

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Property Reference	71 Avenue Road		Issued on Date	30/09/2022	
Assessment Reference	Baseline	Prop Type Ref			
Property	71, Avenue Road, London, NW8 6HP				
SAP Rating	87 B	DER	13.36	TER	13.39
Environmental	84 B	% DER<TER	0.19		
CO ₂ Emissions (t/year)	13.20	DFEE	54.84	TFEE	63.32
General Requirements Compliance	Pass	% DFEE<TFEE	13.39		
Assessor Details	Mr. Karl Webb-Thomas, Mayfield Morrison Limited, Tel: 07910 303578, karl@mayfieldmorrison.com			Assessor ID	5932-0001
Client					

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Orientation	North East
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	House, Detached
2.0 Number of Storeys	4
3.0 Date Built	2022
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	82.74 m	362.23 m ²	3.60 m
1st Storey:	79.68 m	299.99 m ²	4.28 m
2nd Storey:	79.68 m	299.99 m ²	3.70 m
3rd Storey:	73.91 m	245.01 m ²	2.68 m

7.0 Living Area m²

8.0 Thermal Mass Parameter
 Thermal Mass kJ/m²K

9.0 External Walls

Description	Type	U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Main Wall	Cavity Wall	0.25	687.80	570.65
Basement Wall	Cavity Wall	0.25	270.74	270.74
Dormer	Timber Frame	0.25	27.23	16.58

10.0 External Roofs

Description	Type	U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Sloped	External Slope Roof	0.15	214.06	214.06
Flat	External Flat Roof	0.15	180.47	165.41
Flat over Pool	External Flat Roof	0.15	58.57	54.68

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m ² K)	Area (m ²)
Heat Loss Floor 1	Ground Floor - Solid		0.19	362.23

12.0 Opening Types

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Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m ² K)
Rooflight	Manufacture	Roof Window	Double Low-E Hard 0.2			0.72		0.70	1.30
Door	Manufacture	Solid Door							1.30
Half glazed door	Manufacture	Half Glazed Door	Double Low-E Hard 0.2			0.72		0.70	1.30
Windows	Manufacture	Window	Double Low-E Hard 0.2			0.73		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m ²)	Curtain Closed
NE	Window	[1] Main Wall	North East	None	0.00					40.37	
NE Door	Solid Door	[1] Main Wall	North East							5.37	
NE Dormer	Window	[3] Dormer	North East	None	0.00					2.98	
SE	Window	[1] Main Wall	South East	None	0.00					17.16	
SW	Window	[1] Main Wall	South West	None	0.00					29.20	
SW	Window	[3] Dormer	South West	None	0.00					4.69	
NW	Window	[1] Main Wall	North West	None	0.00					21.13	
NW	Half Glazed Door	[1] Main Wall	North West							3.92	
NW	Window	[3] Dormer	North West	None	0.00					2.98	
RL	Roof Window	[3] Flat over Pool	Horizontal	None						3.89	
RL	Roof Window	[2] Flat	Horizontal	None						15.06	

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	59.11	0.050	Yes
Independently assessed	E3 Sill	55.66	0.009	Yes
Independently assessed	E4 Jamb	203.14	0.014	Yes
Table K1 - Default	E22 Basement floor	82.74	0.070	No
Independently assessed	E6 Intermediate floor within a dwelling	233.27	0.005	Yes
Table K1 - Approved	E11 Eaves (insulation at rafter level)	75.91	0.040	No
Table K1 - Default	E14 Flat roof	15.36	0.080	No
Table K1 - Default	E15 Flat roof with parapet	13.14	0.560	No
Independently assessed	E16 Corner (normal)	85.44	0.058	No
Table K1 - Approved	E17 Corner (inverted – internal area greater than external area)	39.12	-0.090	No
Table K1 - Default	R1 Head of roof window	17.04	0.080	Yes
Table K1 - Default	R2 Sill of roof window	17.04	0.060	Yes
Table K1 - Default	R3 Jamb of roof window	12.11	0.080	Yes
Table K1 - Default	R6 Flat ceiling	57.13	0.060	No
Table K1 - Default	R7 Flat ceiling (inverted)	9.08	0.040	No
Table K1 - Default	R9 Roof to wall (flat ceiling)	26.50	0.040	No

Y-value W/m²K

18.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Property Tested ?

