 33.4019 35.5058 31.7009 30.9452 28.1466 28.1716 29.2866 29.5552 32.5849 34.1044 37.6285 (65)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 627.9788 (64a)

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	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	133.3518	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.4953	136.7270	123.4953	127.6118	123.4953	127.6118	123.4953	123.4953	127.6118	123.4953	127.6118	123.4953	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	244.8433	247.3840	240.9815	227.3513	210.1457	193.9748	183.1717	180.6310	187.0335	200.6636	217.8693	234.0402	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	36.3352	(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)	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	-106.6815	(71)
Water heating gains (Table 5)	50.9895	49.7053	47.7228	44.0290	41.5930	39.0925	37.8650	39.3637	41.0489	43.7969	47.3672	50.5759	(72)
Total internal gains	482.3337	496.8218	475.2051	461.9978	438.2396	423.6847	407.5376	406.4956	418.6998	430.9614	455.8539	471.1169	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W			
North				3.3200	10.6334	0.6300		0.7000		0.7700		10.7890 (74)			
Northeast				11.6900	11.2829	0.6300		0.7000		0.7700		40.3096 (75)			
Southeast				4.9300	36.7938	0.6300		0.7000		0.7700		55.4362 (77)			
Northwest				1.4800	11.2829	0.6300		0.7000		0.7700		5.1034 (81)			
Solar gains				111.6382	207.4862	330.7832	489.8797	622.7800	651.1346	614.0688	509.7135	384.9611	241.8753	136.8507	93.5226 (83)
Total gains				593.9719	704.3080	805.9883	951.8775	1061.0195	1074.8193	1021.6064	916.2090	803.6608	672.8367	592.7047	564.6396 (84)

7. Mean internal temperature (heating season)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)	26.7552	26.7995	26.8432	27.0502	27.0892	27.2726	27.2726	27.3069	27.2017	27.0892	27.0103	26.9283	21.0000 (85)
tau	2.7837	2.7866	2.7895	2.8033	2.8059	2.8182	2.8182	2.8205	2.8134	2.8059	2.8007	2.7952	
util living area	0.9812	0.9692	0.9466	0.8893	0.7869	0.6394	0.5075	0.5691	0.7791	0.9254	0.9709	0.9837	(86)
MIT	18.2868	18.5885	19.0777	19.7604	20.3562	20.7533	20.9070	20.8697	20.5390	19.7629	18.9128	18.2366	(87)
Th 2	19.7424	19.7442	19.7460	19.7543	19.7558	19.7631	19.7631	19.7645	19.7603	19.7558	19.7527	19.7494	(88)
util rest of house	0.9773	0.9627	0.9350	0.8640	0.7364	0.5515	0.3847	0.4454	0.7070	0.9031	0.9637	0.9803	(89)
MIT 2	17.3023	17.6015	18.0838	18.7472	19.2948	19.6279	19.7302	19.7137	19.4730	18.7656	17.9315	17.2571	(90)
Living area fraction	17.5854	17.8853	18.3696	19.0386	19.6000	19.9515	20.0686	20.0461	19.7795	19.0524	18.2137	17.5387	(91)
MIT	17.5854	17.8853	18.3696	19.0386	19.6000	19.9515	20.0686	20.0461	19.7795	19.0524	18.2137	17.5387	(92)
Temperature adjustment	17.5854	17.8853	18.3696	19.0386	19.6000	19.9515	20.0686	20.0461	19.7795	19.0524	18.2137	17.5387	(93)
adjusted MIT	17.5854	17.8853	18.3696	19.0386	19.6000	19.9515	20.0686	20.0461	19.7795	19.0524	18.2137	17.5387	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9676	0.9495	0.9181	0.8462	0.7291	0.5661	0.4170	0.4760	0.7083	0.8866	0.9512	0.9714	(94)
Useful gains	574.7097	668.7546	739.9593	805.4631	773.6037	608.4992	426.0542	436.1447	569.1961	596.5040	563.7654	548.5074	(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	1767.3827	1724.5977	1573.8520	1334.0420	1037.9949	698.4158	452.6738	475.2443	743.1508	1110.5632	1464.5094	1763.0662	(97)
Space heating kWh	887.3487	709.5266	620.4162	380.5768	196.7071	0.0000	0.0000	0.0000	0.0000	382.4601	648.5356	903.6318	(98a)
Space heating requirement - total per year (kWh/year)												4729.2029	
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	887.3487	709.5266	620.4162	380.5768	196.7071	0.0000	0.0000	0.0000	0.0000	382.4601	648.5356	903.6318	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4729.2029	
Space heating per m ²										(98c) / (4) =		50.7425	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1226.7698	965.7550	990.6129	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7322	0.7981	0.7514	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	898.2663	770.7250	744.3348	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1207.4889	1147.6839	1026.9175	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	222.6403	280.4575	210.2415	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	55.6601	70.1144	52.5604	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												178.3348	(107)

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Energy for space heating
Energy for space cooling
Total
Fabric Energy Efficiency (TFEE)

50.7425 (99)
1.9135 (108)
52.6560 (109)
52.7 (109)