PREDICTED ENERGY ASSESSMENT

Design SAP
elmhurst energy

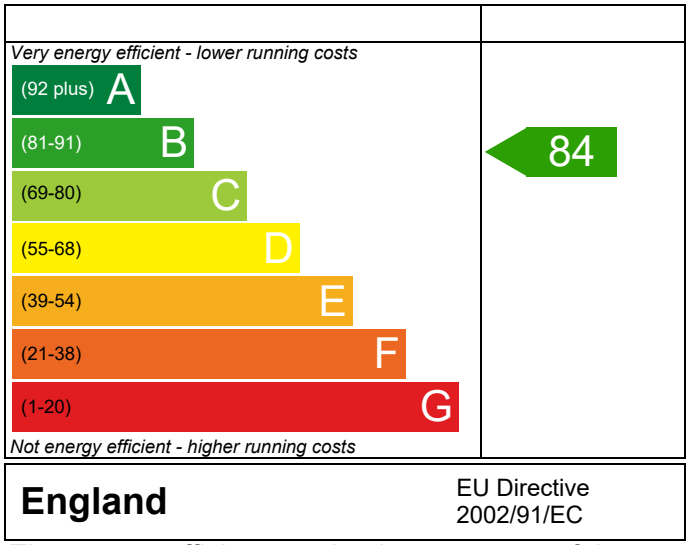
113 - PRJ009250 - MF

Dwelling type:	Flat, End-Terrace
Date of assessment:	13/10/2021
Produced by:	Michael Juckes
Total floor area:	51.26 m²

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

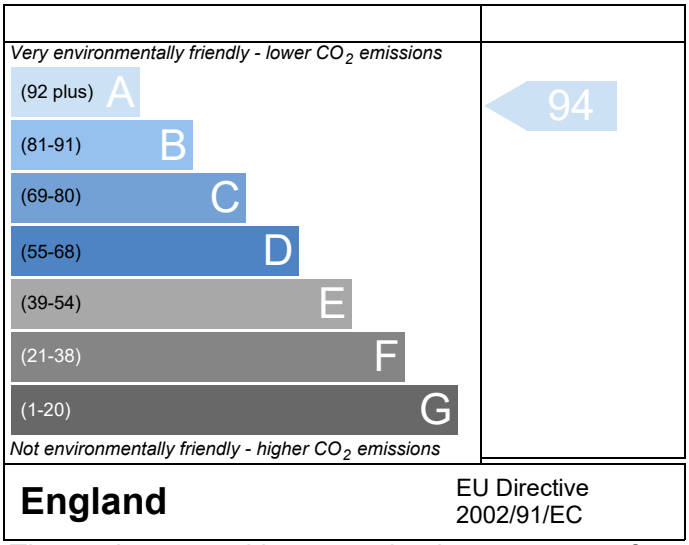
The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO_2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

FULL SAP CALCULATION PRINTOUT
Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Property Reference	113 - PRJ009250 - MF	**Issued on Date**	13/10/2021
Assessment Reference	113 E	**Prop Type Ref**	Block 1B - MF
Property	113 - PRJ009250 - MF		

SAP Rating	84 B	**DER**	9.30	**TER**	18.15
Environmental	94 A	**% DER<TER**	48.77		
CO_2 Emissions (t/year)	0.30	**DFEE**	35.63	**TFEE**	40.64
General Requirements Compliance	Pass	**% DFEE<TFEE**	12.33		

Assessor Details	Chris Nicholls, , Tel: ,	**Assessor ID**	T850-0001
Client			

CALCULATION OF HEAT DEMAND 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF HEAT DEMAND 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	51.2600 (1b)	x	2.5800 (2b)	=	132.2508	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.2600					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	132.2508	(5)

2. Ventilation rate

	main heating		secondary heating		other		total	m3 per hour	
Number of chimneys	0	+	0	+	0	=	0 * 40 =	0.0000	(6a)
Number of open flues	0	+	0	+	0	=	0 * 20 =	0.0000	(6b)
Number of intermittent 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)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Measured/design AP50		5.0100	
Infiltration rate		0.2505	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2317	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000	(22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000	(22a)
Adj infilt rate	0.2781	0.2607	0.2549	0.2259	0.2259	0.2085	0.2143	0.2027	0.2143	0.2317	0.2375	0.2549	(22b)
Mechanical extract ventilation - centralised													
If mechanical ventilation:												0.5000	(23a)
Effective ac	0.5281	0.5107	0.5049	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5049	(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	
Windows (Uw = 1.40)			9.8800	1.3258	13.0985			(27)
Solid Door			2.3100	1.4000	3.2340			(26)
Wl - Brick	23.9330	9.8830	14.0500	0.1800	2.5290	14.0000	196.7000	(29a)
Wl - To Corridor	31.3410	2.3140	29.0270	0.1300	3.7735	14.0000	406.3780	(29a)
Wl - Lift	4.9370		4.9370	0.2800	1.3824	9.0000	44.4330	(29a)
Total net area of external elements Aum(A, m2)			60.2040					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.0174			(33)
Party Wall			21.5000	0.0000	0.0000	54.0300	1161.6450	(32)
Party Floor			51.2580			40.0000	2050.3200	(32d)
Party Ceiling			51.2580			70.0000	3588.0600	(32b)
1st Floor Stud			81.5400			5.8200	474.5625	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7922.0985 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		154.5474 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		6.1995 (36)
Total fabric heat loss	(33) + (36) =	30.2169 (37)

