

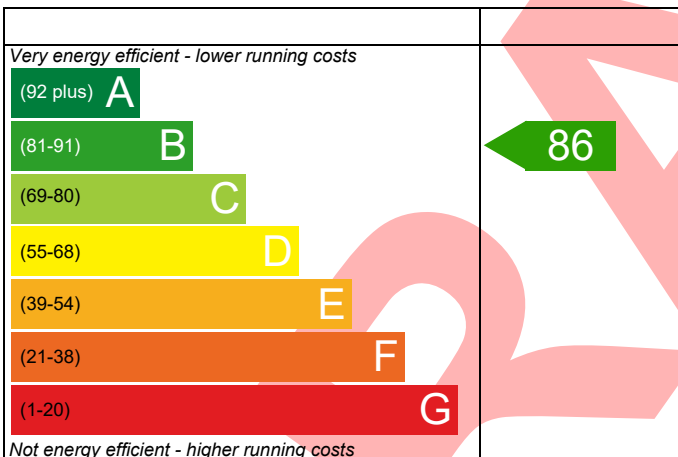
PREDICTED ENERGY ASSESSMENT

Dwelling type: Bungalow, Semi-Detached
Date of assessment: 09/11/2022
Produced by: S J Roberts Construction Limited
Total floor area: 64 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 (CO₂) emissions.

Energy Efficiency Rating

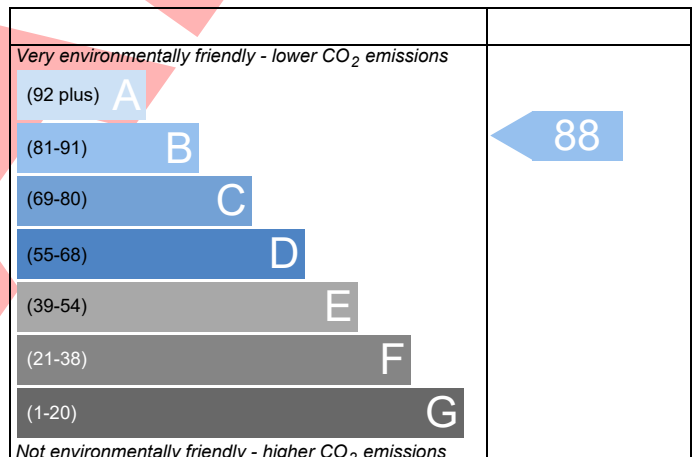


England

EU Directive
2002/91/EC

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 (CO₂) Rating



England

EU Directive
2002/91/EC

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) 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.

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Property Reference	HOUSE TYPE D1			Issued on Date	09/11/2022
Assessment Reference	GRANT ASHP	Prop Type Ref			
Property					
SAP Rating	86 B	DER	17.14	TER	29.87
Environmental	88 B	% DER<TER	42.61		
CO ₂ Emissions (t/year)	0.99	DFEE	50.86	TFEE	57.62
General Requirements Compliance	Pass	% DFEE<TFEE	11.73		
Assessor Details	Mr. Neil Jones, S J Roberts Construction Limited, Tel: 01743 891858, neil.jones@sjroberts.com			Assessor ID	K559-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	29.87	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	17.14	kgCO ₂ /m ²	Pass
	-12.73 (-42.6%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	57.62	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	50.86	kWh/m ² /yr	
	-6.7 (-11.6%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.23 (max. 0.30)	0.23 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	Pass
Roof	0.14 (max. 0.20)	0.14 (max. 0.35)	Pass
Openings	1.36 (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	4.50 (design value)	m ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 50 Pa	Pass

Limiting System Efficiencies

4 Heating efficiency

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

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Main heating system

Heat pump with radiators or underfloor - Electric
Grant AERONA3 HPID6R32

Secondary heating system

None

5 Cylinder insulation

Hot water storage

Measured cylinder loss: 1.61 kWh/day
Permitted by DBSCG 2.10

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1300 0.1600

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Midlands)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

5.28 m², No overhang

Windows facing South

3.35 m², No overhang

Windows facing South West

2.14 m², No overhang

Windows facing West

1.23 m², No overhang

Air change rate

5.00 ach

Blinds/curtains

None

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

4.50 (design value)

m³/(h.m²) @ 50 Pa

Maximum

10.0

m³/(h.m²) @ 50 Pa

Pass

10 Key features

Party wall U-value

0.00

W/m²K

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)

Property Reference	HOUSE TYPE D1				Issued on Date	09/11/2022
Assessment Reference	GRANT ASHP		Prop Type Ref			
Property						
SAP Rating	86 B	DER	17.14	TER	29.87	
Environmental	88 B	% DER<TER	42.61			
CO ₂ Emissions (t/year)	0.99	DFEE	50.86	TFEE	57.62	
General Requirements Compliance	Pass	% DFEE<TFEE	11.73			
Assessor Details	Mr. Neil Jones, S J Roberts Construction Limited, Tel: 01743 891858, neil.jones@sjroberts.com				Assessor ID	K559-0001
Client						

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

Semi-Detached Bungalow, total floor area 64 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:Electricity

Fuel factor:1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 29.87 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 17.14 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)57.6 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE)50.9 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.23 (max. 0.30)	0.23 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	OK
Roof	0.14 (max. 0.20)	0.14 (max. 0.35)	OK
Openings	1.36 (max. 2.00)	1.40 (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: 4.50 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Heat pump with radiators or underfloor - Electric
Grant AERONA3 HPID6R32

Secondary heating system: None

5 Cylinder insulation

Hot water storage Measured cylinder loss: 1.61 kWh/day
Permitted by DBSCG 2.10 OK
Primary pipework insulated: Yes OK

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls:

Cylinderstat OK
Independent timer for DHW OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system (decentralised)
Specific fan power: 0.1300 0.1600
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Midlands): Slight OK

Based on:

Overshading: Average
Windows facing North: 5.28 m², No overhang
Windows facing South: 3.35 m², No overhang
Windows facing South West: 2.14 m², No overhang
Windows facing West: 1.23 m², No overhang
Air change rate: 5.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