As Built AP₅₀ m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather

SUMMARY FOR INPUT DATA

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Cross ventilation possible

Night Ventilation

Air change rate

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				16
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System

22.0 Lighting

Internal

Total number of light fittings

Total number of L.E.L. fittings

Percentage of L.E.L. fittings %

External

External lights fitted

23.0 Electricity Tariff

24.0 Main Heating 1

Database

Percentage of Heat %

Database Ref. No.

Fuel Type

Main Heating

SAP Code

In Winter

In Summer

Controls

PCDF Controls

Delayed Start Stat

Sap Code

Boiler Compensator

Flue Type

Fan Assisted Flue

Is MHS Pumped

Heat Emitter

Flow Temperature

25.0 Main Heating 2

Community Heating

28.0 Water Heating

HWP From main heating 1

Water Heating

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Flue Gas Heat Recovery System	<input type="text" value="No"/>	
Waste Water Heat Recovery Instantaneous System 1	<input type="text" value="No"/>	
Waste Water Heat Recovery Instantaneous System 2	<input type="text" value="No"/>	
Waste Water Heat Recovery Storage System	<input type="text" value="No"/>	
Solar Panel	<input type="text" value="No"/>	
Water use <= 125 litres/person/day	<input type="text" value="Yes"/>	
SAP Code	<input type="text" value="901"/>	
<hr/>		
29.0 Hot Water Cylinder	<input type="text" value="Hot Water Cylinder"/>	
Cylinder Stat	<input type="text" value="Yes"/>	
Cylinder In Heated Space	<input type="text" value="Yes"/>	
Independent Time Control	<input type="text" value="Yes"/>	
Insulation Type	<input type="text" value="Measured Loss"/>	
Cylinder Volume	<input type="text" value="500.00"/>	L
Loss	<input type="text" value="3.13"/>	kWh/day
Pipes insulation	<input type="text" value="Fully insulated primary pipework"/>	
<hr/>		
31.0 Thermal Store	<input type="text" value="None"/>	

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£366	B 88	

FULL SAP CALCULATION PRINTOUT

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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Detached House, total floor area 1207 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 13.39 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 13.36 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 63.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 54.8 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.25 (max. 0.70)	OK
Floor	0.19 (max. 0.25)	0.19 (max. 0.70)	OK
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	OK
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Boiler system with radiators or underfloor - Mains gas
Data from database	
Worcester Greenstar 8000 Life GR8300iW 50 R NG	

Efficiency: 89.7% SEDBUK2009

Minimum: 88.0%	OK
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Secondary heating system:

None

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 3.13 kWh/day	
Permitted by DBSCG 3.92	OK	
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
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Hot water controls:

Cylinderstat	OK
Independent timer for DHW	OK

Boiler interlock

Yes	OK
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7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%		
Minimum	75%	OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):	Not significant	OK
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Based on:

Overshading:	Average
Windows facing North East:	43.35 m ² , No overhang
Windows facing South East:	17.16 m ² , No overhang
Windows facing South West:	33.89 m ² , No overhang
Windows facing North West:	24.11 m ² , No overhang
Air change rate:	5.00 ach
Blinds/curtains:	None