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

CALCULATION OF HEAT DEMAND 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.0458	22.2873	22.0345	21.8214	21.8214	21.8214	21.8214	21.8214	21.8214	21.8214	21.8214	22.0345	(38)
Heat transfer coeff													
	53.2626	52.5042	52.2514	52.0382	52.0382	52.0382	52.0382	52.0382	52.0382	52.0382	52.0382	52.2514	(39)
Average = Sum(39)m / 12 =												52.2146	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0391	1.0243	1.0193	1.0152	1.0152	1.0152	1.0152	1.0152	1.0152	1.0152	1.0152	1.0193	(40)
HLP (average)												1.0186	(40)
Days in month													
	31	28	31	30	31	30	31	31	30	31	30	31	(41)

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7272	(42)
Average daily hot water use (litres/day)												75.2219	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	82.7441	79.7353	76.7264	73.7175	70.7086	67.6997	67.6997	70.7086	73.7175	76.7264	79.7353	82.7441	(44)
Energy conte	122.7072	107.3205	110.7451	96.5503	92.6423	79.9432	74.0792	85.0069	86.0222	100.2506	109.4313	118.8353	(45)
Energy content (annual)										Total = Sum(45)m =		1183.5341	(45)
Distribution loss (46)m = 0.15 x (45)m													
	18.4061	16.0981	16.6118	14.4825	13.8963	11.9915	11.1119	12.7510	12.9033	15.0376	16.4147	17.8253	(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)
Combi loss	14.5215	13.0978	14.4718	13.9718	14.4134	13.9207	14.3674	14.3972	13.9485	14.4477	14.0201	14.5119	(61)
Total heat required for water heating calculated for each month													
	137.2287	120.4183	125.2169	110.5221	107.0557	93.8639	88.4465	99.4042	99.9707	114.6982	123.4514	133.3472	(62)
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	(63)
								Solar input (sum of months) = Sum(63)m =				0.0000	(63)
Output from w/h													
	137.2287	120.4183	125.2169	110.5221	107.0557	93.8639	88.4465	99.4042	99.9707	114.6982	123.4514	133.3472	(64)
								Total per year (kWh/year) = Sum(64)m =				1353.6239	(64)
RHI water heating demand												1354	(64)
Heat gains from water heating, kWh/month													
	44.4305	38.9585	40.4407	35.5959	34.4069	30.0613	28.2232	31.8641	32.0895	36.9452	39.8909	43.1407	(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	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	33.9239	30.1309	24.5041	18.5512	13.8672	11.7073	12.6502	16.4431	22.0700	28.0229	32.7068	34.8668	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	224.6355	226.9665	221.0924	208.5872	192.8016	177.9654	168.0539	165.7228	171.5969	184.1021	199.8877	214.7240	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	(71)
Water heating gains (Table 5)													
	59.7184	57.9740	54.3558	49.4388	46.2459	41.7518	37.9344	42.8281	44.5688	49.6576	55.4041	57.9848	(72)
Total internal gains													
	402.9133	399.7068	384.5878	361.2126	337.5501	316.0599	303.2738	309.6296	322.8711	346.4180	372.6341	392.2110	(73)

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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	
Southeast	9.8830	42.6275	0.7600	0.7000	0.7700	155.3188	(77)

