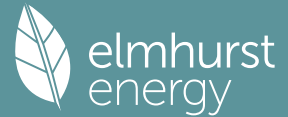


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Property Reference	4907-AU06-6316-048				Issued on Date	19/03/2025
Assessment Reference	Plot 048	Prop Type Ref		TF Flat-TC		
Property	FLAT 8, 38 Spey Road, Tilehurst, Reading, RG30 4NF					
SAP Rating	84 B	DER	4.86	TER	13.17	
Environmental	97 A	% DER < TER				63.10
CO ₂ Emissions (t/year)	0.21	DFEE	23.85	TFEE	27.33	
Compliance Check	See BREL	% DFEE < TFEE				12.71
% DPER < TPER	27.65	DPER	50.61	TPER	69.95	
Assessor Details	Mr. Paul Frearson				Assessor ID	AA61-0001
Client	Bellway Homes, Thames Valley					

SAP 10 WORKSHEET FOR New Build (As Built) (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)
Main dwelling			
Ground floor	50.0400 (1b)	2.4600 (2b)	123.0984 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	123.0984 (5)

2. Ventilation rate

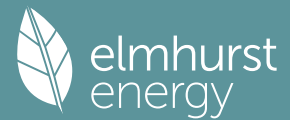
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	3.8800 (17)
Infiltration rate	0.1940 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1649 (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	0.2102	0.2061	0.2020	0.1814	0.1773	0.1567	0.1567	0.1525	0.1649	0.1773	0.1855	0.1938 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Window			3.8200	1.2357	4.7205		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
EW Brick AAC018/019	15.1300	3.8200	11.3100	0.2600	2.9406	60.0000	678.6000 (29a)
E-WM-30 Corridor Wall	22.0400	2.0800	19.9600	0.2100	4.1916	52.3000	1043.9080 (29a)
PR 500mm MW044	50.0400		50.0400	0.0900	4.5036	9.0000	450.3600 (30)
Total net area of external elements Aum(A, m ²)			87.2100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	18.4363		(33)
Main dwelling							
Party Wall			34.7800	0.0000	0.0000	45.0000	1565.0999 (32)
Party Floor			50.0400			70.0000	3502.8000 (32d)
GF Timber			102.3800			9.0000	921.4200 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 8162.1880 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							163.1133 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E2 Other lintels (including other steel lintels)	1.8200	0.0370	0.0673
E4 Jamb	8.2700	0.0140	0.1158
E7 Party floor between dwellings (in blocks of flats)	6.1500	0.0390	0.2399
E16 Corner (normal)	4.9200	0.0350	0.1722
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1400	0.0000	0.0000
E2 Other lintels (including other steel lintels)	1.0200	0.0270	0.0275
E4 Jamb	4.2000	0.0850	0.3570
E7 Party floor between dwellings (in blocks of flats)	8.9600	0.0330	0.2957
E25 Staggered party wall between dwellings	7.3800	0.0380	0.2804
E17 Corner (inverted - internal area greater than external area)	2.4600	0.0000	0.0000
E18 Party wall between dwellings	2.4600	0.0390	0.0959
E10 Eaves (insulation at ceiling level)	6.1500	0.0360	0.2214
E12 Gable (insulation at ceiling level)	8.9600	0.0280	0.2509
P4 Party wall - Roof (insulation at ceiling level)	14.1400	0.0330	0.4666
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			2.5907 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	21.0270 (37)

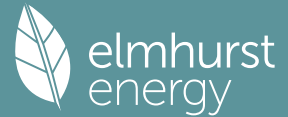
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 20.3112	Feb 20.3112	Mar 20.3112	Apr 20.3112	May 20.3112	Jun 20.3112	Jul 20.3112	Aug 20.3112	Sep 20.3112	Oct 20.3112	Nov 20.3112	Dec 20.3112 (38)
Heat transfer coeff	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382 (39)
Average = Sum(39)m / 12 =												41.3382
HLP	Jan 0.8261	Feb 0.8261	Mar 0.8261	Apr 0.8261	May 0.8261	Jun 0.8261	Jul 0.8261	Aug 0.8261	Sep 0.8261	Oct 0.8261	Nov 0.8261	Dec 0.8261 (40)
HLP (average)												0.8261
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6913 (42)
Hot water usage for mixer showers	52.5767	51.7865	50.6352	48.4322	46.8065	44.9936	43.9631	45.1057	46.3583	48.3049	50.5551	52.3752 (42a)
Hot water usage for baths	22.7329	22.3953	21.9199	21.0433	20.3869	19.6590	19.2659	19.7380	20.2520	21.0308	21.9255	22.6561 (42b)
Hot water usage for other uses	31.9504	30.7886	29.6267	28.4649	27.3031	26.1412	26.1412	27.3031	28.4649	29.6267	30.7886	31.9504 (42c)
Average daily hot water use (litres/day)												98.5967 (43)
Daily hot water use	Jan 107.2600	Feb 104.9704	Mar 102.1818	Apr 97.9404	May 94.4964	Jun 90.7938	Jul 89.3702	Aug 92.1467	Sep 95.0752	Oct 98.9624	Nov 103.2692	Dec 106.9817 (44)
Energy conte	169.8736	149.4764	157.0496	134.0755	127.2104	111.6416	108.0855	114.0969	117.2372	134.2911	147.1259	167.5075 (45)
Energy content (annual)										Total = Sum(45)m =		1637.6710
Distribution loss (46)m = 0.15 x (45)m	25.4810	22.4215	23.5574	20.1113	19.0816	16.7462	16.2128	17.1145	17.5856	20.1437	22.0689	25.1261 (46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (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	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589 (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	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1955.0020 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	56.4830	49.7009	52.2190	44.5801	42.2975	37.1208	35.9384	37.9372	38.9814	44.6518	48.9193	55.6962 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan 84.5639	Feb 84.5639	Mar 84.5639	Apr 84.5639	May 84.5639	Jun 84.5639	Jul 84.5639	Aug 84.5639	Sep 84.5639	Oct 84.5639	Nov 84.5639	Dec 84.5639 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	90.4791	100.1733	90.4791	93.4951	90.4791	93.4951	90.4791	90.4791	93.4951	90.4791	93.4951	90.4791 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.3378	148.8667	145.0139	136.8118	126.4581	116.7270	110.2261	108.6972	112.5500	120.7521	131.1059	140.8369 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564 (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)	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511 (71)
Water heating gains (Table 5)	75.9180	73.9597	70.1868	61.9168	56.8514	51.5567	48.3043	50.9909	54.1408	60.0158	67.9435	74.8605 (72)
Total internal gains	362.1041	371.3690	354.0491	340.5929	322.1578	310.1480	297.3787	298.5364	308.5551	319.6163	340.9137	354.5457 (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		
Southwest			3.8200	36.7938	0.4600	0.0000		0.7700		49.7837 (79)		

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Solar gains	49.7837	84.8000	116.0271	143.7632	161.0267	159.8623	154.1243	141.2449	125.6328	93.7221	59.6294	42.6045 (83)
Total gains	411.8878	456.1690	470.0762	484.3561	483.1846	470.0103	451.5030	439.7813	434.1879	413.3384	400.5431	397.1502 (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	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469
alpha	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565
util living area	0.9615	0.9386	0.9069	0.8362	0.7184	0.5453	0.3993	0.4274	0.6218	0.8390	0.9351	0.9669 (86)
MIT	20.0537	20.2367	20.4434	20.6940	20.8799	20.9734	20.9949	20.9929	20.9510	20.7327	20.3568	20.0017 (87)
Th 2	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308 (88)
util rest of house	0.9547	0.9282	0.8911	0.8091	0.6751	0.4856	0.3311	0.3581	0.5629	0.8074	0.9224	0.9609 (89)
MIT 2	19.1361	19.3630	19.6171	19.9152	20.1217	20.2120	20.2283	20.2272	20.1935	19.9651	19.5157	19.0712 (90)
Living area fraction									fLA =	Living area / (4) =		0.4996 (91)
MIT	19.5945	19.7995	20.0299	20.3043	20.5005	20.5924	20.6113	20.6097	20.5719	20.3486	19.9359	19.5360 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5945	19.7995	20.0299	20.3043	20.5005	20.5924	20.6113	20.6097	20.5719	20.3486	19.9359	19.5360 (93)

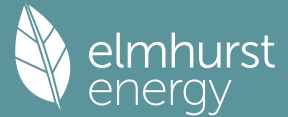
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9480	0.9216	0.8865	0.8119	0.6908	0.5141	0.3651	0.3925	0.5897	0.8126	0.9169	0.9544 (94)
Useful gains	390.4740	420.3906	416.7321	393.2485	333.7963	241.6153	164.8278	172.6131	256.0220	335.8860	367.2516	379.0578 (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	632.2484	615.9184	559.3040	471.4329	363.7975	247.7151	165.8202	174.0235	267.5385	402.9911	530.6135	633.9650 (97)
Space heating kWh	179.8801	131.3947	106.0735	56.2928	22.3209	0.0000	0.0000	0.0000	0.0000	49.9262	117.6206	189.6509 (98a)
Space heating requirement - total per year (kWh/year)												853.1597
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	179.8801	131.3947	106.0735	56.2928	22.3209	0.0000	0.0000	0.0000	0.0000	49.9262	117.6206	189.6509 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												853.1597
Space heating per m2										(98c) / (4) =		17.0496 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (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	179.8801	131.3947	106.0735	56.2928	22.3209	0.0000	0.0000	0.0000	0.0000	49.9262	117.6206	189.6509 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	179.8801	131.3947	106.0735	56.2928	22.3209	0.0000	0.0000	0.0000	0.0000	49.9262	117.6206	189.6509 (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)
Space heating fuel used, main 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)
Water heating												
Water heating requirement	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589 (64)
Efficiency of water heater (217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200 (216)
Fuel for water heating, kWh/month	60.6511	53.5621	56.6994	49.3521	47.5046	42.4392	41.6113	43.4637	44.1634	49.6864	53.3736	59.9220 (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	2.8571	2.5806	2.8571	2.7650	2.8571	2.7650	2.8571	2.8571	2.7650	2.8571	2.7650	2.8571 (231)
Lighting	17.6999	14.1995	12.7851	9.3669	7.2353	5.9113	6.6002	8.5793	11.1436	14.6210	16.5144	18.1918 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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												853.1597 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												324.5200

