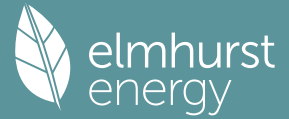


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Property Reference	Wildes Cottage		Issued on Date	18/12/2023	
Assessment Reference	Ewell Road	Prop Type Ref			
Property	Ewell Road, Wildes Cottage, SM3 8AS				
SAP Rating	83 B	DER	4.45	TER	13.63
Environmental	96 A	% DER < TER		67.35	
CO ₂ Emissions (t/year)	0.3	DFEE	48.57	TFEE	49.53
Compliance Check	See BREL	% DFEE < TFEE		1.93	
% DPER < TPER	36.04	DPER	45.71	TPER	71.47
Assessor Details	Mr. John Young			Assessor ID	4778-0001
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)
Ground floor	44.4000 (1b)	x 2.4000 (2b)	= 106.5600 (1b) - (3b)
First floor	44.4000 (1c)	x 2.6000 (2c)	= 115.4400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	88.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.0000 (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) =											0.1351 (8)
Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												5.0000 (17)
Infiltration rate												0.3851 (18)
Number of sides sheltered												0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =											1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.3851 (21)
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 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	0.4910	0.4814	0.4718	0.4236	0.4140	0.3659	0.3659	0.3563	0.3851	0.4140	0.4333	0.4525 (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	0.6206	0.6159	0.6113	0.5897	0.5857	0.5669	0.5669	0.5635	0.5742	0.5857	0.5939	0.6024 (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
Win 1 (Uw = 1.20)			6.6400	1.1450	7.6031		(27)
Win 2 (Uw = 1.20)			16.0000	1.1450	18.3206		(27)
Win 3 (Uw = 1.20)			1.1300	1.1450	1.2939		(27)
Win (Uw = 1.20)			1.1300	1.1450	1.2939		(27)
Ground			44.4000	0.1100	4.8840	110.0000	4884.0000 (28a)
Front	55.0000	6.6400	48.3600	0.1800	8.7048	190.0000	9188.4000 (29a)
Rear	55.0000	16.0000	39.0000	0.1800	7.0200	190.0000	7410.0000 (29a)
Left	58.0300	1.1300	56.9000	0.1800	10.2420	190.0000	10811.0000 (29a)
Right	58.0300	1.1300	56.9000	0.1800	10.2420	190.0000	10811.0000 (29a)
slope	60.0000		60.0000	0.1300	7.8000	9.0000	540.0000 (30)
Total net area of external elements Aum(A, m ²)			330.4600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	77.4043	(33)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 43644.4000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							491.4910 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

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E1 Steel lintel with perforated steel base plate	12.8200	0.0250	0.3205
E3 Sill	12.8200	0.0200	0.2564
E4 Jamb	32.0000	0.0400	1.2800
E5 Ground floor (normal)	29.4500	0.0500	1.4725
E6 Intermediate floor within a dwelling	29.4500	0.0600	1.7670
E10 Eaves (insulation at ceiling level)	12.0000	0.1200	1.4400
E11 Eaves (insulation at rafter level)	6.0000	0.0700	0.4200
E12 Gable (insulation at ceiling level)	17.4000	0.0600	1.0440
E13 Gable (insulation at rafter level)	10.0000	0.0600	0.6000
E16 Corner (normal)	20.0000	0.0700	1.4000
E17 Corner (inverted - internal area greater than external area)	10.0000	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.0004 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	87.4047 (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	45.4625	45.1195	44.7833	43.2043	42.9089	41.5335	41.5335	41.2789	42.0633	42.9089	43.5065	44.1313 (38)
Average = Sum(39)m / 12 =	132.8671	132.5242	132.1880	130.6089	130.3135	128.9382	128.9382	128.6835	129.4679	130.3135	130.9112	131.5360 (39)
												130.6075