Solar gains	155.3188	235.1549	321.1263	421.5926	456.7666	486.1106	462.6376	425.8387	372.9002	278.0043	187.8153	128.5824	(83)
Total gains	558.2321	634.8618	705.7141	782.8053	794.3168	802.1705	765.9115	735.4683	695.7713	624.4223	560.4494	520.7934	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	41.3157	41.9125	42.1153	42.2878	42.2878	42.2878	42.2878	42.2878	42.2878	42.2878	42.2878	42.1153	
alpha	3.7544	3.7942	3.8077	3.8192	3.8192	3.8192	3.8192	3.8192	3.8192	3.8192	3.8192	3.8077	
util living area													
	0.9186	0.8787	0.8032	0.6755	0.5235	0.3584	0.2437	0.2467	0.4369	0.6819	0.8573	0.9283	(86)
MIT	20.0828	20.2912	20.5668	20.8106	20.9421	20.9894	20.9982	20.9982	20.9776	20.8418	20.4810	20.0705	(87)
Th 2	20.0509	20.0632	20.0672	20.0707	20.0707	20.0707	20.0707	20.0707	20.0707	20.0707	20.0707	20.0672	(88)
util rest of house													
	0.9050	0.8601	0.7756	0.6363	0.4726	0.3008	0.1812	0.1817	0.3734	0.6329	0.8322	0.9158	(89)
MIT 2	19.2497	19.4559	19.7135	19.9293	20.0343	20.0659	20.0702	20.0703	20.0596	19.9608	19.6449	19.2525	(90)
Living area fraction									fLA = Living area / (4) =			0.4770	(91)
MIT	19.6471	19.8543	20.1205	20.3497	20.4673	20.5064	20.5129	20.5129	20.4975	20.3810	20.0437	19.6427	(92)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Temperature adjustment												-0.1500	
adjusted MIT	19.4971	19.7043	19.9705	20.1997	20.3173	20.3564	20.3629	20.3629	20.3475	20.2310	19.8937	19.4927	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8957	0.8522	0.7725	0.6420	0.4864	0.3187	0.2010	0.2022	0.3926	0.6417	0.8269	0.9068	(94)
Useful gains	500.0319	541.0321	545.1598	502.5239	386.3489	255.6142	153.9122	148.7113	273.1687	400.7180	463.4110	472.2652	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	772.1530	751.0378	672.5008	556.7918	401.5949	257.9200	154.1826	148.9784	278.2728	443.9376	613.7243	746.8109	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	202.4581	141.1238	94.7417	39.0729	11.3430	0.0000	0.0000	0.0000	0.0000	32.1554	108.2256	204.2620	(98)
Space heating												833.3824	(98)
RHI space heating demand												833	(98)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF ENERGY RATINGS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	51.2600 (1b)	x	2.5800 (2b)	=	132.2508	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.2600					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	132.2508	(5)

2. Ventilation rate

	main heating		secondary heating		other		total	m3 per hour	
Number of chimneys	0	+	0	+	0	=	0 * 40 =	0.0000	(6a)
Number of open flues	0	+	0	+	0	=	0 * 20 =	0.0000	(6b)
Number of intermittent 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)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Measured/design AP50		5.0100	
Infiltration rate		0.2505	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2317	(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	0.2954	0.2896	0.2838	0.2549	0.2491	0.2201	0.2201	0.2143	0.2317	0.2491	0.2607	0.2723	(22b)

Mechanical extract ventilation - centralised
If mechanical ventilation: 0.5000 (23a)

Effective ac	0.5454	0.5396	0.5338	0.5049	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5107	0.5223	(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	
Windows (Uw = 1.40)			9.8800	1.3258	13.0985			(27)
Solid Door			2.3100	1.4000	3.2340			(26)
Wl - Brick	23.9330	9.8830	14.0500	0.1800	2.5290	14.0000	196.7000	(29a)
Wl - To Corridor	31.3410	2.3140	29.0270	0.1300	3.7735	14.0000	406.3780	(29a)
Wl - Lift	4.9370		4.9370	0.2800	1.3824	9.0000	44.4330	(29a)
Total net area of external elements Aum(A, m2)			60.2040					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.0174			(33)
Party Wall			21.5000	0.0000	0.0000	54.0300	1161.6450	(32)
Party Floor			51.2580			40.0000	2050.3200	(32d)
Party Ceiling			51.2580			70.0000	3588.0600	(32b)
1st Floor Stud			81.5400			5.8200	474.5625	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7922.0985 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		154.5474 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		6.1995 (36)
Total fabric heat loss	(33) + (36) =	30.2169 (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	23.8042	23.5514	23.2986	22.0345	21.8214	21.8214	21.8214	21.8214	21.8214	21.8214	22.2873	22.7930	(38)
Heat transfer coeff	54.0211	53.7683	53.5154	52.2514	52.0382	52.0382	52.0382	52.0382	52.0382	52.0382	52.5042	53.0098	(39)