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Water heating fuel used	602.4288	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.2240) mechanical ventilation fans (SFP = 0.2240)	33.6403	(230a)
Total electricity for the above, kWh/year	33.6403	(231)
Electricity for lighting (calculated in Appendix L)	142.8483	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(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	1632.0771	(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	853.1597	0.1559	133.0329	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	602.4288	0.1411	85.0105	(264)
Space and water heating			218.0434	(265)
Pumps, fans and electric keep-hot	33.6403	0.1387	4.6663	(267)
Energy for lighting	142.8483	0.1443	20.6174	(268)
Total CO2, kg/year			243.3271	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.8600	(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	853.1597	1.5773	1345.6641	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	602.4288	1.5218	916.7732	(278)
Space and water heating			2262.4373	(279)
Pumps, fans and electric keep-hot	33.6403	1.5128	50.8911	(281)
Energy for lighting	142.8483	1.5338	219.1054	(282)
Total Primary energy kWh/year			2532.4338	(286)
Dwelling Primary energy Rate (DPER)			50.6100	(287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

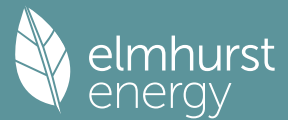
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	50.0400	2.4600	123.0984	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0400			
Dwelling volume			123.0984	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1625 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4125	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3506 (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	0.4470	0.4383	0.4295	0.3857	0.3769	0.3331	0.3331	0.3243	0.3506	0.3769	0.3944	0.4120	(22b)
Effective ac	0.5999	0.5960	0.5922	0.5744	0.5710	0.5555	0.5555	0.5526	0.5615	0.5710	0.5778	0.5849	(25)

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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			2.0800	1.0000	2.0800			(26)
TER Opening Type			3.8200	1.1450	4.3740			(27)
EW Brick AAC018/019	15.1300	3.8200	11.3100	0.1800	2.0358			(29a)
E-WM-30 Corridor Wall	22.0400	2.0800	19.9600	0.1800	3.5928			(29a)
PR 500mm MW044	50.0400		50.0400	0.1100	5.5044			(30)
Total net area of external elements Aum(A, m2)			87.2100					(31)
Fabric heat loss, W/K = Sum (A x U)					17.5870			(33)
Main dwelling								
Party Wall			34.7800	0.0000	0.0000			(32)

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

163.1133 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	1.8200	0.0500	0.0910
E4 Jamb	8.2700	0.0500	0.4135
E7 Party floor between dwellings (in blocks of flats)	6.1500	0.0700	0.4305
E16 Corner (normal)	4.9200	0.0900	0.4428
P3 Party wall - intermediate floor between dwellings (in blocks of flats)	14.1400	0.0000	0.0000
E2 Other lintels (including other steel lintels)	1.0200	0.0500	0.0510
E4 Jamb	4.2000	0.0500	0.2100
E7 Party floor between dwellings (in blocks of flats)	8.9600	0.0700	0.6272
E25 Staggered party wall between dwellings	7.3800	0.0600	0.4428
E17 Corner (inverted - internal area greater than external area)	2.4600	-0.0900	-0.2214
E18 Party wall between dwellings	2.4600	0.0600	0.1476
E10 Eaves (insulation at ceiling level)	6.1500	0.0600	0.3690
E12 Gable (insulation at ceiling level)	8.9600	0.0600	0.5376
P4 Party wall - Roof (insulation at ceiling level)	14.1400	0.1200	1.6968

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

5.2384 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 22.8254 (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	24.3699	24.2123	24.0578	23.3322	23.1965	22.5645	22.5645	22.4475	22.8079	23.1965	23.4711	23.7582	(38)
Heat transfer coeff	47.1953	47.0377	46.8833	46.1577	46.0219	45.3899	45.3899	45.2729	45.6334	46.0219	46.2965	46.5837	(39)
Average = Sum(39)m / 12 =												46.1570	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9432	0.9400	0.9369	0.9224	0.9197	0.9071	0.9071	0.9047	0.9119	0.9197	0.9252	0.9309	(40)
HLP (average)												0.9224	
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6913 (42)
Hot water usage for mixer showers													
52.5767	51.7865	50.6352	48.4322	46.8065	44.9936	43.9631	45.1057	46.3583	48.3049	50.5551	52.3752	52.3752	(42a)
Hot water usage for baths													
22.7329	22.3953	21.9199	21.0433	20.3869	19.6590	19.2659	19.7380	20.2520	21.0308	21.9255	22.6561	22.6561	(42b)
Hot water usage for other uses													
31.9504	30.7886	29.6267	28.4649	27.3031	26.1412	26.1412	27.3031	28.4649	29.6267	30.7886	31.9504	31.9504	(42c)
Average daily hot water use (litres/day)												98.5967	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.2600	104.9704	102.1818	97.9404	94.4964	90.7938	89.3702	92.1467	95.0752	98.9624	103.2692	106.9817	(44)
Energy conte	169.8736	149.4764	157.0496	134.0755	127.2104	111.6416	108.0855	114.0969	117.2372	134.2911	147.1259	167.5075	(45)
Energy content (annual)										Total = Sum(45)m =		1637.6710	
Distribution loss (46)m = 0.15 x (45)m													
25.4810	22.4215	23.5574	20.1113	19.0816	16.7462	16.2128	17.1145	17.5856	20.1437	22.0689	25.1261	25.1261	(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	23.3325	22.5798	23.3325	22.5798	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	23.3325	22.5798	23.3325	22.5798	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													
216.4685	191.5622	203.6445	179.1673	173.8053	156.7334	154.6804	160.6918	162.3290	180.8860	192.2177	214.1024	214.1024	(62)
WWHRS	-24.0359	-21.2575	-22.2596	-18.4319	-17.1778	-14.6992	-13.7781	-14.6517	-15.2084	-17.9290	-20.3113	-23.5907	(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													
192.4326	170.3047	181.3848	160.7355	156.6274	142.0342	140.9022	146.0401	147.1207	162.9570	171.9064	190.5116	190.5116	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1962.9572	(64)
Electric shower(s)												1963	(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													
93.7589	83.3695	89.4949	80.6536	79.5734	73.1943	73.2143	75.2131	75.0548	81.9277	84.9928	92.9721	92.9721	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
90.4791	100.1733	90.4791	93.4951	90.4791	93.4951	90.4791	93.4951	90.4791	93.4951	90.4791	93.4951	90.4791	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													

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Cooking gains	147.3378	148.8667	145.0139	136.8118	126.4581	116.7270	110.2261	108.6972	112.5500	120.7521	131.1059	140.8369 (68)
	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564 (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)	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511 (71)
Water heating gains (Table 5)	126.0200	124.0617	120.2888	112.0189	106.9535	101.6587	98.4064	101.0929	104.2428	110.1179	118.0456	124.9626 (72)
Total internal gains	415.2062	424.4710	407.1511	393.6950	375.2599	360.2501	347.4808	348.6385	358.6571	372.7183	394.0157	407.6478 (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

Southwest				3.8200	36.7938	0.6300	0.7000			0.7700			42.9547 (79)

Solar gains	42.9547	73.1677	100.1112	124.0426	138.9381	137.9333	132.9825	121.8698	108.3992	80.8659	51.4498	36.7602	(83)
Total gains	458.1608	497.6387	507.2623	517.7376	514.1979	498.1834	480.4633	470.5082	467.0564	453.5842	445.4655	444.4080	(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)												
tau	48.0402	48.2012	48.3600	49.1202	49.2651	49.9510	49.9510	50.0802	49.6846	49.2651	48.9729	48.6710
alpha	4.2027	4.2134	4.2240	4.2747	4.2843	4.3301	4.3301	4.3387	4.3123	4.2843	4.2649	4.2447
util living area	0.9545	0.9342	0.9059	0.8398	0.7300	0.5582	0.4102	0.4353	0.6284	0.8319	0.9251	0.9588 (86)
MIT	19.9068	20.0881	20.3126	20.6124	20.8349	20.9609	20.9917	20.9892	20.9329	20.6824	20.2755	19.8856 (87)
Th 2	20.1310	20.1336	20.1362	20.1485	20.1508	20.1615	20.1615	20.1635	20.1574	20.1508	20.1461	20.1413 (88)
util rest of house	0.9462	0.9227	0.8892	0.8116	0.6841	0.4932	0.3345	0.3593	0.5650	0.7978	0.9103	0.9513 (89)
MIT 2	18.8772	19.1038	19.3823	19.7504	20.0014	20.1343	20.1576	20.1581	20.1069	19.8383	19.3488	18.8584 (90)
Living area fraction	19.3916	19.5956	19.8471	20.1811	20.4178	20.5473	20.5743	20.5733	20.5195	20.2600	19.8118	19.3716 (92)
MIT	19.3916	19.5956	19.8471	20.1811	20.4178	20.5473	20.5743	20.5733	20.5195	20.2600	19.8118	19.3716 (93)
Temperature adjustment												0.0000
adjusted MIT	19.3916	19.5956	19.8471	20.1811	20.4178	20.5473	20.5743	20.5733	20.5195	20.2600	19.8118	19.3716 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	429.7048	455.0586	447.8437	420.7787	359.5250	260.8917	178.7654	186.7635	276.9974	364.0189	402.5408	419.1715 (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	712.2528	691.2460	625.7550	520.7077	401.2103	269.9468	180.3946	188.9387	292.9455	444.5728	588.5121	706.7481 (97)
Space heating kWh	210.2157	158.7179	132.3660	71.9489	31.0139	0.0000	0.0000	0.0000	0.0000	59.9321	133.8993	213.9570 (98a)
Space heating requirement - total per year (kWh/year)												1012.0509
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	210.2157	158.7179	132.3660	71.9489	31.0139	0.0000	0.0000	0.0000	0.0000	59.9321	133.8993	213.9570 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1012.0509
Space heating per m2										(98c) / (4) =		20.2248 (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	210.2157	158.7179	132.3660	71.9489	31.0139	0.0000	0.0000	0.0000	0.0000	59.9321	133.8993	213.9570 (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)	227.7527	171.9587	143.4085	77.9512	33.6012	0.0000	0.0000	0.0000	0.0000	64.9319	145.0697	231.8061 (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	192.4326	170.3047	181.3848	160.7355	156.6274	142.0342	140.9022	146.0401	147.1207	162.9570	171.9064	190.5116 (64)
Efficiency of water heater (217)m	84.2584	83.9021	83.3645	82.3818	81.1596	79.8000	79.8000	79.8000	79.8000	82.0356	83.5058	79.8000 (216)
Fuel for water heating, kWh/month	228.3838	202.9803	217.5803	195.1105	192.9871	177.9877	176.5692	183.0077	184.3618	198.6417	205.8616	225.9369 (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	18.7998	15.0819	13.5796	9.9490	7.6849	6.2786	7.0104	9.1124	11.8361	15.5296	17.5406	19.3223 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-17.2803	-25.2762	-37.6785	-43.9939	-48.8749	-46.1750	-45.6596	-42.4342	-36.9249	-29.6837	-19.3383	-14.8386 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