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)
Ground floor	64.0000 (1b)	x 2.4000 (2b)	= 153.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 153.6000 (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					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)+(7a)+(7b)+(7c) =				0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.5000
Infiltration rate					0.2250 (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) =				0.2081 (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	0.2654	0.2602	0.2550	0.2289	0.2237	0.1977	0.1977	0.1925	0.2081	0.2237	0.2341	0.2445 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5154	0.5102	0.5050	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
upvc window (Uw = 1.40)			8.4300	1.3258	11.1761		(27)
FRENCH DOOR (Uw = 1.40)			3.5700	1.3258	4.7330		(27)
external door			3.0000	1.2000	3.6000		(26)
Heat Loss Floor 1			36.1300	0.1600	5.7808		(28a)
BRICK TF	63.6200	15.0000	48.6200	0.2300	11.1826		(29a)
CEILING	64.0000		64.0000	0.1400	8.9600		(30)
Total net area of external elements Aum(A, m ²)			163.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.4325		(33)
Party Wall 1			16.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.1148 (36)
Total fabric heat loss							(33) + (36) = 55.5473 (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	26.1225	25.8588	25.5951	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440 (38)
Heat transfer coeff	81.6698	81.4061	81.1424	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913 (39)
Average = Sum(39)m / 12 =												81.0200 (39)
HLP	1.2761	1.2720	1.2678	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639 (40)
HLP (average)												1.2659 (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												2.0922 (42)
Average daily hot water use (litres/day)												83.8893 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	92.2782	88.9227	85.5671	82.2115	78.8559	75.5004	75.5004	78.8559	82.2115	85.5671	88.9227	92.2782 (44)
Energy conte	136.8460	119.6864	123.5056	107.6752	103.3169	89.1546	82.6149	94.8018	95.9340	111.8018	122.0404	132.5280 (45)
Energy content (annual)												Total = Sum(45)m = 1319.9055 (45)
Distribution loss (46)m = 0.15 x (45)m	20.5269	17.9530	18.5258	16.1513	15.4975	13.3732	12.3922	14.2203	14.3901	16.7703	18.3061	19.8792 (46)

Water storage loss:													
Store volume												180.0000 (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	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													
	187.0598	165.0408	173.7194	156.2692	153.5307	137.7486	132.8287	145.0156	144.5280	162.0156	170.6344	182.7418 (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	187.0598	165.0408	173.7194	156.2692	153.5307	137.7486	132.8287	145.0156	144.5280	162.0156	170.6344	182.7418 (64)	
								Total per year (kWh/year) = Sum (64)m =					1911.1325 (64)
Heat gains from water heating, kWh/month													
	85.6723	76.0792	81.2367	74.6772	74.5239	68.5191	67.6405	71.6926	70.7733	77.3451	79.4536	84.2366 (65)	

[illegible]

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Month	1221.6827	1176.6391	1054.7769	871.0328	656.8505	430.3450	271.7169	287.4171	467.6122	735.6526	998.7558	1217.3045	(97)
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	575.1332	450.1108	382.4190	236.2298	123.6315	0.0000	0.0000	0.0000	0.0000	223.5603	407.6743	587.4302	(98)
Space heating												2986.1890	(98)
Space heating per m2												46.6592	(99)

(98) / (4) =

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 %)													252.2240	(206)
Efficiency of secondary/supplementary heating system, %													100.0000	(208)
Space heating requirement													1183.9434	(211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement	575.1332	450.1108	382.4190	236.2298	123.6315	0.0000	0.0000	0.0000	0.0000	223.5603	407.6743	587.4302	(98)	
Space heating efficiency (main heating system 1)	252.2240	252.2240	252.2240	252.2240	252.2240	0.0000	0.0000	0.0000	0.0000	252.2240	252.2240	252.2240	(210)	
Space heating fuel (main heating system)	228.0248	178.4568	151.6188	93.6588	49.0166	0.0000	0.0000	0.0000	0.0000	88.6356	161.6319	232.9002	(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	187.0598	165.0408	173.7194	156.2692	153.5307	137.7486	132.8287	145.0156	144.5280	162.0156	170.6344	182.7418	(64)	
Efficiency of water heater	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	(216)	
(217)m	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	(217)	
Fuel for water heating, kWh/month	59.2374	52.2645	55.0128	49.4867	48.6195	43.6217	42.0637	45.9230	45.7686	51.3065	54.0359	57.8700	(219)	
Water heating fuel used												605.2101	(219)	
Annual totals kWh/year														
Space heating fuel - main system													1183.9434	(211)
Space heating fuel - secondary													0.0000	(215)
Electricity for pumps and fans:														
(MEV)Decentralised, Database: total watage = 3.6075, total flow = 21.0000, SFP = 0.1718)														
mechanical ventilation fans (SFP = 0.1718)													32.1913	(230a)
Total electricity for the above, kWh/year													32.1913	(231)
Electricity for lighting (calculated in Appendix L)													292.3277	(232)
Total delivered energy for all uses													2113.6725	(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	1183.9434	0.5190	614.4666 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	605.2101	0.5190	314.1040 (264)
Space and water heating			928.5707 (265)
Pumps and fans	32.1913	0.5190	16.7073 (267)
Energy for lighting	292.3277	0.5190	151.7181 (268)
Total CO2, kg/year			1096.9961 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.1400 (273)