Average = Sum(39)m / 12 = 52.6083 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0539	1.0489	1.0440	1.0193	1.0152	1.0152	1.0152	1.0152	1.0152	1.0152	1.0243	1.0341	(40)
HLP (average)												1.0263	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7272 (42)
Average daily hot water use (litres/day) 75.2219 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	82.7441	79.7353	76.7264	73.7175	70.7086	67.6997	67.6997	70.7086	73.7175	76.7264	79.7353	82.7441	(44)
Energy conte	122.7072	107.3205	110.7451	96.5503	92.6423	79.9432	74.0792	85.0069	86.0222	100.2506	109.4313	118.8353	(45)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Energy content (annual)											Total = Sum(45)m =	1183.5341	(45)
Distribution loss (46)m = 0.15 x (45)m													
	18.4061	16.0981	16.6118	14.4825	13.8963	11.9915	11.1119	12.7510	12.9033	15.0376	16.4147	17.8253	(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)
Combi loss	14.5215	13.0978	14.4718	13.9718	14.4134	13.9207	14.3674	14.3972	13.9485	14.4477	14.0201	14.5119	(61)
Total heat required for water heating calculated for each month													
	137.2287	120.4183	125.2169	110.5221	107.0557	93.8639	88.4465	99.4042	99.9707	114.6982	123.4514	133.3472	(62)
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	(63)
								Solar input (sum of months) = Sum(63)m =				0.0000	(63)
Output from w/h													
	137.2287	120.4183	125.2169	110.5221	107.0557	93.8639	88.4465	99.4042	99.9707	114.6982	123.4514	133.3472	(64)
								Total per year (kWh/year) = Sum(64)m =				1353.6239	(64)
Heat gains from water heating, kWh/month													
	44.4305	38.9585	40.4407	35.5959	34.4069	30.0613	28.2232	31.8641	32.0895	36.9452	39.8909	43.1407	(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	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	33.9239	30.1309	24.5041	18.5512	13.8672	11.7073	12.6502	16.4431	22.0700	28.0229	32.7068	34.8668	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	224.6355	226.9665	221.0924	208.5872	192.8016	177.9654	168.0539	165.7228	171.5969	184.1021	199.8877	214.7240	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	(71)
Water heating gains (Table 5)													
	59.7184	57.9740	54.3558	49.4388	46.2459	41.7518	37.9344	42.8281	44.5688	49.6576	55.4041	57.9848	(72)
Total internal gains													
	402.9133	399.7068	384.5878	361.2126	337.5501	316.0599	303.2738	309.6296	322.8711	346.4180	372.6341	392.2110	(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	
Southeast	9.8830	36.7938	0.7600	0.7000	0.7700	134.0629	(77)

Solar gains	134.0629	228.3588	312.4504	387.1412	433.6304	430.4946	415.0428	380.3597	338.3177	252.3851	160.5765	114.7299	(83)
Total gains	536.9762	628.0656	697.0382	748.3538	771.1806	746.5546	718.3166	689.9893	661.1888	598.8031	533.2106	506.9410	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	40.7356	40.9272	41.1205	42.1153	42.2878	42.2878	42.2878	42.2878	42.2878	42.2878	41.9125	41.5127	
alpha	3.7157	3.7285	3.7414	3.8077	3.8192	3.8192	3.8192	3.8192	3.8192	3.8192	3.7942	3.7675	
util living area													
	0.9355	0.8937	0.8292	0.7206	0.5834	0.4345	0.3160	0.3429	0.5176	0.7507	0.8947	0.9447	(86)
MIT	19.9239	20.1797	20.4657	20.7475	20.9075	20.9765	20.9946	20.9925	20.9542	20.7506	20.3143	19.8860	(87)
Th 2	20.0387	20.0428	20.0468	20.0672	20.0707	20.0707	20.0707	20.0707	20.0707	20.0707	20.0632	20.0550	(88)
util rest of house													
	0.9246	0.8771	0.8043	0.6843	0.5352	0.3753	0.2505	0.2754	0.4556	0.7093	0.8756	0.9351	(89)
MIT 2	19.0865	19.3331	19.6033	19.8732	20.0085	20.0585	20.0688	20.0679	20.0450	19.8855	19.4833	19.0634	(90)
Living area fraction										fLA = Living area / (4) =		0.4770	(91)
MIT	19.4859	19.7369	20.0146	20.2902	20.4373	20.4964	20.5104	20.5089	20.4787	20.2981	19.8796	19.4558	(92)
Temperature adjustment												-0.1500	
adjusted MIT	19.3359	19.5869	19.8646	20.1402	20.2873	20.3464	20.3604	20.3589	20.3287	20.1481	19.7296	19.3058	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9151	0.8682	0.7991	0.6873	0.5468	0.3932	0.2710	0.2965	0.4733	0.7130	0.8679	0.9261	(94)
Useful gains	491.4022	545.3057	557.0209	514.3098	421.6672	293.5208	194.6902	204.5820	312.9129	426.9479	462.7698	469.4744	(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													
	812.2550	789.6881	715.2144	587.3160	446.8691	299.0322	195.6841	206.0152	324.1297	496.8675	663.1095	800.7541	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh													
	238.7144	164.2250	117.6960	52.5645	18.7502	0.0000	0.0000	0.0000	0.0000	52.0202	144.2445	246.4721	(98)
Space heating												1034.6870	(98)
Space heating per m2											(98) / (4) =	20.1851	(99)