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(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	-7.1425	-15.2736	-30.8161	-46.9460	-62.7034	-63.2013	-62.4083	-52.5047	-38.0782	-22.0022	-9.5907	-5.6258	(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												1096.4798	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2389.4087	(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)												151.7250	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-824.4508	(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												2899.1627	(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	1096.4798	0.2100	230.2608	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2389.4087	0.2100	501.7758	(264)
Space and water heating			732.0366	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	151.7250	0.1443	21.8986	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-408.1581	0.1338	-54.6108	
PV Unit electricity exported	-416.2927	0.1255	-52.2441	
Total			-106.8548	(269)
Total CO2, kg/year			659.0096	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.1700	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1096.4798	1.1300	1239.0222	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2389.4087	1.1300	2700.0318	(278)
Space and water heating			3939.0540	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	151.7250	1.5338	232.7209	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-408.1581	1.4945	-609.9720	
PV Unit electricity exported	-416.2927	0.4606	-191.7643	
Total			-801.7362	(283)
Total Primary energy kWh/year			3500.1394	(286)
Target Primary Energy Rate (TPER)			69.9500	(287)

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

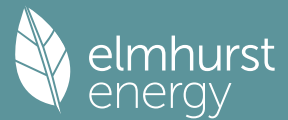
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	50.0400 (1b)	x 2.4600 (2b)	= 123.0984 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0400			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 123.0984	(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)

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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) =	0.1625 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.8800 (17)
Infiltration rate		0.3565 (18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3030 (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													
	0.3863	0.3788	0.3712	0.3333	0.3257	0.2879	0.2879	0.2803	0.3030	0.3257	0.3409	0.3560	(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	0.5746	0.5717	0.5689	0.5555	0.5530	0.5414	0.5414	0.5393	0.5459	0.5530	0.5581	0.5634	(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								
Window			3.8200	1.2357	4.7205			(27)
Corridor Door			2.0800	1.0000	2.0800			(26)
EW Brick AAC018/019	15.1300	3.8200	11.3100	0.2600	2.9406	60.0000	678.6000	(29a)
E-WM-30 Corridor Wall	22.0400	2.0800	19.9600	0.2100	4.1916	52.3000	1043.9080	(29a)
PR 500mm MW044	50.0400		50.0400	0.0900	4.5036	9.0000	450.3600	(30)
Total net area of external elements Aum(A, m2)			87.2100					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	18.4363		(33)
Main dwelling								
Party Wall			34.7800	0.0000	0.0000	45.0000	1565.0999	(32)
Party Floor			50.0400			70.0000	3502.8000	(32d)
GF Timber			102.3800			9.0000	921.4200	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	8162.1880 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		163.1133 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	1.8200	0.0370	0.0673
E2 Other lintels (including other steel lintels)	8.2700	0.0140	0.1158
E4 Jamb	6.1500	0.0390	0.2399
E7 Party floor between dwellings (in blocks of flats)	4.9200	0.0350	0.1722
E16 Corner (normal)	14.1400	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	1.0200	0.0270	0.0275
E2 Other lintels (including other steel lintels)	4.2000	0.0850	0.3570
E4 Jamb	8.9600	0.0330	0.2957
E7 Party floor between dwellings (in blocks of flats)	7.3800	0.0380	0.2804
E25 Staggered party wall between dwellings	2.4600	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	2.4600	0.0390	0.0959
E18 Party wall between dwellings	6.1500	0.0360	0.2214
E10 Eaves (insulation at ceiling level)	8.9600	0.0280	0.2509
E12 Gable (insulation at ceiling level)	14.1400	0.0330	0.4666
P4 Party wall - Roof (insulation at ceiling level)			2.5907 (36)

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	(33a) =	0.0000
Point Thermal bridges	(33) + (36) + (36a) =	21.0270 (37)
Total fabric heat loss		

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

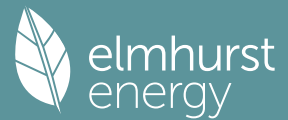
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.3426	23.2249	23.1096	22.5676	22.4662	21.9942	21.9942	21.9068	22.1760	22.4662	22.6713	22.8858	(38)
Heat transfer coeff	44.3696	44.2519	44.1366	43.5946	43.4932	43.0212	43.0212	42.9338	43.2030	43.4932	43.6983	43.9128	(39)
Average = Sum(39)m / 12 =												43.5941	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8867	0.8843	0.8820	0.8712	0.8692	0.8597	0.8597	0.8580	0.8634	0.8692	0.8733	0.8776	(40)
HLP (average)												0.8712	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6913 (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													
	22.7329	22.3953	21.9199	21.0433	20.3869	19.6590	19.2659	19.7380	20.2520	21.0308	21.9255	22.6561	(42b)
Hot water usage for other uses													
	31.9504	30.7886	29.6267	28.4649	27.3031	26.1412	26.1412	27.3031	28.4649	29.6267	30.7886	31.9504	(42c)
Average daily hot water use (litres/day)												50.1228	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.6833	53.1839	51.5466	49.5081	47.6899	45.8002	45.4071	47.0410	48.7169	50.6576	52.7141	54.6065	(44)
Energy conte	86.6050	75.7331	79.2252	67.7742	64.1998	56.3167	54.9159	58.2466	60.0728	68.7418	75.1008	85.5005	(45)
Energy content (annual)										Total = Sum(45)m =		832.4325	
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													
	73.6142	64.3731	67.3414	57.6080	54.5698	47.8692	46.6786	49.5096	51.0619	58.4305	63.8357	72.6754	(62)

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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	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	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	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	0.0000 (63d)
Output from w/h	73.6142	64.3731	67.3414	57.6080	54.5698	47.8692	46.6786	49.5096	51.0619	58.4305	63.8357	72.6754	(64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =												707.5676 (64)
Electric shower(s)	42.1051	37.5160	40.9661	39.0934	39.8270	37.9911	39.2575	39.8270	39.0934	40.9661	40.1958	42.1051	(64a)
Heat gains from water heating, kWh/month	28.9298	25.4723	27.0769	24.1754	23.5992	21.4651	21.4840	22.3342	22.5388	24.8492	26.0079	28.6951	(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	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	90.4791	100.1733	90.4791	93.4951	90.4791	93.4951	90.4791	90.4791	93.4951	90.4791	93.4951	90.4791	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.3378	148.8667	145.0139	136.8118	126.4581	116.7270	110.2261	108.6972	112.5500	120.7521	131.1059	140.8369	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	(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)	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	(71)
Water heating gains (Table 5)	38.8842	37.9052	36.3936	33.5769	31.7194	29.8126	28.8763	30.0190	31.3039	33.3994	36.1220	38.5687	(72)
Total internal gains	325.0704	335.3145	320.2559	312.2530	297.0258	288.4039	277.9508	277.5645	285.7182	292.9999	309.0922	318.2540	(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		
-----				3.8200	36.7938	0.4600	0.0000			0.7700	49.7837 (79)		

Solar gains	49.7837	84.8000	116.0271	143.7632	161.0267	159.8623	154.1243	141.2449	125.6328	93.7221	59.6294	42.6045 (83)	
Total gains	374.8540	420.1145	436.2830	456.0162	458.0525	448.2662	432.0751	418.8094	411.3510	386.7219	368.7216	360.8584 (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	51.0997	51.2356	51.3695	52.0081	52.1294	52.7013	52.7013	52.8086	52.4796	52.1294	51.8847	51.6313
alpha	4.4066	4.4157	4.4246	4.4672	4.4753	4.5134	4.5134	4.5206	4.4986	4.4753	4.4590	4.4421
util living area	0.9748	0.9578	0.9332	0.8712	0.7632	0.5860	0.4321	0.4631	0.6682	0.8751	0.9546	0.9782 (86)
MIT	19.8122	20.0186	20.2626	20.5864	20.8255	20.9598	20.9917	20.9887	20.9261	20.6380	20.1892	19.7801 (87)
Th 2	20.1788	20.1808	20.1828	20.1921	20.1938	20.2019	20.2019	20.2034	20.1987	20.1938	20.1903	20.1866 (88)
util rest of house	0.9700	0.9499	0.9205	0.8469	0.7204	0.5220	0.3564	0.3865	0.6066	0.8470	0.9448	0.9740 (89)
MIT 2	19.1005	19.3037	19.5421	19.8552	20.0684	20.1796	20.1988	20.1988	20.1543	19.9087	19.4803	19.0752 (90)
Living area fraction	19.4560	19.6609	19.9021	20.2205	20.4467	20.5693	20.5949	20.5935	20.5399	20.2731	19.8345	19.4274 (91)
MIT	19.4560	19.6609	19.9021	20.2205	20.4467	20.5693	20.5949	20.5935	20.5399	20.2731	19.8345	19.4274 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4560	19.6609	19.9021	20.2205	20.4467	20.5693	20.5949	20.5935	20.5399	20.2731	19.8345	19.4274 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9648	0.9440	0.9156	0.8478	0.7345	0.5521	0.3940	0.4244	0.6337	0.8500	0.9398	0.9692	(94)	
Useful gains	361.6645	396.6087	399.4421	386.6251	336.4194	247.5007	170.2425	177.7604	260.6717	328.7246	346.5220	349.7443	(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	672.4681	653.1965	591.5225	493.5121	380.4202	256.8085	171.8667	180.0407	278.2210	420.7127	556.4751	668.6763	(97)	
Space heating kWh	231.2378	172.4270	142.9078	76.9586	32.7365	0.0000	0.0000	0.0000	0.0000	68.4392	151.1663	237.2854	(98a)	
Space heating requirement - total per year (kWh/year)	1113.1587													
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	231.2378	172.4270	142.9078	76.9586	32.7365	0.0000	0.0000	0.0000	0.0000	68.4392	151.1663	237.2854	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	1113.1587													
Space heating per m2											(98c) / (4) =			22.2454 (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	404.3992	318.3568	326.2967	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8808	0.9339	0.9221	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	356.1816	297.3167	300.8908	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	479.4652	462.7568	449.1286	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												