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4963	1.4924	1.4886	1.4708	1.4675	1.4520	1.4520	1.4491	1.4580	1.4675	1.4742	1.4813 (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												2.6089 (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	29.3496	28.9137	28.2999	27.1681	26.3206	25.3810	24.8734	25.4829	26.1466	27.1521	28.3071	29.2503 (42b)
Hot water usage for other uses	41.3481	39.8445	38.3410	36.8374	35.3338	33.8303	33.8303	35.3338	36.8374	38.3410	39.8445	41.3481 (42c)
Average daily hot water use (litres/day)												64.8009 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	70.6977	68.7582	66.6408	64.0055	61.6545	59.2112	58.7037	60.8168	62.9840	65.4930	68.1517	70.5984 (44)
Energy content (annual)	111.9678	97.9108	102.4245	87.6203	82.9988	72.8071	70.9970	75.3038	77.6655	88.8734	97.0946	110.5401 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
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 (57)
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 (59)
Total heat required for water heating calculated for each month	95.1727	83.2242	87.0608	74.4773	70.5490	61.8861	60.3474	64.0083	66.0157	75.5424	82.5304	93.9591 (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	95.1727	83.2242	87.0608	74.4773	70.5490	61.8861	60.3474	64.0083	66.0157	75.5424	82.5304	93.9591 (64)
12Total per year (kWh/year)												914.7733 (64)
Electric shower(s)	54.4271	48.4950	52.9546	50.5340	51.4822	49.1090	50.7460	51.4822	50.5340	52.9546	51.9589	54.4271 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												619.1047 (64a)
Heat gains from water heating, kWh/month	37.3999	32.9298	35.0039	31.2528	30.5078	27.7488	27.7734	28.8726	29.1374	32.1243	33.6223	37.0965 (65)