10 Key features

Thermal bridging γ -value	0.019 W/m ² K
Air permeability	3.0 m ³ /m ² h

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Basement floor	362.2300 (1a)	x 3.6000 (2a)	= 1304.0280 (1a) - (3a)
Ground floor	299.9900 (1b)	x 4.2800 (2b)	= 1283.9572 (1b) - (3b)
First floor	299.9900 (1c)	x 3.7000 (2c)	= 1109.9630 (1c) - (3c)
Second floor	245.0100 (1d)	x 2.6800 (2d)	= 656.6268 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	1207.2200		(4)
Dwelling volume			(3a) + (3b) + (3c) + (3d) + (3e)...(3n) = 4354.5750 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					16 * 10 = 160.0000 (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)+(7a)+(7b)+(7c) =					160.0000 / (5) = 0.0367 (8)
Pressure test					Yes
Measured/design AP50					3.0000
Infiltration rate					0.1867 (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) =	0.1587 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.2024	0.1984	0.1944	0.1746	0.1706	0.1508	0.1508	0.1468	0.1587	0.1706	0.1786	0.1865 (22b)
Effective ac	0.5205	0.5197	0.5189	0.5152	0.5146	0.5114	0.5114	0.5108	0.5126	0.5146	0.5159	0.5174 (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
Door			5.3700	1.3000	6.9810		(26)
Half glazed door			3.9200	1.3000	5.0960		(26a)
Windows (Uw = 1.30)			118.5100	1.2357	146.4477		(27)
Rooflight (Uw = 1.30)			18.9500	1.2357	23.4173		(27a)
Heat Loss Floor 1			362.2300	0.1900	68.8237		(28a)
Main Wall	687.8000	117.1500	570.6500	0.2500	142.6625		(29a)
Basement Wall	270.7400		270.7400	0.2203	59.6344		(29a)
Dormer	27.2300	10.6500	16.5800	0.2500	4.1450		(29a)
Sloped	214.0600		214.0600	0.1500	32.1090		(30)
Flat	180.4700	15.0600	165.4100	0.1500	24.8115		(30)
Flat over Pool	58.5700	3.8900	54.6800	0.1500	8.2020		(30)
Total net area of external elements Aum(A, m ²)			1801.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	522.3301		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							34.5223 (36)
Total fabric heat loss						(33) + (36) =	556.8524 (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	747.9339	746.7912	745.6710	740.4098	739.4254	734.8430	734.8430	733.9945	736.6081	739.4254	741.4168	743.4986 (38)
Heat transfer coeff	1304.7863	1303.6435	1302.5234	1297.2621	1296.2778	1291.6954	1291.6954	1290.8468	1293.4605	1296.2778	1298.2691	1300.3510 (39)
Average = Sum(39)m / 12 =												1297.2574 (39)
HLP	1.0808	1.0799	1.0789	1.0746	1.0738	1.0700	1.0700	1.0693	1.0714	1.0738	1.0754	1.0771 (40)
HLP (average)												1.0746 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												4.3113 (42)
Average daily hot water use (litres/day)												136.5938 (43)
Daily hot water use	150.2531	144.7894	139.3256	133.8619	128.3981	122.9344	122.9344	128.3981	133.8619	139.3256	144.7894	150.2531 (44)

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	222.8211	194.8807	201.0994	175.3234	168.2269	145.1671	134.5186	154.3621	156.2057	182.0426	198.7138	215.7903 (45)
Energy content (annual)	Total = Sum (45)m =											2149.1516 (45)
Distribution loss (46)m = 0.15 x (45)m	33.4232	29.2321	30.1649	26.2985	25.2340	21.7751	20.1778	23.1543	23.4308	27.3064	29.8071	32.3685 (46)
Water storage loss:												
Store volume												500.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												3.1300 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.6902 (55)
Total storage loss	52.3962	47.3256	52.3962	50.7060	52.3962	50.7060	52.3962	52.3962	50.7060	52.3962	50.7060	52.3962 (56)
If cylinder contains dedicated solar storage	52.3962	47.3256	52.3962	50.7060	52.3962	50.7060	52.3962	52.3962	50.7060	52.3962	50.7060	52.3962 (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)
Total heat required for water heating calculated for each month	298.4797	263.2175	276.7580	248.5414	243.8855	218.3851	210.1772	230.0207	229.4237	257.7012	271.9318	291.4489 (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	298.4797	263.2175	276.7580	248.5414	243.8855	218.3851	210.1772	230.0207	229.4237	257.7012	271.9318	291.4489 (64)
Heat gains from water heating, kWh/month	134.6149	119.4673	127.3924	116.8694	116.4623	106.8424	105.2543	111.8523	110.5128	121.0561	124.6467	132.2772 (65)
Total per year (kWh/year) = Sum(64)m =												3039.9706 (64)