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Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	88.7641	123.0875	110.2889	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	22.1910	30.7719	27.5722	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												80.5351 (107)
Energy for space heating												22.2454 (99)
Energy for space cooling												1.6094 (108)
Total												23.8548 (109)
Fabric Energy Efficiency (DFEE)												23.9 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (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	50.0400 (1b)	x	2.4600 (2b)	= 123.0984 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0400			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	123.0984 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1625 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4125	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3506 (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)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.4470	0.4383	0.4295	0.3857	0.3769	0.3331	0.3331	0.3243	0.3506	0.3769	0.3944	0.4120 (22b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23b)
Effective ac	0.5999	0.5960	0.5922	0.5744	0.5710	0.5555	0.5555	0.5526	0.5615	0.5710	0.5778	0.5849 (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			2.0800	1.0000	2.0800		(26)
TER Opening Type			3.8200	1.1450	4.3740		(27)
EW Brick AAC018/019	15.1300	3.8200	11.3100	0.1800	2.0358		(29a)
E-WM-30 Corridor Wall	22.0400	2.0800	19.9600	0.1800	3.5928		(29a)
PR 500mm MW044	50.0400		50.0400	0.1100	5.5044		(30)
Total net area of external elements Aum(A, m2)			87.2100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	17.5870		(33)
Main dwelling							
Party Wall			34.7800	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							163.1133 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				1.8200	0.0500	0.0910	
E4 Jamb				8.2700	0.0500	0.4135	
E7 Party floor between dwellings (in blocks of flats)				6.1500	0.0700	0.4305	
E16 Corner (normal)				4.9200	0.0900	0.4428	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1400	0.0000	0.0000	
E2 Other lintels (including other steel lintels)				1.0200	0.0500	0.0510	
E4 Jamb				4.2000	0.0500	0.2100	
E7 Party floor between dwellings (in blocks of flats)				8.9600	0.0700	0.6272	
E25 Staggered party wall between dwellings				7.3800	0.0600	0.4428	
E17 Corner (inverted - internal area greater than external area)				2.4600	-0.0900	-0.2214	
E18 Party wall between dwellings				2.4600	0.0600	0.1476	
E10 Eaves (insulation at ceiling level)				6.1500	0.0600	0.3690	
E12 Gable (insulation at ceiling level)				8.9600	0.0600	0.5376	
P4 Party wall - Roof (insulation at ceiling level)				14.1400	0.1200	1.6968	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.2384 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	22.8254 (37)

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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	24.3699	24.2123	24.0578	23.3322	23.1965	22.5645	22.5645	22.4475	22.8079	23.1965	23.4711	23.7582	(38)
Heat transfer coeff	47.1953	47.0377	46.8833	46.1577	46.0219	45.3899	45.3899	45.2729	45.6334	46.0219	46.2965	46.5837	(39)
Average = Sum(39)m / 12 =												46.1570	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9432	0.9400	0.9369	0.9224	0.9197	0.9071	0.9071	0.9047	0.9119	0.9197	0.9252	0.9309	(40)
HLP (average)												0.9224	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6913 (42)
Hot water usage for mixer showers													(42a)
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	
Hot water usage for baths													(42b)
22.7329	22.3953	21.9199	21.0433	20.3869	19.6590	19.2659	19.7380	20.2520	21.0308	21.9255	22.6561	22.6561	
Hot water usage for other uses													(42c)
31.9504	30.7886	29.6267	28.4649	27.3031	26.1412	26.1412	27.3031	28.4649	29.6267	30.7886	31.9504	31.9504	
Average daily hot water use (litres/day)												50.1228	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.6833	53.1839	51.5466	49.5081	47.6899	45.8002	45.4071	47.0410	48.7169	50.6576	52.7141	54.6065	(44)
Energy conte	86.6050	75.7331	79.2252	67.7742	64.1998	56.3167	54.9159	58.2466	60.0728	68.7418	75.1008	85.5005	(45)
Energy content (annual)										Total = Sum(45)m =		832.4325	
Distribution loss (46)m = 0.15 x (45)m													(46)
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	
Water storage loss:													
Total storage loss													(56)
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	
If cylinder contains dedicated solar storage													(57)
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	
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													
73.6142	64.3731	67.3414	57.6080	54.5698	47.8692	46.6786	49.5096	51.0619	58.4305	63.8357	72.6754	72.6754	(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	73.6142	64.3731	67.3414	57.6080	54.5698	47.8692	46.6786	49.5096	51.0619	58.4305	63.8357	72.6754	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		707.5676	(64)
Electric shower(s)	42.1051	37.5160	40.9661	39.0934	39.8270	37.9911	39.2575	39.8270	39.0934	40.9661	40.1958	42.1051	(64a)
												478.9436	(64a)
Heat gains from water heating, kWh/month													
28.9298	25.4723	27.0769	24.1754	23.5992	21.4651	21.4840	22.3342	22.5388	24.8492	26.0079	28.6951	28.6951	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	84.5639	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
90.4791	100.1733	90.4791	93.4951	90.4791	93.4951	90.4791	93.4951	90.4791	93.4951	90.4791	93.4951	90.4791	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
147.3378	148.8667	145.0139	136.8118	126.4581	116.7270	110.2261	108.6972	112.5500	120.7521	131.1059	140.8369	140.8369	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	31.4564	(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)													
-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	(71)
Water heating gains (Table 5)													
38.8842	37.9052	36.3936	33.5769	31.7194	29.8126	28.8763	30.0190	31.3039	33.3994	36.1220	38.5687	38.5687	(72)
Total internal gains	325.0704	335.3145	320.2559	312.2530	297.0258	288.4039	277.9508	277.5645	285.7182	292.9999	309.0922	318.2540	(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

Southwest					3.8200	36.7938	0.6300	0.7000	0.7700			42.9547 (79)

Solar gains	42.9547	73.1677	100.1112	124.0426	138.9381	137.9333	132.9825	121.8698	108.3992	80.8659	51.4498	36.7602 (83)
Total gains	368.0250	408.4821	420.3671	436.2956	435.9638	426.3373	410.9332	399.4343	394.1175	373.8657	360.5420	355.0142 (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	48.0402	48.2012	48.3600	49.1202	49.2651	49.9510	49.9510	50.0802	49.6846	49.2651	48.9729	48.6710	
alpha	4.2027	4.2134	4.2240	4.2747	4.2843	4.3301	4.3301	4.3387	4.3123	4.2843	4.2649	4.2447	
util living area	0.9779	0.9644	0.9455	0.8954	0.8032	0.6340	0.4748	0.5061	0.7113	0.8958	0.9610	0.9806	(86)
MIT	19.6656	19.8669	20.1188	20.4742	20.7560	20.9365	20.9855	20.9808	20.8915	20.5494	20.0701	19.6420	(87)
Th 2	20.1310	20.1336	20.1362	20.1485	20.1508	20.1615	20.1615	20.1635	20.1574	20.1508	20.1461	20.1413	(88)
util rest of house													

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MIT 2	0.9735	0.9575	0.9344	0.8736	0.7618	0.5655	0.3892	0.4204	0.6479	0.8701	0.9522	0.9768 (89)
Living area fraction	18.9193	19.1188	19.3669	19.7160	19.9727	20.1258	20.1560	20.1558	20.0911	19.7926	19.3301	18.9040 (90)
MIT	19.2922	19.4926	19.7425	20.0948	20.3640	20.5308	20.5704	20.5680	fLA = Living area / (4) =			0.4996 (91)
Temperature adjustment									20.4910	20.1707	19.6998	19.2727 (92)
adjusted MIT	19.2922	19.4926	19.7425	20.0948	20.3640	20.5308	20.5704	20.5680	20.4910	20.1707	19.6998	19.2727 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9682	0.9513	0.9285	0.8721	0.7729	0.5966	0.4315	0.4626	0.6742	0.8707	0.9467	0.9719 (94)	
Useful gains	356.3127	388.5836	390.3047	380.4826	336.9658	254.3698	177.3304	184.7780	265.7085	325.5364	341.3245	345.0273 (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	707.5611	686.4014	620.8535	516.7255	398.7360	269.2000	180.2174	188.6956	291.6436	440.4614	583.3264	702.1406 (97)	
Space heating kWh	261.3288	200.1336	171.5283	98.0948	45.9570	0.0000	0.0000	0.0000	0.0000	85.5042	174.2414	265.6923 (98a)	
Space heating requirement - total per year (kWh/year)												1302.4804	
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	261.3288	200.1336	171.5283	98.0948	45.9570	0.0000	0.0000	0.0000	0.0000	85.5042	174.2414	265.6923 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1302.4804	
Space heating per m2												(98c) / (4) =	26.0288 (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	426.6654	335.8855	344.0741	0.0000	0.0000	0.0000	0.0000 (100)	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8366	0.9025	0.8884	0.0000	0.0000	0.0000	0.0000 (101)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	356.9349	303.1229	305.6820	0.0000	0.0000	0.0000	0.0000 (102)	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	453.8339	438.0456	426.4824	0.0000	0.0000	0.0000	0.0000 (103)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	69.7673	100.3825	89.8754	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	17.4418	25.0956	22.4689	0.0000	0.0000	0.0000	0.0000 (107)	
Space cooling requirement												65.0063 (107)	
Energy for space heating												26.0288 (99)	
Energy for space cooling												1.2991 (108)	
Total												27.3279 (109)	
Fabric Energy Efficiency (TFEE)												27.3 (109)	

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)

CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

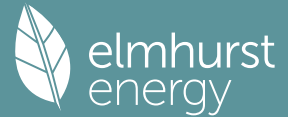
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	50.0400 (1b)	x 2.4600 (2b)	= 123.0984 (1b) - (3b)	
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0400			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	123.0984 (5)

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	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	3.8800	(17)
Infiltration rate	0.1940	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1649 (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)	

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Adj infilt rate	0.2102	0.2061	0.2020	0.1814	0.1773	0.1567	0.1567	0.1525	0.1649	0.1773	0.1855	0.1938 (22b)
Mechanical extract ventilation - centralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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								
Window			3.8200	1.2357	4.7205			(27)
Corridor Door			2.0800	1.0000	2.0800			(26)
EW Brick AAC018/019	15.1300	3.8200	11.3100	0.2600	2.9406	60.0000	678.6000	(29a)
E-WM-30 Corridor Wall	22.0400	2.0800	19.9600	0.2100	4.1916	52.3000	1043.9080	(29a)
PR 500mm MW044	50.0400		50.0400	0.0900	4.5036	9.0000	450.3600	(30)
Total net area of external elements Aum(A, m2)			87.2100					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	18.4363		(33)
Main dwelling								
Party Wall			34.7800	0.0000	0.0000	45.0000	1565.0999	(32)
Party Floor			50.0400			70.0000	3502.8000	(32d)
GF Timber			102.3800			9.0000	921.4200	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
(28)...(30) + (32) + (32a)...(32e) = 8162.1880 (34)
163.1133 (35)

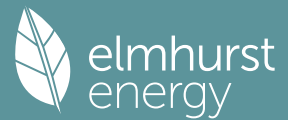
List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	1.8200	0.0370	0.0673	
E2 Other lintels (including other steel lintels)	8.2700	0.0140	0.1158	
E4 Jamb	6.1500	0.0390	0.2399	
E7 Party floor between dwellings (in blocks of flats)	4.9200	0.0350	0.1722	
E16 Corner (normal)	14.1400	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	1.0200	0.0270	0.0275	
E2 Other lintels (including other steel lintels)	4.2000	0.0850	0.3570	
E4 Jamb	8.9600	0.0330	0.2957	
E7 Party floor between dwellings (in blocks of flats)	7.3800	0.0380	0.2804	
E25 Staggered party wall between dwellings	2.4600	0.0000	0.0000	
E17 Corner (inverted - internal area greater than external area)	2.4600	0.0390	0.0959	
E18 Party wall between dwellings	6.1500	0.0360	0.2214	
E10 Eaves (insulation at ceiling level)	8.9600	0.0280	0.2509	
E12 Gable (insulation at ceiling level)	14.1400	0.0330	0.4666	
P4 Party wall - Roof (insulation at ceiling level)				2.5907 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.0000
Point Thermal bridges				(33a) =
Total fabric heat loss				(33) + (36) + (36a) = 21.0270 (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	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	(38)
Average = Sum(39)m / 12 =	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	(39)
	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	(39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	(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													1.6913 (42)
Hot water usage for mixer showers													
52.5767	51.7865	50.6352	48.4322	46.8065	44.9936	43.9631	45.1057	46.3583	48.3049	50.5551	52.3752	52.3752	(42a)
Hot water usage for baths													
22.7329	22.3953	21.9199	21.0433	20.3869	19.6590	19.2659	19.7380	20.2520	21.0308	21.9255	22.6561	22.6561	(42b)
Hot water usage for other uses													
31.9504	30.7886	29.6267	28.4649	27.3031	26.1412	26.1412	27.3031	28.4649	29.6267	30.7886	31.9504	31.9504	(42c)
Average daily hot water use (litres/day)													98.5967 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.2600	104.9704	102.1818	97.9404	94.4964	90.7938	89.3702	92.1467	95.0752	98.9624	103.2692	106.9817	(44)
Energy conte	169.8736	149.4764	157.0496	134.0755	127.2104	111.6416	108.0855	114.0969	117.2372	134.2911	147.1259	167.5075	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	25.4810	22.4215	23.5574	20.1113	19.0816	16.7462	16.2128	17.1145	17.5856	20.1437	22.0689	25.1261	(46)
Water storage loss:													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(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													
196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589	194.4589	(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													
196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589	194.4589	(64)
Total per year (kWh/year) = Sum(64)m =													1955.0020 (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	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													
56.4830	49.7009	52.2190	44.5801	42.2975	37.1208	35.9384	37.9372	38.9814	44.6518	48.9193	55.6962	55.6962	(65)

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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	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.2216	17.9607	14.6066	11.0581	8.2661	6.9786	7.5406	9.8016	13.1556	16.7041	19.4962	20.7837	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.9072	222.1892	216.4387	204.1967	188.7434	174.2195	164.5166	162.2346	167.9851	180.2271	195.6804	210.2043	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	(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)	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	(71)
Water heating gains (Table 5)	75.9180	73.9597	70.1868	61.9168	56.8514	51.5567	48.3043	50.9909	54.1408	60.0158	67.9435	74.8605	(72)
Total internal gains	396.7113	394.7741	381.8967	357.8362	334.5254	313.4193	301.0260	303.6916	315.9460	337.6115	363.7846	386.5130	(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	

Southwest				3.8200		36.7938	0.4600		0.0000		0.7700		49.7837 (79)

Solar gains	49.7837	84.8000	116.0271	143.7632	161.0267	159.8623	154.1243	141.2449	125.6328	93.7221	59.6294	42.6045	(83)
Total gains	446.4950	479.5741	497.9237	501.5994	495.5522	473.2815	455.1503	444.9365	441.5788	431.3336	423.4140	429.1175	(84)

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)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	
alpha	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	
util living area	0.9493	0.9280	0.8902	0.8221	0.7058	0.5419	0.3963	0.4227	0.6133	0.8219	0.9228	0.9565	(86)
MIT	20.1431	20.2910	20.4978	20.7175	20.8885	20.9740	20.9951	20.9933	20.9537	20.7575	20.4088	20.0868	(87)
Th 2	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	(88)
util rest of house	0.9407	0.9163	0.8725	0.7939	0.6623	0.4825	0.3285	0.3540	0.5547	0.7887	0.9083	0.9490	(89)
MIT 2	19.2466	19.4290	19.6814	19.9412	20.1300	20.2125	20.2284	20.2273	20.1957	19.9918	19.5780	19.1769	(90)
Living area fraction	19.6945	19.8596	20.0893	20.3291	20.5089	20.5930	20.6114	20.6100	20.5744	20.3743	19.9931	19.6315	(91)
MIT	19.6945	19.8596	20.0893	20.3291	20.5089	20.5930	20.6114	20.6100	20.5744	20.3743	19.9931	19.6315	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6945	19.8596	20.0893	20.3291	20.5089	20.5930	20.6114	20.6100	20.5744	20.3743	19.9931	19.6315	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9338	0.9099	0.8690	0.7977	0.6786	0.5109	0.3622	0.3881	0.5815	0.7953	0.9033	0.9422	(94)
Useful gains	416.9279	436.3623	432.6823	400.1323	336.2682	241.7909	164.8648	172.6876	256.7569	343.0380	382.4645	404.3137	(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	636.3810	618.4048	561.7572	472.4577	364.1461	247.7387	165.8252	174.0335	267.6388	404.0536	532.9765	637.9105	(97)
Space heating kWh	163.2731	122.3326	96.0317	52.0743	20.7412	0.0000	0.0000	0.0000	0.0000	45.3956	108.3687	173.7960	(98a)
Space heating requirement - total per year (kWh/year)												782.0132	
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	163.2731	122.3326	96.0317	52.0743	20.7412	0.0000	0.0000	0.0000	0.0000	45.3956	108.3687	173.7960	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												782.0132	
Space heating per m ²										(98c) / (4) =		15.6278	(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)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	163.2731	122.3326	96.0317	52.0743	20.7412	0.0000	0.0000	0.0000	0.0000	45.3956	108.3687	173.7960	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	163.2731	122.3326	96.0317	52.0743	20.7412	0.0000	0.0000	0.0000	0.0000	45.3956	108.3687	173.7960	(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)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													

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Water heating requirement	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589 (64)
Efficiency of water heater												324.5200 (216)
(217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200 (217)
Fuel for water heating, kWh/month	60.6511	53.5621	56.6994	49.3521	47.5046	42.4392	41.6113	43.4637	44.1634	49.6864	53.3736	59.9220 (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	2.8571	2.5806	2.8571	2.7650	2.8571	2.7650	2.8571	2.8571	2.7650	2.8571	2.7650	2.8571 (231)
Lighting	17.6999	14.1995	12.7851	9.3669	7.2353	5.9113	6.6002	8.5793	11.1436	14.6210	16.5144	18.1918 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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												782.0132 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												324.5200
Water heating fuel used												602.4288 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2240)												
mechanical ventilation fans (SFP = 0.2240)												33.6403 (230a)
Total electricity for the above, kWh/year												33.6403 (231)
Electricity for lighting (calculated in Appendix L)												142.8483 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (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												1560.9306 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	782.0132	16.4900	128.9540 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	602.4288	16.4900	99.3405 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	33.6403	16.4900	5.5473 (249)
Energy for lighting	142.8483	16.4900	23.5557 (250)
Additional standing charges			0.0000 (251)
Total energy cost			257.3974 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.9750 (257)
SAP value		84.1954
SAP rating (Section 12)		84 (258)
SAP band		B

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	782.0132	0.1559	121.9303 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	602.4288	0.1411	85.0105 (264)
Space and water heating			206.9408 (265)
Pumps, fans and electric keep-hot	33.6403	0.1387	4.6663 (267)
Energy for lighting	142.8483	0.1443	20.6174 (268)
Total CO2, kg/year			232.2245 (272)
CO2 emissions per m2			4.6400 (273)
EI value			96.7258
EI rating			97 (274)
EI band			A