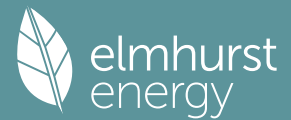
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.4650	132.2648	119.4650	123.4471	119.4650	123.4471	119.4650	119.4650	123.4471	119.4650	123.4471	119.4650 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	236.8526	239.3104	233.1169	219.9315	203.2874	187.6443	177.1937	174.7360	180.9295	194.1148	210.7590	226.4021 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447 (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)	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575 (71)
Water heating gains (Table 5)	50.2687	49.0027	47.0482	43.4067	41.0051	38.5400	37.3298	38.8073	40.4686	43.1778	46.6977	49.8609 (72)
Total internal gains	468.7204	482.7119	461.7641	448.9194	425.8915	411.7654	396.1225	395.1422	406.9793	418.8916	443.0378	457.8620 (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	6.6400	10.6334	0.6300	0.7000	0.7700	21.5780 (74)						
South	16.0000	46.7521	0.6300	0.7000	0.7700	228.6086 (78)						
East	1.1300	19.6403	0.6300	0.7000	0.7700	6.7826 (76)						
West	1.1300	19.6403	0.6300	0.7000	0.7700	6.7826 (80)						
Solar gains	263.7519	442.1752	590.6948	715.3140	791.4274	782.8304	755.8226	698.5322	633.2765	484.4024	314.5127	226.6828 (83)
Total gains	732.4723	924.8871	1052.4589	1164.2334	1217.3189	1194.5959	1151.9452	1093.6744	1040.2558	903.2940	757.5505	684.5448 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	91.2449	91.4810	91.7137	92.8225	93.0329	94.0252	94.0252	94.2113	93.6405	93.0329	92.6082	92.1683
alpha	7.0830	7.0987	7.1142	7.1882	7.2022	7.2683	7.2683	7.2808	7.2427	7.2022	7.1739	7.1446
util living area	0.9997	0.9985	0.9936	0.9681	0.8761	0.6755	0.4910	0.5384	0.8024	0.9814	0.9989	0.9998 (86)
MIT	20.0176	20.2000	20.4240	20.6997	20.9036	20.9879	20.9989	20.9979	20.9611	20.6893	20.2960	19.9905 (87)
Th 2	19.6903	19.6932	19.6961	19.7095	19.7120	19.7237	19.7237	19.7259	19.7192	19.7120	19.7069	19.7016 (88)
util rest of house	0.9996	0.9974	0.9889	0.9448	0.8013	0.5497	0.3495	0.3911	0.6827	0.9627	0.9980	0.9997 (89)
MIT 2	18.8228	19.0070	19.2308	19.5028	19.6665	19.7210	19.7236	19.7257	19.7077	19.5013	19.1145	18.8050 (90)
Living area fraction										FLA = Living area / (4) =		0.1904 (91)
MIT	19.0503	19.2342	19.4580	19.7307	19.9020	19.9623	19.9665	19.9679	19.9464	19.7275	19.3395	19.0308 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0503	19.2342	19.4580	19.7307	19.9020	19.9623	19.9665	19.9679	19.9464	19.7275	19.3395	19.0308 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9994	0.9969	0.9877	0.9453	0.8140	0.5741	0.3766	0.4194	0.7063	0.9630	0.9976	0.9996 (94)
Useful gains	732.0415	922.0119	1039.5201	1100.4917	990.9541	685.8707	433.8397	458.6557	734.6923	869.8500	755.6950	684.2945 (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	1959.8329	1899.6277	1712.8886	1414.5905	1068.8375	691.4021	434.0643	459.1358	756.9180	1189.4418	1602.2905	1950.7783 (97)
Space heating kWh	913.4768	656.9578	500.9862	226.1511	57.9453	0.0000	0.0000	0.0000	0.0000	237.7763	609.5488	942.2639 (98a)
Space heating requirement - total per year (kWh/year)												4145.1061
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	913.4768	656.9578	500.9862	226.1511	57.9453	0.0000	0.0000	0.0000	0.0000	237.7763	609.5488	942.2639 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4145.1061
Space heating per m2												(98c) / (4) = 46.6791 (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	1212.0191	954.1427	977.9947	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9207	0.9698	0.9557	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1115.9615	925.3135	934.6681	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1349.4967	1301.9629	1236.1957	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	168.1453	280.2271	224.3365	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	42.0363	70.0568	56.0841	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												168.1772 (107)
Energy for space heating												46.6791 (99)
Energy for space cooling												1.8939 (108)
Total												48.5730 (109)
Fabric Energy Efficiency (DFEE)												48.6 (109)

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

1. Overall dwelling characteristics

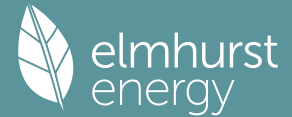
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	44.4000 (1b)	x 2.4000 (2b)	= 106.5600 (1b) - (3b)
First floor	44.4000 (1c)	x 2.6000 (2c)	= 115.4400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	88.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.0000 (5)

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)

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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) =	Air changes per hour	30.0000 / (5) = 0.1351 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50			5.0000 (17)
Infiltration rate			0.3851 (18)
Number of sides sheltered			0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3851 (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	0.4910	0.4814	0.4718	0.4236	0.4140	0.3659	0.3659	0.3563	0.3851	0.4140	0.4333	0.4525	(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	0.6206	0.6159	0.6113	0.5897	0.5857	0.5669	0.5669	0.5635	0.5742	0.5857	0.5939	0.6024	(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	
TER Opening Type (Uw = 1.20)			22.2100	1.1450	25.4313			(27)
Ground			44.4000	0.1300	5.7720			(28a)
Front	55.0000	5.9200	49.0800	0.1800	8.8344			(29a)
Rear	55.0000	14.2700	40.7300	0.1800	7.3314			(29a)
Left	58.0300	1.0100	57.0200	0.1800	10.2636			(29a)
Right	58.0300	1.0100	57.0200	0.1800	10.2636			(29a)
slope	60.0000		60.0000	0.1100	6.6000			(30)
Total net area of external elements Aum(A, m ²)			330.4600					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 74.4963			(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							491.4910	(35)