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	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	102.1841	90.7590	73.8102	55.8791	41.7703	35.2642	38.1042	49.5293	66.4781	84.4093	98.5181	105.0241 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	1027.0337	1037.6911	1010.8348	953.6609	881.4892	813.6579	768.3424	757.6851	784.5413	841.7152	913.8870	981.7182 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566 (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)	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526 (71)
Water heating gains (Table 5)	180.9340	177.7787	171.2264	162.3186	156.5354	148.3923	141.4709	150.3391	153.4900	162.7098	173.1205	177.7919 (72)
Total internal gains	1400.8215	1396.8985	1346.5411	1262.5283	1170.4645	1087.9841	1038.5873	1048.2232	1095.1792	1179.5040	1276.1952	1355.2039 (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						
Horizontal	18.9500	26.0000	0.7200	0.7000	1.0000	223.4887 (82)						
Northeast	43.3500	11.2829	0.7300	0.7000	0.7700	173.2070 (75)						
Southeast	17.1600	36.7938	0.7300	0.7000	0.7700	223.5869 (77)						
Southwest	33.8900	36.7938	0.7300	0.7000	0.7700	441.5712 (79)						
Northwest	24.1100	11.2829	0.7300	0.7000	0.7700	96.3327 (81)						
Solar gains	1158.1866	2145.8352	3363.9268	4833.5801	5984.0286	6181.4907	5860.1703	4971.6918	3871.5906	2490.0364	1419.5156	969.8666 (83)
Total gains	2559.0081	3542.7337	4710.4679	6096.1084	7154.4932	7269.4749	6898.7575	6019.9149	4966.7698	3669.5404	2695.7109	2325.0705 (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	64.2517	64.3080	64.3633	64.6244	64.6734	64.9029	64.9029	64.9455	64.8143	64.6734	64.5742	64.4708
alpha	5.2834	5.2872	5.2909	5.3083	5.3116	5.3269	5.3269	5.3297	5.3210	5.3116	5.3049	5.2981
util living area	1.0000	0.9999	0.9995	0.9960	0.9736	0.8907	0.7507	0.8362	0.9799	0.9993	1.0000	1.0000 (86)
MIT	19.4848	19.6252	19.8825	20.2408	20.5985	20.8586	20.9602	20.9286	20.6797	20.2257	19.7894	19.4609 (87)
Th 2	20.0165	20.0173	20.0181	20.0216	20.0223	20.0254	20.0254	20.0260	20.0242	20.0223	20.0210	20.0195 (88)
util rest of house	1.0000	0.9999	0.9993	0.9940	0.9589	0.8261	0.6184	0.7207	0.9626	0.9988	0.9999	1.0000 (89)
MIT 2	17.9454	18.1516	18.5289	19.0549	19.5685	19.9095	20.0071	19.9865	19.6911	19.0345	18.3946	17.9126 (90)
Living area fraction	fLA = Living area / (4) =											0.0479 (91)
MIT	18.0191	18.2222	18.5937	19.1117	19.6178	19.9550	20.0528	20.0316	19.7384	19.0916	18.4614	17.9868 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0191	18.2222	18.5937	19.1117	19.6178	19.9550	20.0528	20.0316	19.7384	19.0916	18.4614	17.9868 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	1.0000	0.9998	0.9988	0.9912	0.9504	0.8203	0.6226	0.7215	0.9547	0.9980	0.9999	1.0000 (94)
Ext temp.	4.3000	4.9027	4.7040	6.5000	8.9000	11.7000	14.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (95)
Heat loss rate W	17900.5585	17367.3371	15752.3607	13247.2242	10263.7005	6916.9845	4459.9023	4687.8341	7293.0958	11007.4550	14750.1987	17927.6218 (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												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

11414.1697	9290.5575	8219.3047	5187.5841	2577.5027	0.0000	0.0000	0.0000	0.0000	5464.7354	8679.4239	11608.3282	(98)
Space heating											62441.6062	(98)
Space heating per m2											(98) / (4) =	51.7235 (99)