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1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.0400 (1b)	x 2.4600 (2b)	= 123.0984 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 123.0984 (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		3.8800	(17)
Infiltration rate		0.1940	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1649	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000 (22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000 (22a)
Adj infilt rate	0.1814	0.1690	0.1690	0.1608	0.1608	0.1402	0.1402	0.1360	0.1402	0.1567	0.1525	0.1649 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Window			3.8200	1.2357	4.7205		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
EW Brick AAC018/019	15.1300	3.8200	11.3100	0.2600	2.9406	60.0000	678.6000 (29a)
E-WM-30 Corridor Wall	22.0400	2.0800	19.9600	0.2100	4.1916	52.3000	1043.9080 (29a)
PR 500mm MW044	50.0400		50.0400	0.0900	4.5036	9.0000	450.3600 (30)
Total net area of external elements Aum(A, m ²)			87.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.4363		(33)
Main dwelling							
Party Wall			34.7800	0.0000	0.0000	45.0000	1565.0999 (32)
Party Floor			50.0400			70.0000	3502.8000 (32d)
GF Timber			102.3800			9.0000	921.4200 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	8162.1880 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		163.1133 (35)

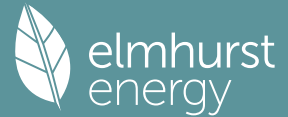
List of Thermal Bridges	Length	Psi-value	Total
K1 Element	1.8200	0.0370	0.0673
E2 Other lintels (including other steel lintels)	8.2700	0.0140	0.1158
E4 Jamb	6.1500	0.0390	0.2399
E7 Party floor between dwellings (in blocks of flats)	4.9200	0.0350	0.1722
E16 Corner (normal)	14.1400	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	1.0200	0.0270	0.0275
E2 Other lintels (including other steel lintels)	4.2000	0.0850	0.3570
E4 Jamb	8.9600	0.0330	0.2957
E7 Party floor between dwellings (in blocks of flats)	7.3800	0.0380	0.2804
E25 Staggered party wall between dwellings	2.4600	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	2.4600	0.0390	0.0959
E18 Party wall between dwellings	6.1500	0.0360	0.2214
E10 Eaves (insulation at ceiling level)	8.9600	0.0280	0.2509
E12 Gable (insulation at ceiling level)	14.1400	0.0330	0.4666
P4 Party wall - Roof (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			2.5907 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		21.0270 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112 (38)
Heat transfer coeff	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382 (39)
Average = Sum(39)m / 12 =												41.3382
HLP	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261 (40)
HLP (average)												0.8261
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6913 (42)
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Hot water usage for mixer showers	52.5767	51.7865	50.6352	48.4322	46.8065	44.9936	43.9631	45.1057	46.3583	48.3049	50.5551	52.3752 (42a)
Hot water usage for baths	22.7329	22.3953	21.9199	21.0433	20.3869	19.6590	19.2659	19.7380	20.2520	21.0308	21.9255	22.6561 (42b)
Hot water usage for other uses	31.9504	30.7886	29.6267	28.4649	27.3031	26.1412	26.1412	27.3031	28.4649	29.6267	30.7886	31.9504 (42c)
Average daily hot water use (litres/day)												98.5967 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.2600	104.9704	102.1818	97.9404	94.4964	90.7938	89.3702	92.1467	95.0752	98.9624	103.2692	106.9817	(44)
Energy content (annual)	169.8736	149.4764	157.0496	134.0755	127.2104	111.6416	108.0855	114.0969	117.2372	134.2911	147.1259	167.5075	(45)
Distribution loss (46)m = 0.15 x (45)m	25.4810	22.4215	23.5574	20.1113	19.0816	16.7462	16.2128	17.1145	17.5856	20.1437	22.0689	25.1261	(46)
Water storage loss:													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(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	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589	(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	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589	(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	56.4830	49.7009	52.2190	44.5801	42.2975	37.1208	35.9384	37.9372	38.9814	44.6518	48.9193	55.6962	(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	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.2216	17.9607	14.6066	11.0581	8.2661	6.9786	7.5406	9.8016	13.1556	16.7041	19.4962	20.7837	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.9072	222.1892	216.4387	204.1967	188.7434	174.2195	164.5166	162.2346	167.9851	180.2271	195.6804	210.2043	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	(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)	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	(71)
Water heating gains (Table 5)	75.9180	73.9597	70.1868	61.9168	56.8514	51.5567	48.3043	50.9909	54.1408	60.0158	67.9435	74.8605	(72)
Total internal gains	396.7113	394.7741	381.8967	357.8362	334.5254	313.4193	301.0260	303.6916	315.9460	337.6115	363.7846	386.5130	(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			
-----				-----				-----		-----		-----			
Southwest				3.8200				42.9509				0.4600			
												0.0000		0.7700	
-----				-----				-----				-----		-----	
Solar gains	58.1145	86.4777	117.7143	148.9848	163.6396	172.3779	164.3298	152.6878	136.1481	102.6223	68.5579	50.0351	(83)		
Total gains	454.8258	481.2517	499.6110	506.8210	498.1650	485.7971	465.3558	456.3794	452.0941	440.2338	432.3425	436.5481	(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	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	
Feb	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	
util living area	0.9392	0.9181	0.8706	0.7881	0.6458	0.4528	0.3012	0.3249	0.5487	0.7780	0.9040	0.9468	(86)
MIT	20.2335	20.3605	20.5776	20.7823	20.9312	20.9895	20.9988	20.9982	20.9735	20.8253	20.5022	20.1890	(87)
Th 2	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	(88)
util rest of house	0.9289	0.9047	0.8498	0.7555	0.5967	0.3909	0.2335	0.2561	0.4868	0.7386	0.8862	0.9376	(89)
MIT 2	19.3591	19.5148	19.7771	20.0144	20.1727	20.2245	20.2304	20.2301	20.2125	20.0662	19.6914	19.3047	(90)
Living area fraction	19.7959	19.9373	20.1770	20.3980	20.5516	20.6067	20.6143	20.6139	20.5927	20.4454	20.0965	19.7465	(91)
MIT	19.7959	19.9373	20.1770	20.3980	20.5516	20.6067	20.6143	20.6139	20.5927	20.4454	20.0965	19.7465	(92)
Temperature adjustment	19.7959	19.9373	20.1770	20.3980	20.5516	20.6067	20.6143	20.6139	20.5927	20.4454	20.0965	19.7465	(93)
adjusted MIT	19.7959	19.9373	20.1770	20.3980	20.5516	20.6067	20.6143	20.6139	20.5927	20.4454	20.0965	19.7465	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	419.4485	432.6601	423.8013	386.6587	307.6927	204.7139	124.4074	132.5552	233.4549	330.2380	381.6431	406.3547	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)

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Heat loss rate W	615.7716	596.8132	532.3143	442.2384	324.5733	206.9672	124.6050	132.8563	239.4608	373.9212	508.3152	613.7291 (97)
Space heating kWh	146.0644	110.3109	80.7337	40.0174	12.5592	0.0000	0.0000	0.0000	0.0000	32.5003	91.2039	154.2866 (98a)
Space heating requirement - total per year (kWh/year)												667.6763
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	146.0644	110.3109	80.7337	40.0174	12.5592	0.0000	0.0000	0.0000	0.0000	32.5003	91.2039	154.2866 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												667.6763
Space heating per m2										(98c) / (4) =		13.3429 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (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	146.0644	110.3109	80.7337	40.0174	12.5592	0.0000	0.0000	0.0000	0.0000	32.5003	91.2039	154.2866 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	146.0644	110.3109	80.7337	40.0174	12.5592	0.0000	0.0000	0.0000	0.0000	32.5003	91.2039	154.2866 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589 (64)
Efficiency of water heater (217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200 (216)
Fuel for water heating, kWh/month	60.6511	53.5621	56.6994	49.3521	47.5046	42.4392	41.6113	43.4637	44.1634	49.6864	53.3736	59.9220 (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	2.8571	2.5806	2.8571	2.7650	2.8571	2.7650	2.8571	2.7650	2.8571	2.7650	2.8571	2.8571 (231)
Lighting	17.6999	14.1995	12.7851	9.3669	7.2353	5.9113	6.6002	8.5793	11.1436	14.6210	16.5144	18.1918 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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												667.6763 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												324.5200
Water heating fuel used												602.4288 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.2240)												
mechanical ventilation fans (SFP = 0.2240)												33.6403 (230a)
Total electricity for the above, kWh/year												33.6403 (231)
Electricity for lighting (calculated in Appendix L)												142.8483 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (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												1446.5936 (238)

10a. Fuel costs - using BEDF prices (567)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	667.6763	26.0600	173.9964 (240)
Space heating - main system 2	0.0000	26.0600	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	602.4288	26.0600	156.9929 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	33.6403	26.0600	8.7667 (249)
Energy for lighting	142.8483	26.0600	37.2263 (250)
Additional standing charges			0.0000 (251)
Total energy cost			376.9823 (255)

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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	667.6763	0.1566	104.5313 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	602.4288	0.1411	85.0105 (264)
Space and water heating			189.5418 (265)
Pumps, fans and electric keep-hot	33.6403	0.1387	4.6663 (267)
Energy for lighting	142.8483	0.1443	20.6174 (268)
Total CO2, kg/year			214.8256 (272)

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	667.6763	1.5796	1054.6646 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	602.4288	1.5218	916.7732 (278)
Space and water heating			1971.4378 (279)
Pumps, fans and electric keep-hot	33.6403	1.5128	50.8911 (281)
Energy for lighting	142.8483	1.5338	219.1054 (282)
Total Primary energy kWh/year			2241.4343 (286)

SAP 10 EPC IMPROVEMENTS

Plot 048

Current energy efficiency rating: B 84
Current environmental impact rating: A 97

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact

Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 84
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 567 TEST (07 Mar 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current £377	Potential £377	Saving £0
Electricity			
Space heating	£183	£183	£0
Water heating	£157	£157	£0
Lighting	£37	£37	£0
Total cost of fuels	£377	£377	£0
Total cost of uses	£377	£377	£0
Delivered energy	29 kWh/m²	29 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	4 kg/m²	4 kg/m²	0 kg/m²
Primary energy	45 kWh/m²	45 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

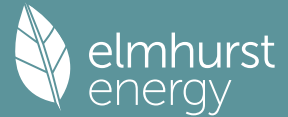
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0400 (1b)	x 2.4600 (2b)	= 123.0984 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 123.0984 (5)