8c. Space cooling requirement

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Not applicable

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 %)	90.5000	(206)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)
Space heating requirement	1143.3005	(211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	238.7144	164.2250	117.6960	52.5645	18.7502	0.0000	0.0000	0.0000	0.0000	52.0202	144.2445	246.4721	(98)
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)
Space heating fuel (main heating system)	263.7728	181.4641	130.0508	58.0823	20.7185	0.0000	0.0000	0.0000	0.0000	57.4809	159.3862	272.3449	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	137.2287	120.4183	125.2169	110.5221	107.0557	93.8639	88.4465	99.4042	99.9707	114.6982	123.4514	133.3472	(64)
Efficiency of water heater												87.3000	(216)
(217)m	89.3051	89.1180	88.8217	88.3064	87.7625	87.3000	87.3000	87.3000	87.3000	88.2739	88.9956	89.3502	(217)
Fuel for water heating, kWh/month	153.6628	135.1222	140.9756	125.1575	121.9834	107.5188	101.3133	113.8650	114.5140	129.9344	138.7163	149.2412	(219)
Water heating fuel used												1532.0046	(219)
Annual totals kWh/year													
Space heating fuel - main system												1143.3005	(211)
Space heating fuel - secondary												0.0000	(215)

Electricity for pumps and fans:		
(MEVCentralised, Database: in-use factor = 1.3000, SFP = 0.3380)		
mechanical ventilation fans (SFP = 0.3380)	54.5349	(230a)
central heating pump	30.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	129.5349	(231)
Electricity for lighting (calculated in Appendix L)	239.6428	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV Unit 0 (0.80 * 0.93 * 951 * 1.00) =	-707.2583	(233)
Total delivered energy for all uses	2337.2245	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1143.3005	3.4800	39.7869	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	1532.0046	3.4800	53.3138	(247)
Mechanical ventilation fans	54.5349	13.1900	7.1932	(249)
Pumps and fans for heating	75.0000	13.1900	9.8925	(249)
Energy for lighting	239.6428	13.1900	31.6089	(250)
Additional standing charges			120.0000	(251)
Energy saving/generation technologies				
PV Unit	0.0000	0.0000	0.0000	(252)
Total energy cost			261.7952	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.4200	(256)
Energy cost factor (ECF) [(255) x (256)] / [(4) + 45.0] =	1.1423	(257)
SAP value	84.0655	
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	1143.3005	0.2160	246.9529	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1532.0046	0.2160	330.9130	(264)
Space and water heating			577.8659	(265)
Pumps and fans	129.5349	0.5190	67.2286	(267)
Energy for lighting	239.6428	0.5190	124.3746	(268)
Energy saving/generation technologies				
PV Unit	-707.2583	0.5190	-367.0671	(269)
Total kg/year			402.4021	(272)
CO2 emissions per m2			7.8500	(273)
EI value			94.3983	
EI rating			94	(274)
EI band			A	

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Calculation of stars for heating and DHW

Main heating energy efficiency	3.48 × (1 + 0.29 × 0.00) / 0.9050 = 3.845, stars = 4
Main heating environmental impact	0.216 × (1 + 0.29 × 0.00) / 0.9050 = 0.2387, stars = 4
Water heating energy efficiency	3.48 / 0.8826 = 3.943, stars = 4
Water heating environmental impact	0.216 / 0.8826 = 0.2447, stars = 4

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	51.2600 (1b)	x	2.5800 (2b)	=	132.2508	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.2600					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	132.2508	(5)

2. Ventilation rate

	main heating		secondary heating		other		total	m3 per hour	
Number of chimneys	0	+	0	+	0	=	0 * 40 =	0.0000	(6a)
Number of open flues	0	+	0	+	0	=	0 * 20 =	0.0000	(6b)
Number of intermittent 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)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Measured/design AP50		5.0100	
Infiltration rate		0.2505	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2317	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000	(22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000	(22a)
Adj infilt rate	0.2781	0.2607	0.2549	0.2259	0.2259	0.2085	0.2143	0.2027	0.2143	0.2317	0.2375	0.2549	(22b)

Mechanical extract ventilation - centralised
If mechanical ventilation: 0.5000 (23a)