8c. Space cooling requirement

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 %)												93.7000	(206)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement												66639.9212	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	11414.1697	9290.5575	8219.3047	5187.5841	2577.5027	0.0000	0.0000	0.0000	0.0000	5464.7354	8679.4239	11608.3282	(98)
Space heating efficiency (main heating system 1)	93.7000	93.7000	93.7000	93.7000	93.7000	0.0000	0.0000	0.0000	0.0000	93.7000	93.7000	93.7000	(210)
Space heating fuel (main heating system)	12181.6112	9915.2161	8771.9368	5536.3758	2750.8033	0.0000	0.0000	0.0000	0.0000	5832.1616	9262.9924	12388.8241	(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 requirement	298.4797	263.2175	276.7580	248.5414	243.8855	218.3851	210.1772	230.0207	229.4237	257.7012	271.9318	291.4489	(64)
Efficiency of water heater (217)m	90.3919	90.3670	90.3065	90.1487	89.6634	80.0000	80.0000	80.0000	80.0000	90.1570	90.3330	90.4039	(217)
Fuel for water heating, kWh/month	330.2062	291.2761	306.4651	275.7015	272.0014	272.9813	262.7215	287.5259	286.7796	285.8362	301.0327	322.3855	(219)
Water heating fuel used												3494.9129	(219)
Annual totals kWh/year													
Space heating fuel - main system												66639.9212	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
central heating pump												30.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												75.0000	(231)
Electricity for lighting (calculated in Appendix L)												1804.6032	(232)
Total delivered energy for all uses												72014.4374	(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	66639.9212	0.2160	14394.2230 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	3494.9129	0.2160	754.9012 (264)
Space and water heating			15149.1242 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	1804.6032	0.5190	936.5891 (268)
Total CO2, kg/year			16124.6382 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			13.3600 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER			13.3600 ZC1
Total Floor Area		TFA	1207.2200
Assumed number of occupants		N	4.3113
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			5.0413 ZC2
CO2 emissions from cooking, equation (L16)			0.1843 ZC3
Total CO2 emissions			18.5856 ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year			0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000 ZC7
Net CO2 emissions			18.5856 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Basement floor	362.2300 (1a)	x 3.6000 (2a)	= 1304.0280 (1a) - (3a)
Ground floor	299.9900 (1b)	x 4.2800 (2b)	= 1283.9572 (1b) - (3b)
First floor	299.9900 (1c)	x 3.7000 (2c)	= 1109.9630 (1c) - (3c)
Second floor	245.0100 (1d)	x 2.6800 (2d)	= 656.6268 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	1207.2200		(3a) + (3b) + (3c) + (3d) + (3e)...(3n) = 4354.5750 (5)
Dwelling volume			