2. Ventilation rate

m3 per hour

Full SAP Calculation Printout



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		3.8800	(17)
Infiltration rate		0.1940	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1649	(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)
Mechanical extract ventilation - centralised	0.2102	0.2061	0.2020	0.1814	0.1773	0.1567	0.1567	0.1525	0.1649	0.1773	0.1855	0.1938	(22b)
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

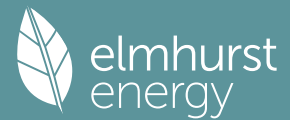
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			3.8200	1.2357	4.7205			(27)
Corridor Door			2.0800	1.0000	2.0800			(26)
EW Brick AAC018/019	15.1300	3.8200	11.3100	0.2600	2.9406	60.0000	678.6000	(29a)
E-WM-30 Corridor Wall	22.0400	2.0800	19.9600	0.2100	4.1916	52.3000	1043.9080	(29a)
PR 500mm MW044	50.0400		50.0400	0.0900	4.5036	9.0000	450.3600	(30)
Total net area of external elements Aum(A, m2)			87.2100					(31)
Fabric heat loss, W/K = Sum (A x U)					18.4363			(33)
Main dwelling								
Party Wall			34.7800	0.0000	0.0000	45.0000	1565.0999	(32)
Party Floor			50.0400			70.0000	3502.8000	(32d)
GF Timber			102.3800			9.0000	921.4200	(32c)
Heat capacity Cm = Sum(A x k)							8162.1880	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							163.1133	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				1.8200	0.0370		0.0673	
E4 Jamb				8.2700	0.0140		0.1158	
E7 Party floor between dwellings (in blocks of flats)				6.1500	0.0390		0.2399	
E16 Corner (normal)				4.9200	0.0350		0.1722	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1400	0.0000		0.0000	
E2 Other lintels (including other steel lintels)				1.0200	0.0270		0.0275	
E4 Jamb				4.2000	0.0850		0.3570	
E7 Party floor between dwellings (in blocks of flats)				8.9600	0.0330		0.2957	
E25 Staggered party wall between dwellings				7.3800	0.0380		0.2804	
E17 Corner (inverted - internal area greater than external area)				2.4600	0.0000		0.0000	
E18 Party wall between dwellings				2.4600	0.0390		0.0959	
E10 Eaves (insulation at ceiling level)				6.1500	0.0360		0.2214	
E12 Gable (insulation at ceiling level)				8.9600	0.0280		0.2509	
P4 Party wall - Roof (insulation at ceiling level)				14.1400	0.0330		0.4666	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							2.5907	(36)
Point Thermal bridges							0.0000	(36a)
Total fabric heat loss							21.0270	(37)
							(33) + (36) + (36a) =	

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	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	(38)
Average = Sum(39)m / 12 =	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	(39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	(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													1.6913 (42)
Hot water usage for mixer showers	52.5767	51.7865	50.6352	48.4322	46.8065	44.9936	43.9631	45.1057	46.3583	48.3049	50.5551	52.3752	(42a)
Hot water usage for baths	22.7329	22.3953	21.9199	21.0433	20.3869	19.6590	19.2659	19.7380	20.2520	21.0308	21.9255	22.6561	(42b)
Hot water usage for other uses	31.9504	30.7886	29.6267	28.4649	27.3031	26.1412	26.1412	27.3031	28.4649	29.6267	30.7886	31.9504	(42c)
Average daily hot water use (litres/day)													98.5967 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	107.2600	104.9704	102.1818	97.9404	94.4964	90.7938	89.3702	92.1467	95.0752	98.9624	103.2692	106.9817	(44)
Energy content (annual)	169.8736	149.4764	157.0496	134.0755	127.2104	111.6416	108.0855	114.0969	117.2372	134.2911	147.1259	167.5075	(45)
Distribution loss (46)m = 0.15 x (45)m	25.4810	22.4215	23.5574	20.1113	19.0816	16.7462	16.2128	17.1145	17.5856	20.1437	22.0689	25.1261	(46)
Water storage loss:													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)

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Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(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	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589	(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	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589	(64)
												1955.0020	(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)
												0.0000	(64a)
Heat gains from water heating, kWh/month	56.4830	49.7009	52.2190	44.5801	42.2975	37.1208	35.9384	37.9372	38.9814	44.6518	48.9193	55.6962	(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	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.2216	17.9607	14.6066	11.0581	8.2661	6.9786	7.5406	9.8016	13.1556	16.7041	19.4962	20.7837	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.9072	222.1892	216.4387	204.1967	188.7434	174.2195	164.5166	162.2346	167.9851	180.2271	195.6804	210.2043	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	(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)	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	(71)
Water heating gains (Table 5)	75.9180	73.9597	70.1868	61.9168	56.8514	51.5567	48.3043	50.9909	54.1408	60.0158	67.9435	74.8605	(72)
Total internal gains	396.7113	394.7741	381.8967	357.8362	334.5254	313.4193	301.0260	303.6916	315.9460	337.6115	363.7846	386.5130	(73)

6. Solar gains

[Jan]													
				Area m2	Solar flux Table 6a		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
				3.8200	36.7938		0.4600		0.0000		0.7700		49.7837 (79)
Solar gains	49.7837	84.8000	116.0271	143.7632	161.0267	159.8623	154.1243	141.2449	125.6328	93.7221	59.6294	42.6045	(83)
Total gains	446.4950	479.5741	497.9237	501.5994	495.5522	473.2815	455.1503	444.9365	441.5788	431.3336	423.4140	429.1175	(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	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	
alpha	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	
util living area	0.9493	0.9280	0.8902	0.8221	0.7058	0.5419	0.3963	0.4227	0.6133	0.8219	0.9228	0.9565	(86)
MIT	20.1431	20.2910	20.4978	20.7175	20.8885	20.9740	20.9951	20.9933	20.9537	20.7575	20.4088	20.0868	(87)
Th 2	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	(88)
util rest of house	0.9407	0.9163	0.8725	0.7939	0.6623	0.4825	0.3285	0.3540	0.5547	0.7887	0.9083	0.9490	(89)
MIT 2	19.2466	19.4290	19.6814	19.9412	20.1300	20.2125	20.2284	20.2273	20.1957	19.9918	19.5780	19.1769	(90)
Living area fraction	19.6945	19.8596	20.0893	20.3291	20.5089	20.5930	20.6114	20.6100	20.5744	20.3743	19.9931	19.6315	(91)
MIT	19.6945	19.8596	20.0893	20.3291	20.5089	20.5930	20.6114	20.6100	20.5744	20.3743	19.9931	19.6315	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6945	19.8596	20.0893	20.3291	20.5089	20.5930	20.6114	20.6100	20.5744	20.3743	19.9931	19.6315	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9338	0.9099	0.8690	0.7977	0.6786	0.5109	0.3622	0.3881	0.5815	0.7953	0.9033	0.9422	(94)
Ext temp.	416.9279	436.3623	432.6823	400.1323	336.2682	241.7909	164.8648	172.6876	256.7569	343.0380	382.4645	404.3137	(95)
Heat loss rate W	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)
Space heating kWh	636.3810	618.4048	561.7572	472.4577	364.1461	247.7387	165.8252	174.0335	267.6388	404.0536	532.9765	637.9105	(97)
Space heating requirement - total per year (kWh/year)	163.2731	122.3326	96.0317	52.0743	20.7412	0.0000	0.0000	0.0000	0.0000	45.3956	108.3687	173.7960	(98a)
Solar heating kWh												782.0132	
Solar heating contribution - total per year (kWh/year)	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)
Space heating kWh	163.2731	122.3326	96.0317	52.0743	20.7412	0.0000	0.0000	0.0000	0.0000	45.3956	108.3687	173.7960	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												782.0132	
Space heating per m2												15.6278	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

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Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (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	163.2731	122.3326	96.0317	52.0743	20.7412	0.0000	0.0000	0.0000	0.0000	45.3956	108.3687	173.7960	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	163.2731	122.3326	96.0317	52.0743	20.7412	0.0000	0.0000	0.0000	0.0000	45.3956	108.3687	173.7960	(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)
Space heating fuel used, main system 2													0.0000 (213)
Water heating													
Water heating requirement	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589	(64)
Efficiency of water heater (217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(216)
Fuel for water heating, kWh/month	60.6511	53.5621	56.6994	49.3521	47.5046	42.4392	41.6113	43.4637	44.1634	49.6864	53.3736	59.9220	(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	2.8571	2.5806	2.8571	2.7650	2.8571	2.7650	2.8571	2.8571	2.7650	2.8571	2.7650	2.8571	(231)
Lighting	17.6999	14.1995	12.7851	9.3669	7.2353	5.9113	6.6002	8.5793	11.1436	14.6210	16.5144	18.1918	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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													782.0132 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													324.5200
Water heating fuel used													602.4288 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.2240)													
mechanical ventilation fans (SFP = 0.2240)													33.6403 (230a)
Total electricity for the above, kWh/year													33.6403 (231)
Electricity for lighting (calculated in Appendix L)													142.8483 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (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													1560.9306 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	782.0132	16.4900	128.9540	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	602.4288	16.4900	99.3405	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	33.6403	16.4900	5.5473	(249)
Energy for lighting	142.8483	16.4900	23.5557	(250)
Additional standing charges			0.0000	(251)
Total energy cost			257.3974	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.9750 (257)
SAP value	84.1954	
SAP rating (Section 12)	84	(258)
SAP band	B	

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	782.0132	0.1559	121.9303	(261)

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Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	602.4288	0.1411	85.0105 (264)
Space and water heating			206.9408 (265)
Pumps, fans and electric keep-hot	33.6403	0.1387	4.6663 (267)
Energy for lighting	142.8483	0.1443	20.6174 (268)
Total CO2, kg/year			232.2245 (272)
CO2 emissions per m2			4.6400 (273)
EI value			96.7258
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.0400 (1b)	x 2.4600 (2b)	= 123.0984 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 123.0984 (5)