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

DER		17.1400	ZC1
Total Floor Area	TFA	64.0000	
Assumed number of occupants	N	2.0922	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		16.9358	ZC2
CO2 emissions from cooking, equation (L16)		2.6439	ZC3
Total CO2 emissions		36.7197	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		36.7197	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)
Ground floor	64.0000 (1b)	x 2.4000 (2b)	= 153.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 153.6000 (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					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)+(7a)+(7b)+(7c) =					Air changes per hour
Pressure test					20.0000 / (5) = 0.1302 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.3802 (18)
					1 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3517 (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												
Effective ac	0.4484	0.4396	0.4308	0.3869	0.3781	0.3341	0.3341	0.3253	0.3517	0.3781	0.3957	0.4132 (22b)
	0.6005	0.5966	0.5928	0.5748	0.5715	0.5558	0.5558	0.5529	0.5618	0.5715	0.5783	0.5854 (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			3.0000	1.0000	3.0000		(26)
TER Opening Type (Uw = 1.40)			12.0000	1.3258	15.9091		(27)
Heat Loss Floor 1			36.1300	0.1300	4.6969		(28a)
BRICK TF	63.6200	15.0000	48.6200	0.1800	8.7516		(29a)
CEILING	64.0000		64.0000	0.1300	8.3200		(30)
Total net area of external elements Aum(A, m ²)			163.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.6776		(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)							9.8566 (36)
Total fabric heat loss						(33) + (36) =	50.5342 (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	30.4399	30.2420	30.0481	29.1370	28.9666	28.1731	28.1731	28.0262	28.4787	28.9666	29.3114	29.6719 (38)
Heat transfer coeff	80.9741	80.7762	80.5823	79.6712	79.5008	78.7073	78.7073	78.5604	79.0129	79.5008	79.8456	80.2061 (39)
Average = Sum(39)m / 12 =												79.6704 (39)
HLP	1.2652	1.2621	1.2591	1.2449	1.2422	1.2298	1.2298	1.2275	1.2346	1.2422	1.2476	1.2532 (40)
HLP (average)												1.2449 (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												2.0922 (42)
Average daily hot water use (litres/day)												83.8893 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	92.2782	88.9227	85.5671	82.2115	78.8559	75.5004	75.5004	78.8559	82.2115	85.5671	88.9227	92.2782 (44)
Energy content (annual)	136.8460	119.6864	123.5056	107.6752	103.3169	89.1546	82.6149	94.8018	95.9340	111.8018	122.0404	132.5280 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1319.9055 (45)
	20.5269	17.9530	18.5258	16.1513	15.4975	13.3732	12.3922	14.2203	14.3901	16.7703	18.3061	19.8792 (46)
Water storage loss:												180.0000 (47)
Store volume												1.5520 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8381 (55)
Enter (49) or (54) in (55)												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (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	186.0886	164.1636	172.7483	155.3294	152.5596	136.8088	131.8575	144.0444	143.5882	161.0445	169.6946	181.7707 (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)
Output from w/h	186.0886	164.1636	172.7483	155.3294	152.5596	136.8088	131.8575	144.0444	143.5882	161.0445	169.6946	181.7707 (64)
Heat gains from water heating, kWh/month	84.8954	75.3775	80.4597	73.9254	73.7470	67.7673	66.8636	70.9157	70.0214	76.5682	78.7018	83.4597 (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	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.5528	14.7021	11.9565	9.0519	6.7664	5.7125	6.1725	8.0233	10.7688	13.6735	15.9589	17.0129	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.9108	184.8088	180.0258	169.8433	156.9898	144.9093	136.8388	134.9408	139.7238	149.9062	162.7598	174.8402	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	(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)	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	(71)
Water heating gains (Table 5)	114.1067	112.1689	108.1448	102.6741	99.1223	94.1212	89.8704	95.3168	97.2520	102.9143	109.3081	112.1770	(72)
Total internal gains	370.9530	369.0625	357.5098	338.9520	320.2612	302.1257	290.2645	295.6636	305.1273	323.8767	345.4095	361.4128	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W		
North				5.2800	10.6334	0.6300	0.7000	0.7700		17.1584 (74)		
South				3.3500	46.7521	0.6300	0.7000	0.7700		47.8649 (78)		
Southwest				2.1400	36.7938	0.6300	0.7000	0.7700		24.0636 (79)		
West				1.2300	19.6403	0.6300	0.7000	0.7700		7.3829 (80)		
Solar gains	96.4698	166.6127	235.4427	306.5362	358.5159	363.0367	347.0134	306.8551	259.6923	186.0234	115.9316	82.3285 (83)
Total gains	467.4228	535.6752	592.9525	645.4882	678.7771	665.1625	637.2778	602.5187	564.8196	509.9001	461.3411	443.7414 (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	54.8872	55.0217	55.1541	55.7848	55.9044	56.4680	56.4680	56.5736	56.2496	55.9044	55.6630	55.4128	
alpha	4.6591	4.6681	4.6769	4.7190	4.7270	4.7645	4.7645	4.7716	4.7500	4.7270	4.7109	4.6942	
util living area	0.9954	0.9906	0.9789	0.9446	0.8587	0.6961	0.5294	0.5777	0.8112	0.9584	0.9906	0.9963	(86)
MIT	19.7251	19.8929	20.1540	20.4890	20.7742	20.9411	20.9871	20.9807	20.8742	20.5120	20.0587	19.6960	(87)
Th 2	19.8682	19.8706	19.8730	19.8843	19.8864	19.8962	19.8962	19.8981	19.8924	19.8864	19.8821	19.8777	(88)
util rest of house	0.9938	0.9874	0.9715	0.9243	0.8076	0.5996	0.4037	0.4502	0.7296	0.9389	0.9868	0.9951	(89)
MIT 2	18.1923	18.4377	18.8160	19.2959	19.6694	19.8581	19.8917	19.8905	19.7960	19.3378	18.6883	18.1565	(90)
Living area fraction	18.8940	19.1039	19.4286	19.8421	20.1752	20.3539	20.3932	20.3896	20.2896	19.8754	19.3157	18.8613	(91)
MIT	18.8940	19.1039	19.4286	19.8421	20.1752	20.3539	20.3932	20.3896	20.2896	19.8754	19.3157	18.8613	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8940	19.1039	19.4286	19.8421	20.1752	20.3539	20.3932	20.3896	20.2896	19.8754	19.3157	18.8613	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	463.6505	527.4074	573.8693	596.0500	558.1760	426.8919	294.2162	306.6189	430.2867	478.6115	454.0934	440.8822	(94)
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	1181.7400	1147.3358	1041.8122	871.7700	673.7831	452.8745	298.5519	313.4261	489.0606	737.3976	975.3693	1175.9247	(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	534.2585	416.5919	348.1495	198.5184	86.0117	0.0000	0.0000	0.0000	0.0000	192.5369	375.3186	546.8716	(98)
Space heating												2698.2572	(98)
Space heating per m2												42.1603	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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													2885.8365 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	534.2585	416.5919	348.1495	198.5184	86.0117	0.0000	0.0000	0.0000	0.0000	192.5369	375.3186	546.8716	(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)	571.3995	445.5528	372.3524	212.3192	91.9911	0.0000	0.0000	0.0000	0.0000	205.9218	401.4103	584.8895	(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	186.0886	164.1636	172.7483	155.3294	152.5596	136.8088	131.8575	144.0444	143.5882	161.0445	169.6946	181.7707	(64)
Efficiency of water heater (217)m	87.4702	87.1951	86.6470	85.4693	83.3530	79.8000	79.8000	79.8000	79.8000	85.2912	86.8732	79.8000	(216)
Fuel for water heating, kWh/month	212.7453	188.2716	199.3701	181.7370	183.0283	171.4396	165.2350	180.5068	179.9351	188.8173	195.3361	207.5700	(219)
Water heating fuel used												2253.9921	(219)
Annual totals kWh/year													
Space heating fuel - main system												2885.8365	(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)												292.3277	(232)
Total delivered energy for all uses												5507.1564	(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	2885.8365	0.2160	623.3407 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2253.9921	0.2160	486.8623 (264)
Space and water heating			1110.2030 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	292.3277	0.5190	151.7181 (268)
Total CO2, kg/m2/year			1300.8461 (272)
Emissions per m2 for space and water heating			17.3469 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			2.3706 (272b)
Emissions per m2 for pumps and fans			0.6082 (272c)
Target Carbon Dioxide Emission Rate (TER) = (17.3469 * 1.55) + 2.3706 + 0.6082, rounded to 2 d.p.			29.8700 (273)

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

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	64.0000 (1b)	x 2.4000 (2b)	= 153.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 153.6000 (5)