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

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate	12.8200	0.0500	0.6410	
E3 Sill	12.8200	0.0500	0.6410	
E4 Jamb	32.0000	0.0500	1.6000	
E5 Ground floor (normal)	29.4500	0.1600	4.7120	
E6 Intermediate floor within a dwelling	29.4500	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	12.0000	0.0600	0.7200	
E11 Eaves (insulation at rafter level)	6.0000	0.0400	0.2400	
E12 Gable (insulation at ceiling level)	17.4000	0.0600	1.0440	
E13 Gable (insulation at rafter level)	10.0000	0.0800	0.8000	
E16 Corner (normal)	20.0000	0.0900	1.8000	
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000	

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

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 85.7943 (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	45.4625	45.1195	44.7833	43.2043	42.9089	41.5335	41.5335	41.2789	42.0633	42.9089	43.5065	44.1313	(38)
Average = Sum(39)m / 12 =	131.2568	130.9138	130.5776	128.9986	128.7031	127.3278	127.3278	127.0732	127.8576	128.7031	129.3008	129.9256	(39)
													128.9972

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.4781	1.4743	1.4705	1.4527	1.4494	1.4339	1.4339	1.4310	1.4398	1.4494	1.4561	1.4631	(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													2.6089 (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	29.3496	28.9137	28.2999	27.1681	26.3206	25.3810	24.8734	25.4829	26.1466	27.1521	28.3071	29.2503	(42b)
Hot water usage for other uses	41.3481	39.8445	38.3410	36.8374	35.3338	33.8303	33.8303	35.3338	36.8374	38.3410	39.8445	41.3481	(42c)
Average daily hot water use (litres/day)													64.8009 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	70.6977	68.7582	66.6408	64.0055	61.6545	59.2112	58.7037	60.8168	62.9840	65.4930	68.1517	70.5984	(44)
Energy content (annual)	111.9678	97.9108	102.4245	87.6203	82.9988	72.8071	70.9970	75.3038	77.6655	88.8734	97.0946	110.5401	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	95.1727	83.2242	87.0608	74.4773	70.5490	61.8861	60.3474	64.0083	66.0157	75.5424	82.5304	93.9591	(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	95.1727	83.2242	87.0608	74.4773	70.5490	61.8861	60.3474	64.0083	66.0157	75.5424	82.5304	93.9591	(64)
12Total per year (kWh/year)													914.7733 (64)
Electric shower(s)													915 (64)

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	54.4271	48.4950	52.9546	50.5340	51.4822	49.1090	50.7460	51.4822	50.5340	52.9546	51.9589	54.4271 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 619.1047 (64a)											
Heat gains from water heating, kWh/month	37.3999	32.9298	35.0039	31.2528	30.5078	27.7488	27.7734	28.8726	29.1374	32.1243	33.6223	37.0965 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468	130.4468 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	119.4650	132.2648	119.4650	123.4471	119.4650	123.4471	119.4650	119.4650	123.4471	119.4650	123.4471	119.4650 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	236.8526	239.3104	233.1169	219.9315	203.2874	187.6443	177.1937	174.7360	180.9295	194.1148	210.7590	226.4021 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447	36.0447 (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)												
	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575	-104.3575 (71)
Water heating gains (Table 5)												
	50.2687	49.0027	47.0482	43.4067	41.0051	38.5400	37.3298	38.8073	40.4686	43.1778	46.6977	49.8609 (72)
Total internal gains												
	468.7204	482.7119	461.7641	448.9194	425.8915	411.7654	396.1225	395.1422	406.9793	418.8916	443.0378	457.8620 (73)