Effective ac	0.5281	0.5107	0.5049	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5049	(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	
Windows (Uw = 1.40)			9.8800	1.3258	13.0985			(27)
Solid Door			2.3100	1.4000	3.2340			(26)
Wl - Brick	23.9330	9.8830	14.0500	0.1800	2.5290	14.0000	196.7000	(29a)
Wl - To Corridor	31.3410	2.3140	29.0270	0.1300	3.7735	14.0000	406.3780	(29a)
Wl - Lift	4.9370		4.9370	0.2800	1.3824	9.0000	44.4330	(29a)
Total net area of external elements Aum(A, m2)			60.2040					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.0174			(33)
Party Wall			21.5000	0.0000	0.0000	54.0300	1161.6450	(32)
Party Floor			51.2580			40.0000	2050.3200	(32d)
Party Ceiling			51.2580			70.0000	3588.0600	(32b)
1st Floor Stud			81.5400			5.8200	474.5625	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7922.0985 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		154.5474 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		6.1995 (36)
Total fabric heat loss	(33) + (36) =	30.2169 (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	23.0458	22.2873	22.0345	21.8214	21.8214	21.8214	21.8214	21.8214	21.8214	21.8214	21.8214	22.0345	(38)
Heat transfer coeff	53.2626	52.5042	52.2514	52.0382	52.0382	52.0382	52.0382	52.0382	52.0382	52.0382	52.0382	52.2514	(39)

Average = Sum(39)m / 12 = 52.2146 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0391	1.0243	1.0193	1.0152	1.0152	1.0152	1.0152	1.0152	1.0152	1.0152	1.0152	1.0193	(40)
HLP (average)												1.0186	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7272 (42)
Average daily hot water use (litres/day) 75.2219 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	82.7441	79.7353	76.7264	73.7175	70.7086	67.6997	67.6997	70.7086	73.7175	76.7264	79.7353	82.7441	(44)
Energy conte	122.7072	107.3205	110.7451	96.5503	92.6423	79.9432	74.0792	85.0069	86.0222	100.2506	109.4313	118.8353	(45)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

Energy content (annual)											Total = Sum(45)m =	1183.5341	(45)
Distribution loss (46)m = 0.15 x (45)m													
	18.4061	16.0981	16.6118	14.4825	13.8963	11.9915	11.1119	12.7510	12.9033	15.0376	16.4147	17.8253	(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)
Combi loss	14.5215	13.0978	14.4718	13.9718	14.4134	13.9207	14.3674	14.3972	13.9485	14.4477	14.0201	14.5119	(61)
Total heat required for water heating calculated for each month													
	137.2287	120.4183	125.2169	110.5221	107.0557	93.8639	88.4465	99.4042	99.9707	114.6982	123.4514	133.3472	(62)
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	(63)
								Solar input (sum of months) = Sum(63)m =				0.0000	(63)
Output from w/h													
	137.2287	120.4183	125.2169	110.5221	107.0557	93.8639	88.4465	99.4042	99.9707	114.6982	123.4514	133.3472	(64)
								Total per year (kWh/year) = Sum(64)m =				1353.6239	(64)
Heat gains from water heating, kWh/month													
	44.4305	38.9585	40.4407	35.5959	34.4069	30.0613	28.2232	31.8641	32.0895	36.9452	39.8909	43.1407	(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	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	103.6344	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	33.9239	30.1309	24.5041	18.5512	13.8672	11.7073	12.6502	16.4431	22.0700	28.0229	32.7068	34.8668	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	224.6355	226.9665	221.0924	208.5872	192.8016	177.9654	168.0539	165.7228	171.5969	184.1021	199.8877	214.7240	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	47.0907	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	-69.0896	(71)
Water heating gains (Table 5)													
	59.7184	57.9740	54.3558	49.4388	46.2459	41.7518	37.9344	42.8281	44.5688	49.6576	55.4041	57.9848	(72)
Total internal gains													
	402.9133	399.7068	384.5878	361.2126	337.5501	316.0599	303.2738	309.6296	322.8711	346.4180	372.6341	392.2110	(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	
Southeast	9.8830	42.6275	0.7600	0.7000	0.7700	155.3188	(77)