	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							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)+(7a)+(7b)+(7c) =						20.0000 / (5) =	0.1302	(8)
Pressure test							Yes		
Measured/design AP50							4.5000		
Infiltration rate							0.3552		(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) =	0.3286	(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												
	0.4189	0.4107	0.4025	0.3614	0.3532	0.3121	0.3121	0.3039	0.3286	0.3532	0.3696	0.3861 (22b)
Effective ac	0.5877	0.5843	0.5810	0.5653	0.5624	0.5487	0.5487	0.5462	0.5540	0.5624	0.5683	0.5745 (25)

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
upvc window (Uw = 1.40)			8.4300	1.3258	11.1761		(27)
FRENCH DOOR (Uw = 1.40)			3.5700	1.3258	4.7330		(27)
external door			3.0000	1.2000	3.6000		(26)
Heat Loss Floor 1			36.1300	0.1600	5.7808		(28a)
BRICK TF	63.6200	15.0000	48.6200	0.2300	11.1826		(29a)
CEILING	64.0000		64.0000	0.1400	8.9600		(30)
Total net area of external elements Aum(A, m2)			163.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.4325		(33)
Party Wall 1			16.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.1148 (36)
Total fabric heat loss						(33) + (36) =	55.5473 (37)

[illegible]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3334	1.3307	1.3281	1.3157	1.3133	1.3025	1.3025	1.3005	1.3067	1.3133	1.3180	1.3229 (40)
HLP (average)												1.3156 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

[illegible]

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	(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	(59)
Heat gains from water heating, kWh/month	29.0798	25.4333	26.2449	22.8810	21.9548	18.9454	17.5557	20.1454	20.3860	23.7579	25.9336	(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	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.5528	14.7021	11.9565	9.0519	6.7664	5.7125	6.1725	8.0233	10.7688	13.6735	15.9589	17.0129	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.9108	184.8088	180.0258	169.8433	156.9898	144.9093	136.8388	134.9408	139.7238	149.9062	162.7598	174.8402	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	(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)	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	(71)
Water heating gains (Table 5)	39.0857	37.8472	35.2755	31.7791	29.5092	26.3130	23.5963	27.0771	28.3139	31.9326	36.0189	37.8524	(72)
Total internal gains	292.9320	291.7408	281.6405	265.0570	247.6481	231.3175	220.9904	224.4239	233.1892	249.8951	269.1203	284.0882	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	1.7100	10.6334	0.7200	0.7000	0.7700	6.3508	(74)
South	3.3500	46.7521	0.7200	0.7000	0.7700	54.7028	(78)
Southwest	2.1400	36.7938	0.7200	0.7000	0.7700	27.5013	(79)
West	1.2300	19.6403	0.7200	0.7000	0.7700	8.4375	(80)
North	3.5700	10.6334	0.7200	0.7000	0.7700	13.2588	(74)