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					4 * 10 = 40.0000 (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)+(7a)+(7b)+(7c) =					40.0000 / (5) = 0.0092 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.2592 (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) = 0.2203 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.2809	0.2754	0.2699	0.2423	0.2368	0.2093	0.2093	0.2038	0.2203	0.2368	0.2478	0.2589 (22b)
Effective ac	0.5395	0.5379	0.5364	0.5294	0.5280	0.5219	0.5219	0.5208	0.5243	0.5280	0.5307	0.5335 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			5.3700	1.0000	5.3700		(26)
TER Semi-glazed door			3.9200	1.2000	4.7040		(26a)
TER Opening Type (Uw = 1.40)			118.5100	1.3258	157.1155		(27)
TER Room Window (Uw = 1.70)			18.9500	1.5918	30.1639		(27a)
Heat Loss Floor 1			362.2300	0.1300	47.0899		(28a)
Main Wall	687.8000	117.1500	570.6500	0.1800	102.7170		(29a)
Basement Wall	270.7400		270.7400	0.1800	48.7332		(29a)
Dormer	27.2300	10.6500	16.5800	0.1800	2.9844		(29a)
Sloped	214.0600		214.0600	0.1300	27.8278		(30)
Flat	180.4700	15.0600	165.4100	0.1300	21.5033		(30)
Flat over Pool	58.5700	3.8900	54.6800	0.1300	7.1084		(30)
Total net area of external elements Aum(A, m ²)			1801.1000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 455.3174		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							45.6851 (36)
Total fabric heat loss							(33) + (36) = 501.0025 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	775.1954	772.9940	770.8362	760.7013	758.8050	749.9778	749.9778	748.3431	753.3779	758.8050	762.6411	766.6515 (38)
Heat transfer coeff	1276.1978	1273.9965	1271.8387	1261.7037	1259.8075	1250.9803	1250.9803	1249.3456	1254.3804	1259.8075	1263.6436	1267.6540 (39)
Average = Sum(39)m / 12 =												1261.6947 (39)
HLP	1.0571	1.0553	1.0535	1.0451	1.0436	1.0362	1.0362	1.0349	1.0391	1.0436	1.0467	1.0501 (40)
HLP (average)												1.0451 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												4.3113 (42)
Average daily hot water use (litres/day)												136.5938 (43)
Daily hot water use	150.2531	144.7894	139.3256	133.8619	128.3981	122.9344	122.9344	128.3981	133.8619	139.3256	144.7894	150.2531 (44)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Energy content (annual)	222.8211	194.8807	201.0994	175.3234	168.2269	145.1671	134.5186	154.3621	156.2057	182.0426	198.7138	215.7903 (45)
Energy content (annual)	Total = Sum(45)m =											2149.1516 (45)
Distribution loss (46)m = 0.15 x (45)m	33.4232	29.2321	30.1649	26.2985	25.2340	21.7751	20.1778	23.1543	23.4308	27.3064	29.8071	32.3685 (46)
Water storage loss:												
Store volume												500.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.9009 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.5665 (55)
Total storage loss	48.5607	43.8613	48.5607	46.9942	48.5607	46.9942	48.5607	48.5607	46.9942	48.5607	46.9942	48.5607 (56)
If cylinder contains dedicated solar storage	48.5607	43.8613	48.5607	46.9942	48.5607	46.9942	48.5607	48.5607	46.9942	48.5607	46.9942	48.5607 (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)
Total heat required for water heating calculated for each month	294.6442	259.7532	272.9226	244.8296	240.0501	214.6733	206.3417	226.1852	225.7119	253.8657	268.2200	287.6134 (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	294.6442	259.7532	272.9226	244.8296	240.0501	214.6733	206.3417	226.1852	225.7119	253.8657	268.2200	287.6134 (64)
Total per year (kWh/year) = Sum(64)m =												2994.8109 (64)
Heat gains from water heating, kWh/month	131.5465	116.6958	124.3241	113.9000	113.3939	103.8730	102.1859	108.7839	107.5434	117.9877	121.6773	129.2088 (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	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658	215.5658 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	102.1841	90.7590	73.8102	55.8791	41.7703	35.2642	38.1042	49.5293	66.4781	84.4093	98.5181	105.0241 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	1027.0337	1037.6911	1010.8348	953.6609	881.4892	813.6579	768.3424	757.6851	784.5413	841.7152	913.8870	981.7182 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566	44.5566 (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)	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526	-172.4526 (71)
Water heating gains (Table 5)	176.8098	173.6545	167.1022	158.1945	152.4112	144.2681	137.3467	146.2149	149.3658	158.5856	168.9963	173.6677 (72)
Total internal gains	1396.6973	1392.7743	1342.4169	1258.4042	1166.3404	1083.8600	1034.4631	1044.0990	1091.0550	1175.3798	1272.0710	1351.0798 (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						
Northeast	43.3500	11.2829	0.6300	0.7000	0.7700	149.4801 (75)						
Southeast	17.1600	36.7938	0.6300	0.7000	0.7700	192.9586 (77)						
Southwest	33.8900	36.7938	0.6300	0.7000	0.7700	381.0820 (79)						
Northwest	24.1100	11.2829	0.6300	0.7000	0.7700	83.1364 (81)						
Horizontal	18.9500	26.0000	0.6300	0.7000	1.0000	195.5526 (82)						
Solar gains	1002.2097	1857.4489	2913.0059	4186.9004	5184.0806	5355.3174	5076.8800	4306.8139	3353.0843	2155.7356	1228.4615	839.1718 (83)
Total gains	2398.9070	3250.2232	4255.4228	5445.3046	6350.4210	6439.1773	6111.3431	5350.9129	4444.1393	3331.1154	2500.5325	2190.2516 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	65.6910	65.8045	65.9162	66.4456	66.5457	67.0152	67.0152	67.1029	66.8336	66.5457	66.3436	66.1338
alpha	5.3794	5.3870	5.3944	5.4297	5.4364	5.4677	5.4677	5.4735	5.4556	5.4364	5.4229	5.4089
util living area	1.0000	1.0000	0.9997	0.9976	0.9833	0.9213	0.7980	0.8740	0.9870	0.9996	1.0000	1.0000 (86)
MIT	19.5033	19.6336	19.8765	20.2200	20.5659	20.8352	20.9501	20.9150	20.6611	20.2247	19.8056	19.4861 (87)
Th 2	20.0360	20.0375	20.0390	20.0459	20.0472	20.0532	20.0532	20.0544	20.0509	20.0472	20.0446	20.0418 (88)
util rest of house	1.0000	0.9999	0.9996	0.9964	0.9734	0.8687	0.6721	0.7714	0.9752	0.9993	1.0000	1.0000 (89)
MIT 2	17.9864	18.1784	18.5352	19.0426	19.5436	19.9103	20.0285	20.0034	19.6868	19.0511	18.4354	17.9654 (90)
Living area fraction												fLA = Living area / (4) =
MIT	18.0591	18.2481	18.5994	19.0990	19.5926	19.9546	20.0726	20.0471	19.7335	19.1073	18.5010	18.0382 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0591	18.2481	18.5994	19.0990	19.5926	19.9546	20.0726	20.0471	19.7335	19.1073	18.5010	18.0382 (93)