6. Solar gains

[Jan]		Area	Solar flux	g	FF	Access	Gains					
		m2	Table 6a	Specific data	Specific data	factor	W					
			W/m2	or Table 6b	or Table 6c	Table 6d						
North		5.9200	10.6334	0.6300	0.7000	0.7700	19.2382 (74)					
East		1.0100	19.6403	0.6300	0.7000	0.7700	6.0623 (76)					
South		14.2700	46.7521	0.6300	0.7000	0.7700	203.8903 (78)					
West		1.0100	19.6403	0.6300	0.7000	0.7700	6.0623 (80)					
Solar gains	235.2532	394.4035	526.8887	638.0590	705.9583	698.2911	674.1995	623.0925	564.8755	432.0720	280.5305	202.1887 (83)
Total gains	703.9736	877.1154	988.6528	1086.9784	1131.8498	1110.0566	1070.3220	1018.2347	971.8549	850.9636	723.5682	660.0507 (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	92.3643	92.6063	92.8447	93.9812	94.1970	95.2144	95.2144	95.4052	94.8199	94.1970	93.7616	93.3106
alpha	7.1576	7.1738	7.1896	7.2654	7.2798	7.3476	7.3476	7.3603	7.3213	7.2798	7.2508	7.2207
util living area												
	0.9998	0.9989	0.9955	0.9769	0.9023	0.7123	0.5213	0.5699	0.8332	0.9862	0.9992	0.9999 (86)
MIT	20.0148	20.1843	20.3976	20.6688	20.8834	20.9839	20.9985	20.9972	20.9519	20.6685	20.2872	19.9903 (87)
Th 2	19.7040	19.7069	19.7097	19.7232	19.7257	19.7375	19.7375	19.7396	19.7329	19.7257	19.7206	19.7153 (88)
util rest of house												
	0.9997	0.9981	0.9921	0.9589	0.8354	0.5843	0.3731	0.4164	0.7178	0.9717	0.9985	0.9998 (89)
MIT 2	18.8313	19.0029	19.2168	19.4883	19.6677	19.7337	19.7373	19.7394	19.7179	19.4949	19.1172	18.8162 (90)
Living area fraction												0.1904 (91)
MIT	19.0566	19.2279	19.4416	19.7131	19.8992	19.9718	19.9775	19.9789	19.9528	19.7184	19.3400	19.0398 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0566	19.2279	19.4416	19.7131	19.8992	19.9718	19.9775	19.9789	19.9528	19.7184	19.3400	19.0398 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9995	0.9977	0.9911	0.9587	0.8463	0.6093	0.4015	0.4460	0.7405	0.9715	0.9981	0.9997 (94)
Useful gains	703.6535	875.1108	979.8500	1042.0763	957.8527	676.3665	429.7322	454.1143	719.6780	826.7369	722.2185	659.8619 (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												
	1936.9106	1875.7152	1689.8870	1394.8731	1055.2619	683.9814	430.0491	454.7824	748.3311	1173.5607	1582.6423	1928.0730 (97)
Space heating kWh												
	917.5433	672.4061	528.2675	254.0137	72.4724	0.0000	0.0000	0.0000	0.0000	258.0369	619.5051	943.5491 (98a)
Space heating requirement - total per year (kWh/year)												
												4265.7940
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												
	917.5433	672.4061	528.2675	254.0137	72.4724	0.0000	0.0000	0.0000	0.0000	258.0369	619.5051	943.5491 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												
												4265.7940
Space heating per m2												
												48.0382 (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	1196.8817	942.2261	965.7560	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8986	0.9592	0.9418	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1075.5622	903.8010	909.5602	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1250.6845	1206.5592	1148.0195	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	126.0881	225.2521	177.4137	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	31.5220	56.3130	44.3534	0.0000	0.0000	0.0000	0.0000 (107)

Space cooling requirement	132.1885 (107)
Energy for space heating	48.0382 (99)
Energy for space cooling	1.4886 (108)
Total	49.5268 (109)
Fabric Energy Efficiency (TFEE)	49.5 (109)