Solar gains	110.2512	190.4145	269.0773	350.3271	409.7324	414.8991	396.5867	350.6915	296.7912	212.5981	132.4933	94.0898	(83)
Total gains	403.1832	482.1553	550.7178	615.3841	657.3805	646.2166	617.5771	575.1154	529.9804	462.4932	401.6136	378.1780	(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	20.8319	20.8742	20.9157	21.1133	21.1506	21.3264	21.3264	21.3592	21.2583	21.1506	21.0752	20.9969		
alpha	2.3888	2.3916	2.3944	2.4076	2.4100	2.4218	2.4218	2.4239	2.4172	2.4100	2.4050	2.3998		
util living area	0.9644	0.9452	0.9140	0.8566	0.7651	0.6374	0.5118	0.5553	0.7368	0.8854	0.9487	0.9691	(86)	
MIT	18.2799	18.5951	19.0830	19.7020	20.2636	20.6775	20.8656	20.8315	20.5061	19.7724	18.9120	18.2190	(87)	
Th 2	19.8147	19.8168	19.8189	19.8286	19.8304	19.8389	19.8389	19.8404	19.8356	19.8304	19.8267	19.8229	(88)	
util rest of house	0.9586	0.9365	0.8999	0.8315	0.7203	0.5609	0.4019	0.4471	0.6713	0.8599	0.9390	0.9641	(89)	
MIT 2	17.3541	17.6656	18.1454	18.7501	19.2760	19.6420	19.7811	19.7630	19.5076	18.8313	17.9896	17.2994	(90)	
Living area fraction									fLA = Living area / (4) =			0.4578	(91)	
MIT	17.7779	18.0911	18.5746	19.1859	19.7281	20.1161	20.2776	20.2522	19.9647	19.2622	18.4119	17.7204	(92)	
Temperature adjustment												0.0000		
adjusted MIT	17.7779	18.0911	18.5746	19.1859	19.7281	20.1161	20.2776	20.2522	19.9647	19.2622	18.4119	17.7204	(93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9453	0.9200	0.8813	0.8152	0.7159	0.5807	0.4460	0.4883	0.6795	0.8448	0.9237	0.9520	(94)
Useful gains	381.1468	443.5652	485.3273	501.6510	470.6364	375.2539	275.4183	280.8202	360.1122	390.6989	370.9859	360.0071	(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	1150.1940	1123.4406	1026.3088	866.0903	674.7894	459.8257	306.5677	320.6241	490.4522	728.0811	954.2058	1144.7538	(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	572.1711	456.8762	402.4902	262.3963	151.8898	0.0000	0.0000	0.0000	0.0000	251.0124	419.9184	583.8515	(98)
Space heating												3100.6060	(98)
Space heating per m2												(98) / (4) =	48.4470 (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	783.5896	616.8684	632.5658	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7292	0.7923	0.7654	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	571.3861	488.7628	484.1795	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	833.3127	798.2964	749.9275	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	188.5871	230.2930	197.7165	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												616.5966 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	47.1468	57.5732	49.4291	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												154.1492 (107)
Space cooling per m2												2.4086 (108)
Energy for space heating												48.4470 (99)
Energy for space cooling												2.4086 (108)
Total												50.8555 (109)
Dwelling Fabric Energy Efficiency (DFEE)												50.9 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	64.0000 (1b)	x 2.4000 (2b)	= 153.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 153.6000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 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					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)+(7a)+(7b)+(7c) =				Air changes per hour
Pressure test					20.0000 / (5) = 0.1302 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.3802 (18)
					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3517 (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												
Effective ac	0.4484	0.4396	0.4308	0.3869	0.3781	0.3341	0.3341	0.3253	0.3517	0.3781	0.3957	0.4132 (22b)
	0.6005	0.5966	0.5928	0.5748	0.5715	0.5558	0.5558	0.5529	0.5618	0.5715	0.5783	0.5854 (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			3.0000	1.0000	3.0000		(26)
TER Opening Type (Uw = 1.40)			12.0000	1.3258	15.9091		(27)
Heat Loss Floor 1			36.1300	0.1300	4.6969		(28a)
BRICK TF	63.6200	15.0000	48.6200	0.1800	8.7516		(29a)
CEILING	64.0000		64.0000	0.1300	8.3200		(30)
Total net area of external elements Aum(A, m ²)			163.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.6776		(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)							9.8566 (36)
Total fabric heat loss						(33) + (36) =	50.5342 (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	30.4399	30.2420	30.0481	29.1370	28.9666	28.1731	28.1731	28.0262	28.4787	28.9666	29.3114	29.6719 (38)
Heat transfer coeff	80.9741	80.7762	80.5823	79.6712	79.5008	78.7073	78.7073	78.5604	79.0129	79.5008	79.8456	80.2061 (39)
Average = Sum(39)m / 12 =												79.6704 (39)
HLP	1.2652	1.2621	1.2591	1.2449	1.2422	1.2298	1.2298	1.2275	1.2346	1.2422	1.2476	1.2532 (40)
HLP (average)												1.2449 (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												2.0922 (42)
Average daily hot water use (litres/day)												83.8893 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	92.2782	88.9227	85.5671	82.2115	78.8559	75.5004	75.5004	78.8559	82.2115	85.5671	88.9227	92.2782 (44)
Energy content (annual)	136.8460	119.6864	123.5056	107.6752	103.3169	89.1546	82.6149	94.8018	95.9340	111.8018	122.0404	132.5280 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water 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 (46)
Total storage loss												
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 (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 (57)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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)
Heat gains from water heating, kWh/month	29.0798	25.4333	26.2449	22.8810	21.9548	18.9454	17.5557	20.1454	20.3860	23.7579	25.9336	28.1622 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091	104.6091 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	16.5528	14.7021	11.9565	9.0519	6.7664	5.7125	6.1725	8.0233	10.7688	13.6735	15.9589	17.0129 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	182.9108	184.8088	180.0258	169.8433	156.9898	144.9093	136.8388	134.9408	139.7238	149.9062	162.7598	174.8402 (68)
Pumps, fans	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609	33.4609 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873 (71)
Total internal gains	39.0857	37.8472	35.2755	31.7791	29.5092	26.3130	23.5963	27.0771	28.3139	31.9326	36.0189	37.8524 (72)
	292.9320	291.7408	281.6405	265.0570	247.6481	231.3175	220.9904	224.4239	233.1892	249.8951	269.1203	284.0882 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
	m2	Table 6a	Specific data	Specific data	factor	W
		W/m2	or Table 6b	or Table 6c	Table 6d	
North	5.2800	10.6334	0.6300	0.7000	0.7700	17.1584 (74)
South	3.3500	46.7521	0.6300	0.7000	0.7700	47.8649 (78)
Southwest	2.1400	36.7938	0.6300	0.7000	0.7700	24.0636 (79)
West	1.2300	19.6403	0.6300	0.7000	0.7700	7.3829 (80)
Solar gains	96.4698	166.6127	235.4427	306.5362	358.5159	363.0367
Total gains	389.4018	458.3535	517.0831	571.5932	606.1640	594.3542
						347.0134
						306.8551
						259.6923
						186.0234
						115.9316
						82.3285 (83)
						492.8815
						435.9184
						385.0519
						366.4168 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	54.8872	55.0217	55.1541	55.7848	55.9044	56.4680	56.4680	56.5736	56.2496	55.9044	55.6630	55.4128
util living area	4.6591	4.6681	4.6769	4.7190	4.7270	4.7645	4.7645	4.7716	4.7500	4.7270	4.7109	4.6942
	0.9978	0.9950	0.9876	0.9636	0.8963	0.7519	0.5858	0.6414	0.8650	0.9765	0.9955	0.9984 (86)
MIT	19.6149	19.7857	20.0535	20.4039	20.7171	20.9178	20.9804	20.9702	20.8282	20.4211	19.9525	19.5861 (87)
Th 2	19.8682	19.8706	19.8730	19.8843	19.8864	19.8962	19.8962	19.8981	19.8924	19.8864	19.8821	19.8777 (88)
util rest of house	0.9971	0.9933	0.9830	0.9491	0.8534	0.6570	0.4508	0.5063	0.7941	0.9643	0.9937	0.9978 (89)
MIT 2	18.6144	18.7863	19.0538	19.4044	19.6937	19.8581	19.8913	19.8896	19.7967	19.4276	18.9623	18.5931 (90)
Living area fraction									fLA = Living area / (4) =			0.4578 (91)
MIT	19.0724	19.2438	19.5115	19.8620	20.1622	20.3432	20.3899	20.3843	20.2689	19.8824	19.4156	19.0477 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0724	19.2438	19.5115	19.8620	20.1622	20.3432	20.3899	20.3843	20.2689	19.8824	19.4156	19.0477 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9964	0.9920	0.9811	0.9487	0.8655	0.6983	0.5133	0.5688	0.8215	0.9643	0.9926	0.9973 (94)
Ext temp.	387.9917	454.6830	507.2996	542.2820	524.6084	415.0163	291.5429	302.1974	404.8808	420.3383	382.2102	365.4124 (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)
Month fracti	1196.1837	1158.6398	1048.4957	873.3566	672.7508	452.0352	298.2918	313.0087	487.4255	737.9584	983.3469	1190.8770 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000 (97a)
Space heating per m2	601.2949	473.0590	402.6499	238.3737	110.2179	0.0000	0.0000	0.0000	0.0000	236.3094	432.8184	614.1456 (98)
												3108.8688 (98)
												48.5761 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	739.8486	582.4340	597.0587	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8440	0.9092	0.8848	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	624.4135	529.5609	528.2720	0.0000	0.0000	0.0000	0.0000 (102)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	772.6943	740.3536	698.6901	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000 (103a)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	106.7621	156.8297	126.7911	0.0000	0.0000	0.0000	0.0000 (104)
												390.3829 (104)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Cooled fraction											FC = cooled area / (4) =	1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	26.6905	39.2074	31.6978	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												97.5957 (107)
Space cooling per m2												1.5249 (108)
Energy for space heating												48.5761 (99)
Energy for space cooling												1.5249 (108)
Total												50.1010 (109)
Target Fabric Energy Efficiency (TFEE)												57.6 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	64.0000 (1b)	x 2.4000 (2b)	= 153.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 153.6000 (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					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)+(7a)+(7b)+(7c) =				0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.5000
Infiltration rate					0.2250 (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) =				0.2081 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.5000	4.5000	4.4000	3.9000	3.8000	3.4000	3.3000	3.3000	3.5000	3.8000	3.9000	4.1000 (22)
Wind factor	1.1250	1.1250	1.1000	0.9750	0.9500	0.8500	0.8250	0.8250	0.8750	0.9500	0.9750	1.0250 (22a)
Adj infilt rate	0.2341	0.2341	0.2289	0.2029	0.1977	0.1769	0.1717	0.1717	0.1821	0.1977	0.2029	0.2133 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (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
upvc window (Uw = 1.40)			8.4300	1.3258	11.1761		(27)
FRENCH DOOR (Uw = 1.40)			3.5700	1.3258	4.7330		(27)
external door			3.0000	1.2000	3.6000		(26)
Heat Loss Floor 1			36.1300	0.1600	5.7808		(28a)
BRICK TF	63.6200	15.0000	48.6200	0.2300	11.1826		(29a)
CEILING	64.0000		64.0000	0.1400	8.9600		(30)
Total net area of external elements Aum(A, m ²)				163.7500			(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.4325		(33)
Party Wall 1			16.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.1148 (36)
Total fabric heat loss							(33) + (36) = 55.5473 (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	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440 (38)
Heat transfer coeff	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913 (39)
Average = Sum(39)m / 12 =												80.8913 (39)
HLP	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639 (40)
HLP (average)												1.2639 (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												2.0922 (42)
Average daily hot water use (litres/day)												83.8893 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	92.2782	88.9227	85.5671	82.2115	78.8559	75.5004	75.5004	78.8559	82.2115	85.5671	88.9227	92.2782 (44)
Energy content (annual)	136.8460	119.6864	123.5056	107.6752	103.3169	89.1546	82.6149	94.8018	95.9340	111.8018	122.0404	132.5280 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1319.9055 (45)
	20.5269	17.9530	18.5258	16.1513	15.4975	13.3732	12.3922	14.2203	14.3901	16.7703	18.3061	19.8792 (46)