8. Space heating requirement

Utilisation	1.0000	0.9999	0.9993	0.9946	0.9666	0.8616	0.6751	0.7704	0.9689	0.9988	0.9999	1.0000 (94)
Useful gains	2398.8607	3249.8697	4252.4235	5415.7352	6138.0608	5547.8347	4125.8414	4122.4326	4305.8664	3327.1143	2500.3773	2190.2267 (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	17559.3183	17005.3706	15388.5436	12868.1354	9943.0948	6698.5444	4344.2118	4556.4516	7066.5493	10717.5286	14406.8515	17542.0898 (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												

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Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

11279.3805	9243.6966	8285.2733	5365.7281	2830.9453	0.0000	0.0000	0.0000	0.0000	5498.4682	8572.6614	11421.7862	(98)
Space heating											62497.9396	(98)
Space heating per m2											(98) / (4) =	51.7701 (99)

8c. Space cooling requirement

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 %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													66842.7161 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	11279.3805	9243.6966	8285.2733	5365.7281	2830.9453	0.0000	0.0000	0.0000	0.0000	5498.4682	8572.6614	11421.7862	(98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000	(210)
Space heating fuel (main heating system)	12063.5085	9886.3065	8861.2549	5738.7466	3027.7490	0.0000	0.0000	0.0000	0.0000	5880.7147	9168.6218	12215.8141	(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 requirement	294.6442	259.7532	272.9226	244.8296	240.0501	214.6733	206.3417	226.1852	225.7119	253.8657	268.2200	287.6134	(64)
Efficiency of water heater (217)m	90.1921	90.1695	90.1147	89.9736	89.5613	79.8000	79.8000	79.8000	79.8000	89.9676	90.1333	79.8000	(216)
Fuel for water heating, kWh/month	326.6850	288.0720	302.8614	272.1129	268.0288	269.0142	258.5736	283.4401	282.8470	282.1746	297.5813	318.8515	(219)
Water heating fuel used													3450.2424 (219)
Annual totals kWh/year													
Space heating fuel - main system													66842.7161 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													1804.6032 (232)
Total delivered energy for all uses													72172.5617 (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	66842.7161	0.2160	14438.0267 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	3450.2424	0.2160	745.2523 (264)
Space and water heating			15183.2790 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	1804.6032	0.5190	936.5891 (268)
Total CO2, kg/m2/year			16158.7931 (272)
Emissions per m2 for space and water heating			12.5771 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			0.7758 (272b)
Emissions per m2 for pumps and fans			0.0322 (272c)
Target Carbon Dioxide Emission Rate (TER) = (12.5771 * 1.00) + 0.7758 + 0.0322, rounded to 2 d.p.			13.3900 (273)