Solar gains	155.3188	235.1549	321.1263	421.5926	456.7666	486.1106	462.6376	425.8387	372.9002	278.0043	187.8153	128.5824	(83)
Total gains	558.2321	634.8618	705.7141	782.8053	794.3168	802.1705	765.9115	735.4683	695.7713	624.4223	560.4494	520.7934	(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	41.3157	41.9125	42.1153	42.2878	42.2878	42.2878	42.2878	42.2878	42.2878	42.2878	42.2878	42.1153	
alpha	3.7544	3.7942	3.8077	3.8192	3.8192	3.8192	3.8192	3.8192	3.8192	3.8192	3.8192	3.8077	
util living area													
	0.9186	0.8787	0.8032	0.6755	0.5235	0.3584	0.2437	0.2467	0.4369	0.6819	0.8573	0.9283	(86)
MIT	20.0828	20.2912	20.5668	20.8106	20.9421	20.9894	20.9982	20.9982	20.9776	20.8418	20.4810	20.0705	(87)
Th 2	20.0509	20.0632	20.0672	20.0707	20.0707	20.0707	20.0707	20.0707	20.0707	20.0707	20.0707	20.0672	(88)
util rest of house													
	0.9050	0.8601	0.7756	0.6363	0.4726	0.3008	0.1812	0.1817	0.3734	0.6329	0.8322	0.9158	(89)
MIT 2	19.2497	19.4559	19.7135	19.9293	20.0343	20.0659	20.0702	20.0703	20.0596	19.9608	19.6449	19.2525	(90)
Living area fraction									fLA = Living area / (4) =			0.4770	(91)
MIT	19.6471	19.8543	20.1205	20.3497	20.4673	20.5064	20.5129	20.5129	20.4975	20.3810	20.0437	19.6427	(92)
Temperature adjustment												-0.1500	
adjusted MIT	19.4971	19.7043	19.9705	20.1997	20.3173	20.3564	20.3629	20.3629	20.3475	20.2310	19.8937	19.4927	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8957	0.8522	0.7725	0.6420	0.4864	0.3187	0.2010	0.2022	0.3926	0.6417	0.8269	0.9068	(94)
Useful gains	500.0319	541.0321	545.1598	502.5239	386.3489	255.6142	153.9122	148.7113	273.1687	400.7180	463.4110	472.2652	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W													
	772.1530	751.0378	672.5008	556.7918	401.5949	257.9200	154.1826	148.9784	278.2728	443.9376	613.7243	746.8109	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh													
	202.4581	141.1238	94.7417	39.0729	11.3430	0.0000	0.0000	0.0000	0.0000	32.1554	108.2256	204.2620	(98)
Space heating												833.3824	(98)
Space heating per m2											(98) / (4) =	16.2579	(99)

8c. Space cooling requirement

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

Not applicable

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 %)												90.5000	(206)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement												920.8646	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	202.4581	141.1238	94.7417	39.0729	11.3430	0.0000	0.0000	0.0000	0.0000	32.1554	108.2256	204.2620	(98)
Space heating efficiency (main heating system 1)													
	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)
Space heating fuel (main heating system)													
	223.7106	155.9379	104.6870	43.1744	12.5337	0.0000	0.0000	0.0000	0.0000	35.5308	119.5863	225.7039	(211)
Water heating requirement													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	137.2287	120.4183	125.2169	110.5221	107.0557	93.8639	88.4465	99.4042	99.9707	114.6982	123.4514	133.3472	(64)
Efficiency of water heater												87.3000	(216)
(217)m	89.1794	88.9980	88.6501	88.1138	87.5967	87.3000	87.3000	87.3000	87.3000	87.9812	88.7662	89.2084	(217)
Fuel for water heating, kWh/month													
	153.8793	135.3044	141.2484	125.4311	122.2143	107.5188	101.3133	113.8650	114.5140	130.3668	139.0748	149.4783	(219)
Water heating fuel used												1534.2085	(219)
Annual totals kWh/year													
Space heating fuel - main system												920.8646	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
(MEVCentralised, Database: in-use factor = 1.3000, SFP = 0.3380)													
mechanical ventilation fans (SFP = 0.3380)												54.5349	(230a)
central heating pump												30.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												129.5349	(231)
Electricity for lighting (calculated in Appendix L)												239.6428	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 0.93 * 1082 * 1.00) =												-804.6985	(233)
Total delivered energy for all uses												2019.5523	(238)

10a. Fuel costs - using BEDF prices (483)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	920.8646	3.7400	34.4403	(240)
Space heating - secondary	0.0000	0.0000	0.0000	(242)
Water heating (other fuel)	1534.2085	3.7400	57.3794	(247)
Mechanical ventilation fans	54.5349	19.1200	10.4271	(249)
Pumps and fans for heating	75.0000	19.1200	14.3400	(249)
Energy for lighting	239.6428	19.1200	45.8197	(250)
Additional standing charges			94.0000	(251)
Energy saving/generation technologies				
PV Unit	0.0000	0.0000	0.0000	(252)
Total energy cost			256.4065	(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	920.8646	0.2160	198.9067	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1534.2085	0.2160	331.3890	(264)
Space and water heating			530.2958	(265)
Pumps and fans	129.5349	0.5190	67.2286	(267)
Energy for lighting	239.6428	0.5190	124.3746	(268)
Energy saving/generation technologies				
PV Unit	-804.6985	0.5190	-417.6385	(269)
Total kg/year			304.2605	(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	920.8646	1.2200	1123.4548	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1534.2085	1.2200	1871.7344	(264)
Space and water heating			2995.1892	(265)
Pumps and fans	129.5349	3.0700	397.6723	(267)
Energy for lighting	239.6428	3.0700	735.7034	(268)
Energy saving/generation technologies				
PV Unit	-804.6985	3.0700	-2470.4244	(269)
Primary energy kWh/year			1658.1404	(272)
Primary energy kWh/m2/year			32.3476	(273)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 84
Current environmental impact rating: A 94