Water storage loss:												180.0000	(47)
Store volume													
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	26.0820	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	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Total heat required for water heating calculated for each month													
	187.0598	165.0408	173.7194	156.2692	153.5307	137.7486	132.8287	145.0156	144.5280	162.0156	170.6344	182.7418	(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													
	187.0598	165.0408	173.7194	156.2692	153.5307	137.7486	132.8287	145.0156	144.5280	162.0156	170.6344	182.7418	(64)
Total per year (kWh/year) = Sum(64)m =												1911.1325	(64)
RHI water heating demand												1911	(64)
Heat gains from water heating, kWh/month													
	85.6723	76.0792	81.2367	74.6772	74.5239	68.5191	67.6405	71.6926	70.7733	77.3451	79.4536	84.2366	(65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	41.3820	36.7551	29.8913	22.6296	16.9159	14.2811	15.4313	20.0581	26.9220	34.1837	39.8974	42.5322 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	273.0011	275.8340	268.6952	253.4975	234.3132	216.2826	204.2371	201.4042	208.5430	223.7407	242.9250	260.9556 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453 (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)	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873 (71)
Water heating gains (Table 5)	115.1510	113.2131	109.1890	103.7183	100.1665	95.1654	90.9146	96.3611	98.2962	103.9585	110.3523	113.2212 (72)
Total internal gains	521.0230	517.2912	499.2644	471.3344	442.8845	417.2181	402.0719	409.3123	425.2501	453.3717	484.6636	508.1979 (73)