2. Ventilation rate

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	3.8800	(17)
Infiltration rate	0.1940	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1649 (21)
Wind speed	Jan 4.4000 Feb 4.1000 Mar 4.1000 Apr 3.9000 May 3.9000 Jun 3.4000 Jul 3.4000 Aug 3.3000 Sep 3.4000 Oct 3.8000 Nov 3.7000 Dec 4.0000	(22)
Wind factor	1.1000 1.0250 1.0250 0.9750 0.9750 0.8500 0.8500 0.8250 0.8500 0.9500 0.9250 1.0000	(22a)
Adj infilt rate	0.1814 0.1690 0.1690 0.1608 0.1608 0.1402 0.1402 0.1360 0.1402 0.1567 0.1525 0.1649	(22b)
Mechanical extract ventilation - centralised		
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)
Effective ac	0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	(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							
Window			3.8200	1.2357	4.7205		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
EW Brick AAC018/019	15.1300	3.8200	11.3100	0.2600	2.9406	60.0000	678.6000 (29a)
E-WM-30 Corridor Wall	22.0400	2.0800	19.9600	0.2100	4.1916	52.3000	1043.9080 (29a)
PR 500mm MW044	50.0400		50.0400	0.0900	4.5036	9.0000	450.3600 (30)
Total net area of external elements Aum(A, m2)			87.2100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.4363		(33)
Main dwelling							
Party Wall			34.7800	0.0000	0.0000	45.0000	1565.0999 (32)
Party Floor			50.0400			70.0000	3502.8000 (32d)
GF Timber			102.3800			9.0000	921.4200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	8162.1880 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							163.1133 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				1.8200	0.0370	0.0673	
E4 Jamb				8.2700	0.0140	0.1158	
E7 Party floor between dwellings (in blocks of flats)				6.1500	0.0390	0.2399	
E16 Corner (normal)				4.9200	0.0350	0.1722	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1400	0.0000	0.0000	
E2 Other lintels (including other steel lintels)				1.0200	0.0270	0.0275	
E4 Jamb				4.2000	0.0850	0.3570	
E7 Party floor between dwellings (in blocks of flats)				8.9600	0.0330	0.2957	
E25 Staggered party wall between dwellings				7.3800	0.0380	0.2804	
E17 Corner (inverted - internal area greater than external area)				2.4600	0.0000	0.0000	
E18 Party wall between dwellings				2.4600	0.0390	0.0959	
E10 Eaves (insulation at ceiling level)				6.1500	0.0360	0.2214	

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E12 Gable (insulation at ceiling level)					8.9600		0.0280		0.2509				
P4 Party wall - Roof (insulation at ceiling level)					14.1400		0.0330		0.4666				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											2.5907 (36)		
Point Thermal bridges											0.0000		
Total fabric heat loss							(33) + (36) + (36a) =				21.0270 (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	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	20.3112	(38)
Average = Sum(39)m / 12 =	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	41.3382	(39)
												41.3382	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	0.8261	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												0.8261	
												31	

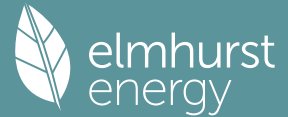
Water heating energy requirements (kWh/year)												
Assumed occupancy												1.6913 (42)
Hot water usage for mixer showers	52.5767	51.7865	50.6352	48.4322	46.8065	44.9936	43.9631	45.1057	46.3583	48.3049	50.5551	52.3752 (42a)
Hot water usage for baths	22.7329	22.3953	21.9199	21.0433	20.3869	19.6590	19.2659	19.7380	20.2520	21.0308	21.9255	22.6561 (42b)
Hot water usage for other uses	31.9504	30.7886	29.6267	28.4649	27.3031	26.1412	26.1412	27.3031	28.4649	29.6267	30.7886	31.9504 (42c)
Average daily hot water use (litres/day)												98.5967 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	107.2600	104.9704	102.1818	97.9404	94.4964	90.7938	89.3702	92.1467	95.0752	98.9624	103.2692	106.9817 (44)
Energy content (annual)	169.8736	149.4764	157.0496	134.0755	127.2104	111.6416	108.0855	114.0969	117.2372	134.2911	147.1259	167.5075 (45)
Distribution loss (46)m = 0.15 x (45)m												1637.6710
	25.4810	22.4215	23.5574	20.1113	19.0816	16.7462	16.2128	17.1145	17.5856	20.1437	22.0689	25.1261 (46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (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												
	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589 (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	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589 (64)
Total per year (kWh/year) = Sum(64)m =												1955.0020 (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												
	56.4830	49.7009	52.2190	44.5801	42.2975	37.1208	35.9384	37.9372	38.9814	44.6518	48.9193	55.6962 (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	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767	101.4767 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.2216	17.9607	14.6066	11.0581	8.2661	6.9786	7.5406	9.8016	13.1556	16.7041	19.4962	20.7837 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.9072	222.1892	216.4387	204.1967	188.7434	174.2195	164.5166	162.2346	167.9851	180.2271	195.6804	210.2043 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390	46.8390 (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)	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511	-67.6511 (71)
Water heating gains (Table 5)	75.9180	73.9597	70.1868	61.9168	56.8514	51.5567	48.3043	50.9909	54.1408	60.0158	67.9435	74.8605 (72)
Total internal gains	396.7113	394.7741	381.8967	357.8362	334.5254	313.4193	301.0260	303.6916	315.9460	337.6115	363.7846	386.5130 (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							
Southwest	3.8200	42.9509	0.4600	0.0000	0.7700	58.1145 (79)						
Solar gains	58.1145	86.4777	117.7143	148.9848	163.6396	172.3779	164.3298	152.6878	136.1481	102.6223	68.5579	50.0351 (83)
Total gains	454.8258	481.2517	499.6110	506.8210	498.1650	485.7971	465.3558	456.3794	452.0941	440.2338	432.3425	436.5481 (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	

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tau	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469	54.8469
alpha	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565	4.6565
util living area	0.9392	0.9181	0.8706	0.7881	0.6458	0.4528	0.3012	0.3249	0.5487	0.7780	0.9040	0.9468 (86)
MIT	20.2335	20.3605	20.5776	20.7823	20.9312	20.9895	20.9988	20.9982	20.9735	20.8253	20.5022	20.1890 (87)
Th 2	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308	20.2308 (88)
util rest of house	0.9289	0.9047	0.8498	0.7555	0.5967	0.3909	0.2335	0.2561	0.4868	0.7386	0.8862	0.9376 (89)
MIT 2	19.3591	19.5148	19.7771	20.0144	20.1727	20.2245	20.2304	20.2301	20.2125	20.0662	19.6914	19.3047 (90)
Living area fraction									FLA = Living area / (4) =			0.4996 (91)
MIT	19.7959	19.9373	20.1770	20.3980	20.5516	20.6067	20.6143	20.6139	20.5927	20.4454	20.0965	19.7465 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7959	19.9373	20.1770	20.3980	20.5516	20.6067	20.6143	20.6139	20.5927	20.4454	20.0965	19.7465 (93)

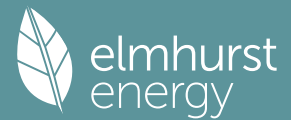
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9222	0.8990	0.8483	0.7629	0.6177	0.4214	0.2673	0.2904	0.5164	0.7501	0.8827	0.9308 (94)
Useful gains	419.4485	432.6601	423.8013	386.6587	307.6927	204.7139	124.4074	132.5552	233.4549	330.2380	381.6431	406.3547 (95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000 (96)
Heat loss rate W	615.7716	596.8132	532.3143	442.2384	324.5733	206.9672	124.6050	132.8563	239.4608	373.9212	508.3152	613.7291 (97)
Space heating kWh	146.0644	110.3109	80.7337	40.0174	12.5592	0.0000	0.0000	0.0000	0.0000	32.5003	91.2039	154.2866 (98a)
Space heating requirement - total per year (kWh/year)												667.6763
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	146.0644	110.3109	80.7337	40.0174	12.5592	0.0000	0.0000	0.0000	0.0000	32.5003	91.2039	154.2866 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												667.6763
Space heating per m2										(98c) / (4) =		13.3429 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (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	146.0644	110.3109	80.7337	40.0174	12.5592	0.0000	0.0000	0.0000	0.0000	32.5003	91.2039	154.2866 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	146.0644	110.3109	80.7337	40.0174	12.5592	0.0000	0.0000	0.0000	0.0000	32.5003	91.2039	154.2866 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	196.8250	173.8196	184.0010	160.1575	154.1618	137.7236	135.0369	141.0483	143.3192	161.2425	173.2079	194.4589 (64)
Efficiency of water heater (217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200 (216)
Fuel for water heating, kWh/month	60.6511	53.5621	56.6994	49.3521	47.5046	42.4392	41.6113	43.4637	44.1634	49.6864	53.3736	59.9220 (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	2.8571	2.5806	2.8571	2.7650	2.8571	2.7650	2.8571	2.8571	2.7650	2.8571	2.7650	2.8571 (231)
Lighting	17.6999	14.1995	12.7851	9.3669	7.2353	5.9113	6.6002	8.5793	11.1436	14.6210	16.5144	18.1918 (232)
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 (233a)
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 (234a)
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 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
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 (234b)
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 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	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												667.6763 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												324.5200
Water heating fuel used												602.4288 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2240)												
mechanical ventilation fans (SFP = 0.2240)												33.6403 (230a)
Total electricity for the above, kWh/year												33.6403 (231)
Electricity for lighting (calculated in Appendix L)												142.8483 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)

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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	1446.5936 (238)

10a. Fuel costs - using BEDF prices (567)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	667.6763	26.0600	173.9964 (240)
Space heating - main system 2	0.0000	26.0600	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	602.4288	26.0600	156.9929 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	33.6403	26.0600	8.7667 (249)
Energy for lighting	142.8483	26.0600	37.2263 (250)
Additional standing charges			0.0000 (251)
Total energy cost			376.9823 (255)

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	667.6763	0.1566	104.5313 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	602.4288	0.1411	85.0105 (264)
Space and water heating			189.5418 (265)
Pumps, fans and electric keep-hot	33.6403	0.1387	4.6663 (267)
Energy for lighting	142.8483	0.1443	20.6174 (268)
Total CO2, kg/year			214.8256 (272)

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	667.6763	1.5796	1054.6646 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	602.4288	1.5218	916.7732 (278)
Space and water heating			1971.4378 (279)
Pumps, fans and electric keep-hot	33.6403	1.5128	50.8911 (281)
Energy for lighting	142.8483	1.5338	219.1054 (282)
Total Primary energy kWh/year			2241.4343 (286)