(For testing purposes):

A		Not considered
B		Not considered
C		Not considered
D		Not considered
E	Low energy lighting	Already installed
F		Not considered
G		Not considered
H		Not considered
I		Not considered
J		Not considered
K		Not considered
M		Not considered
N	Solar water heating	Not applicable
O		Not considered
P		Not considered
R		Not considered
S		Not considered
T		Not considered
U	Solar photovoltaic panels	Not applicable
A2		Not considered
A3		Not considered
T2		Not considered
W		Not considered
X		Not considered
Y		Not considered
J2		Not considered
Q2		Not considered
Z1		Not considered
Z2		Not considered
Z3		Not considered
Z4		Not considered
Z5		Not considered
V2	Wind turbine	Not applicable
L2		Not considered
Q3		Not considered
O3		Not considered

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

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: B 84
Potential environmental impact rating: A 94

Fuel prices for cost data on this page from database revision number 483 TEST (30 Sep 2021)
Recommendation texts revision number 4.9c (22 Feb 2014)

Typical heating and lighting costs of this home (per year, South East England):

	Current	Potential	Saving
Electricity	£71	£71	£0
Mains gas	£186	£186	£0
Space heating	£153	£153	£0
Water heating	£57	£57	£0
Lighting	£46	£46	£0
Total cost of fuels	£257	£257	£0
Total cost of uses	£256	£256	£0
Delivered energy	39 kWh/m²	39 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	6 kg/m²	6 kg/m²	0 kg/m²
Primary energy	32 kWh/m²	32 kWh/m²	0 kWh/m²

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

No improvements selected / applicable

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

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SAP 2012 WORKSHEET FOR New Build (As Designed)   (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING      09 Jan 2014
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No improvements selected / applicable
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BASIC COMPLIANCE REPORT
Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Property Reference	113 - PRJ009250 - MF	**Issued on Date**	13/10/2021
Assessment Reference	113 E	**Prop Type Ref**	Block 1B - MF
Property	113 - PRJ009250 - MF		

SAP Rating	84 B	**DER**	9.30	**TER**	18.15
Environmental	94 A	**% DER<TER**	48.77		
CO_2 Emissions (t/year)	0.30	**DFEE**	35.63	**TFEE**	40.64
General Requirements Compliance	Pass	**% DFEE<TFEE**	12.33		

Assessor Details	Chris Nicholls, , Tel: ,	**Assessor ID**	T850-0001
Client			

SUMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	18.15	$kgCO_2/m^2$	
Dwelling Carbon Dioxide Emission Rate (DER)	9.30	$kgCO_2/m^2$	Pass
	-8.85 (-48.8%)	$kgCO_2/m^2$	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	40.64	$kWh/m^2/yr$	
Dwelling Fabric Energy Efficiency (DFEE)	35.63	$kWh/m^2/yr$	
	-5.0 (-12.3%)	$kWh/m^2/yr$	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.28 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.01 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal LOGIC COMBI ESP1 30 Combi boiler Efficiency: 89.6% SEDBUK2009 Minimum: 88.0%	Pass
Secondary heating system	None	

5 Cylinder insulation

Hot water storage	No cylinder		
6 Controls			
Space heating controls	Programmer, room thermostat and TRVs		Pass
Hot water controls	No cylinder		
Boiler interlock	Yes		Pass
7 Low energy lights			
Percentage of fixed lights with low-energy fittings	100	%	
Minimum	75	%	Pass
8 Mechanical ventilation			
Continuous extract system			
Specific fan power	0.26		
Maximum	0.7		Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)	Slight	Pass

Based on:

Overshading	Average
Windows facing South East	9.88 m², No overhang
Air change rate	4.21 ach
Blinds/curtains	Dark-coloured curtain or roller blind, closed 100% of daylight hours

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type	U-value		
Filled Cavity with Edge Sealing	0.00	W/m²K	Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals	5.01 (design value)		
Maximum	10.0		Pass

10 Key features

External wall U-value	0.13	W/m²K
Party wall U-value	0.00	W/m²K
Photovoltaic array	0.93	kW

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.