[Jan	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	1.7100	11.3201	0.7200	0.7000	0.7700	6.7610 (74)
South	3.3500	49.0238	0.7200	0.7000	0.7700	57.3608 (78)
Southwest	2.1400	38.7358	0.7200	0.7000	0.7700	28.9528 (79)
West	1.2300	21.0039	0.7200	0.7000	0.7700	9.0234 (80)
North	3.5700	11.3201	0.7200	0.7000	0.7700	14.1151 (74)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774
alpha	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652
util living area	0.9105	0.8819	0.8334	0.7542	0.6545	0.4968	0.3960	0.4184	0.6033	0.7822	0.8742	0.9164 (86)
Tweekday	18.7164	18.8077	18.9654	19.1345	19.2665	19.3569	19.3812	19.3791	19.3230	19.1504	18.9159	18.6953
Tweekend	20.4549	20.4966	20.5691	20.6486	20.7132	20.7622	20.7778	20.7760	20.7415	20.6540	20.5449	20.4453
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	20.1587	20.2214	20.3349	20.4513	20.5573	20.6348	20.6571	20.6543	20.5964	20.4660	20.2894	20.1438 (87)
Th 2	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692 (88)
util rest of house	0.8983	0.8663	0.8109	0.7204	0.6044	0.4237	0.3048	0.3257	0.5353	0.7453	0.8549	0.9049 (89)
Tweekday	18.7164	18.8077	18.9654	19.1345	19.2665	19.3569	19.3812	19.3791	19.3230	19.1504	18.9159	18.6953
Tweekend	18.7164	18.8077	18.9654	19.1345	19.2665	19.3569	19.3812	19.3791	19.3230	19.1504	18.9159	18.6953
MIT 2	18.7164	18.8077	18.9654	19.1345	19.2665	19.3569	19.3812	19.3791	19.3230	19.1504	18.9159	18.6953 (90)
Living area fraction									fLA = Living area / (4) =			0.4578 (91)
MIT	19.3767	19.4549	19.5924	19.7374	19.8575	19.9420	19.9653	19.9629	19.9060	19.7527	19.5447	19.3585 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3767	19.4549	19.5924	19.7374	19.8575	19.9420	19.9653	19.9629	19.9060	19.7527	19.5447	19.3585 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8922	0.8600	0.8049	0.7161	0.6038	0.4287	0.3129	0.3338	0.5377	0.7411	0.8487	0.8990 (94)
Useful gains	568.5722	620.1660	634.8036	613.7807	524.6971	378.8711	260.3154	265.9319	406.4867	509.2967	544.7536	555.4461 (95)
Ext temp.	4.3000	4.8000	6.6000	9.0000	11.8000	14.8000	16.6000	16.5000	14.0000	10.5000	7.1000	4.2000 (96)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Heat loss rate W	1219.5720	1185.4514	1050.9708	868.5604	651.7800	415.9410	272.2275	280.1196	477.7431	748.4621	1006.6654	1226.1895 (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												
Space heating	484.3439	379.8718	309.6283	183.4414	94.5497	0.0000	0.0000	0.0000	0.0000	177.9391	332.5765	499.0331 (98)
Space heating												2461.3838 (98)
RHI space heating demand												2461 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	64.0000 (1b)	x 2.4000 (2b)	= 153.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 153.6000 (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					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)+(7a)+(7b)+(7c) =					Air changes per hour
Pressure test					0.0000 / (5) = 0.0000 (8)
Measured/design AP50					Yes
Infiltration rate					4.5000
Number of sides sheltered					0.2250 (18)
					1 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2081 (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	0.2654	0.2602	0.2550	0.2289	0.2237	0.1977	0.1977	0.1925	0.2081	0.2237	0.2341	0.2445 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5154	0.5102	0.5050	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
upvc window (Uw = 1.40)			8.4300	1.3258	11.1761		(27)
FRENCH DOOR (Uw = 1.40)			3.5700	1.3258	4.7330		(27)
external door			3.0000	1.2000	3.6000		(26)
Heat Loss Floor 1			36.1300	0.1600	5.7808		(28a)
BRICK TF	63.6200	15.0000	48.6200	0.2300	11.1826		(29a)
CEILING	64.0000		64.0000	0.1400	8.9600		(30)
Total net area of external elements Aum(A, m ²)			163.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.4325		(33)
Party Wall 1			16.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.1148 (36)
Total fabric heat loss						(33) + (36) =	55.5473 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	26.1225	25.8588	25.5951	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440 (38)
Heat transfer coeff	81.6698	81.4061	81.1424	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913 (39)
Average = Sum(39)m / 12 =												81.0200 (39)
HLP	1.2761	1.2720	1.2678	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639 (40)
HLP (average)												1.2659 (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												2.0922 (42)
Average daily hot water use (litres/day)												83.8893 (43)
Daily hot water use	92.2782	88.9227	85.5671	82.2115	78.8559	75.5004	75.5004	78.8559	82.2115	85.5671	88.9227	92.2782 (44)
Energy conte	136.8460	119.6864	123.5056	107.6752	103.3169	89.1546	82.6149	94.8018	95.9340	111.8018	122.0404	132.5280 (45)
Energy content (annual)												Total = Sum(45)m = 1319.9055 (45)
Distribution loss (46)m = 0.15 x (45)m	20.5269	17.9530	18.5258	16.1513	15.4975	13.3732	12.3922	14.2203	14.3901	16.7703	18.3061	19.8792 (46)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Month fracti	1229.8104	1183.9553	1060.7795	875.2956	659.3078	431.4263	272.1334	287.9728	469.4731	740.1369	1005.5832	1225.4014 (97)
Space heating kWh	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	494.8489	385.0866	323.5502	196.2533	100.0521	0.0000	0.0000	0.0000	0.0000	180.0806	342.8166	506.8443 (98)
Space heating												2529.5326 (98)
Space heating per m2											(98) / (4) =	39.5239 (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 %)												252.2240 (206)
Efficiency of secondary/supplementary heating system, %												100.0000 (208)
Space heating requirement												1002.8915 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	494.8489	385.0866	323.5502	196.2533	100.0521	0.0000	0.0000	0.0000	0.0000	180.0806	342.8166	506.8443 (98)
Space heating efficiency (main heating system 1)	252.2240	252.2240	252.2240	252.2240	252.2240	0.0000	0.0000	0.0000	0.0000	252.2240	252.2240	252.2240 (210)
Space heating fuel (main heating system)	196.1942	152.6765	128.2789	77.8091	39.6680	0.0000	0.0000	0.0000	0.0000	71.3971	135.9175	200.9501 (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	187.0598	165.0408	173.7194	156.2692	153.5307	137.7486	132.8287	145.0156	144.5280	162.0156	170.6344	182.7418 (64)
Efficiency of water heater	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800 (216)
(217)m	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800 (217)
Fuel for water heating, kWh/month	59.2374	52.2645	55.0128	49.4867	48.6195	43.6217	42.0637	45.9230	45.7686	51.3065	54.0359	57.8700 (219)
Water heating fuel used												605.2101 (219)
Annual totals kWh/year												
Space heating fuel - main system												1002.8915 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(MEVDecentralised, Database: total watage = 3.6075, total flow = 21.0000, SFP = 0.1718)												
mechanical ventilation fans (SFP = 0.1718)												32.1913 (230a)
Total electricity for the above, kWh/year												32.1913 (231)
Electricity for lighting (calculated in Appendix L)												292.3277 (232)
Total delivered energy for all uses												1932.6206 (238)

10a. Fuel costs - using Table 12 prices

	Fuel	Fuel price	Fuel cost
	kWh/year	p/kWh	£/year
Space heating - main system 1	1002.8915	13.1900	132.2814 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	605.2101	13.1900	79.8272 (247)
Mechanical ventilation fans	32.1913	13.1900	4.2460 (249)
Pumps and fans for heating	0.0000	0.0000	0.0000 (249)
Energy for lighting	292.3277	13.1900	38.5580 (250)
Additional standing charges			0.0000 (251)
Total energy cost			254.9127 (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] =	0.9822 (257)
SAP value		86.2979
SAP rating (Section 12)		86 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy	Emission factor	Emissions
	kWh/year	kg CO2/kWh	kg CO2/year
Space heating - main system 1	1002.8915	0.5190	520.5007 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	605.2101	0.5190	314.1040 (264)
Space and water heating			834.6047 (265)
Pumps and fans	32.1913	0.5190	16.7073 (267)
Energy for lighting	292.3277	0.5190	151.7181 (268)
Total kg/year			1003.0301 (272)
CO2 emissions per m2			15.6700 (273)
EI value			87.6692
EI rating			88 (274)
EI band			B

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS 09 Jan 2014

Calculation of stars for heating and DHW	

Main heating energy efficiency	$13.19 \times (1 + 0.29 \times 0.75) / 2.5222 = 6.367$, stars = 3
Main heating environmental impact	$0.519 \times (1 + 0.29 \times 0.75) / 2.5222 = 0.2505$, stars = 4
Water heating energy efficiency	$13.19 / 3.1578 = 4.177$, stars = 4
Water heating environmental impact	$0.519 / 3.1578 = 0.1644$, stars = 5

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	64.0000 (1b)	x 2.4000 (2b)	= 153.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 153.6000 (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					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)+(7a)+(7b)+(7c) =				0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.5000
Infiltration rate					0.2250 (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) =				0.2081 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.5000	4.5000	4.4000	3.9000	3.8000	3.4000	3.3000	3.3000	3.5000	3.8000	3.9000	4.1000 (22)
Wind factor	1.1250	1.1250	1.1000	0.9750	0.9500	0.8500	0.8250	0.8250	0.8750	0.9500	0.9750	1.0250 (22a)
Adj infilt rate	0.2341	0.2341	0.2289	0.2029	0.1977	0.1769	0.1717	0.1717	0.1821	0.1977	0.2029	0.2133 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (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
upvc window (Uw = 1.40)			8.4300	1.3258	11.1761		(27)
FRENCH DOOR (Uw = 1.40)			3.5700	1.3258	4.7330		(27)
external door			3.0000	1.2000	3.6000		(26)
Heat Loss Floor 1			36.1300	0.1600	5.7808		(28a)
BRICK TF	63.6200	15.0000	48.6200	0.2300	11.1826		(29a)
CEILING	64.0000		64.0000	0.1400	8.9600		(30)
Total net area of external elements Aum(A, m ²)				163.7500			(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.4325		(33)
Party Wall 1				16.1300	0.0000	0.0000	(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.1148 (36)
Total fabric heat loss							(33) + (36) = 55.5473 (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	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440 (38)
Average = Sum(39)m / 12 =	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639 (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												
Average daily hot water use (litres/day)												2.0922 (42)
												83.8893 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	92.2782	88.9227	85.5671	82.2115	78.8559	75.5004	75.5004	78.8559	82.2115	85.5671	88.9227	92.2782 (44)
Energy content (annual)	136.8460	119.6864	123.5056	107.6752	103.3169	89.1546	82.6149	94.8018	95.9340	111.8018	122.0404	132.5280 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1319.9055 (45)
	20.5269	17.9530	18.5258	16.1513	15.4975	13.3732	12.3922	14.2203	14.3901	16.7703	18.3061	19.8792 (46)

Water storage loss:													
Store volume												180.0000 (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	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													
	187.0598	165.0408	173.7194	156.2692	153.5307	137.7486	132.8287	145.0156	144.5280	162.0156	170.6344	182.7418 (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	187.0598	165.0408	173.7194	156.2692	153.5307	137.7486	132.8287	145.0156	144.5280	162.0156	170.6344	182.7418 (64)	
								Total per year (kWh/year) = Sum (64)m =					1911.1325 (64)
Heat gains from water heating, kWh/month													
	85.6723	76.0792	81.2367	74.6772	74.5239	68.5191	67.6405	71.6926	70.7733	77.3451	79.4536	84.2366 (65)	

[illegible]

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

Month fracti	1219.5720	1185.4514	1050.9708	868.5604	651.7800	415.9410	272.2275	280.1196	477.7431	748.4621	1006.6654	1226.1895 (97)
Space heating kWh	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	484.3439	379.8718	309.6283	183.4414	94.5497	0.0000	0.0000	0.0000	0.0000	177.9391	332.5765	499.0331 (98)
Space heating requirement												2461.3838 (98)
Space heating per m2											(98) / (4) =	38.4591 (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 %)												251.8648 (206)
Efficiency of secondary/supplementary heating system, %												100.0000 (208)
Space heating requirement												977.2637 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	484.3439	379.8718	309.6283	183.4414	94.5497	0.0000	0.0000	0.0000	0.0000	177.9391	332.5765	499.0331 (98)
Space heating efficiency (main heating system 1)	251.8648	251.8648	251.8648	251.8648	251.8648	0.0000	0.0000	0.0000	0.0000	251.8648	251.8648	251.8648 (210)
Space heating fuel (main heating system)	192.3031	150.8237	122.9343	72.8333	37.5399	0.0000	0.0000	0.0000	0.0000	70.6486	132.0456	198.1353 (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	187.0598	165.0408	173.7194	156.2692	153.5307	137.7486	132.8287	145.0156	144.5280	162.0156	170.6344	182.7418 (64)
Efficiency of water heater	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800 (216)
(217)m	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800 (217)
Fuel for water heating, kWh/month	59.2374	52.2645	55.0128	49.4867	48.6195	43.6217	42.0637	45.9230	45.7686	51.3065	54.0359	57.8700 (219)
Water heating fuel used												605.2101 (219)
Annual totals kWh/year												
Space heating fuel - main system												977.2637 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 3.6075, total flow = 21.0000, SFP = 0.1718)												
mechanical ventilation fans (SFP = 0.1718)												32.1913 (230a)
Total electricity for the above, kWh/year												32.1913 (231)
Electricity for lighting (calculated in Appendix L)												292.3277 (232)
Total delivered energy for all uses												1906.9929 (238)

10a. Fuel costs - using BEDF prices (506)

	Fuel	Fuel price	Fuel cost
	kWh/year	p/kWh	£/year
Space heating - main system 1	977.2637	20.4300	199.6550 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	605.2101	20.4300	123.6444 (247)
Mechanical ventilation fans	32.1913	20.4300	6.5767 (249)
Pumps and fans for heating	0.0000	0.0000	0.0000 (249)
Energy for lighting	292.3277	20.4300	59.7226 (250)
Additional standing charges			0.0000 (251)
Total energy cost			389.5986 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy	Emission factor	Emissions
	kWh/year	kg CO2/kWh	kg CO2/year
Space heating - main system 1	977.2637	0.5190	507.1999 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	605.2101	0.5190	314.1040 (264)
Space and water heating			821.3039 (265)
Pumps and fans	32.1913	0.5190	16.7073 (267)
Energy for lighting	292.3277	0.5190	151.7181 (268)
Total kg/year			989.7293 (272)

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

	Energy	Primary energy factor	Primary energy
	kWh/year	kg CO2/kWh	kWh/year
Space heating - main system 1	977.2637	3.0700	3000.1997 (261)
Space heating - secondary	0.0000	3.0700	0.0000 (263)
Water heating (other fuel)	605.2101	3.0700	1857.9950 (264)
Space and water heating			4858.1947 (265)
Pumps and fans	32.1913	3.0700	98.8272 (267)
Energy for lighting	292.3277	3.0700	897.4462 (268)
Primary energy kWh/year			5854.4681 (272)
Primary energy kWh/m2/year			91.4761 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 86
Current environmental impact rating: B 88

(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	Recommended
O	Not considered	
P	Not considered	
R	Not considered	
S	Not considered	
T	Not considered	
U	Solar photovoltaic panels	Recommended
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
N Solar water heating	+ 1.6	-£ 47	-120 kg (12.1%)
U Solar photovoltaic panels	+ 12.2	-£ 388	-985 kg (113.2%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£47	1.88 kg/m²	B 88 B 89
Solar photovoltaic panels	£388	15.38 kg/m²	A 100 A 100
Total Savings	£435	17.26 kg/m²	

Potential energy efficiency rating: A 100
Potential environmental impact rating: A 100

Fuel prices for cost data on this page from database revision number 506 TEST (30 Sep 2022)
Recommendation texts revision number 4.9c (22 Feb 2014)

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

	Current	Potential	Saving
Electricity	£390	£342	£47
Space heating	£206	£207	-£0
Water heating	£124	£76	£48
Lighting	£60	£60	£0
Generated (PV)	-£0	-£388	£388
Total cost of fuels	£390	-£46	£435
Total cost of uses	£390	-£45	£436
Delivered energy	30 kWh/m²	-3 kWh/m²	33 kWh/m²
Carbon dioxide emissions	1.0 tonnes	-0.1 tonnes	1.1 tonnes
CO2 emissions per m²	15 kg/m²	-2 kg/m²	17 kg/m²
Primary energy	91 kWh/m²	-11 kWh/m²	102 kWh/m²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	64.0000 (1b)	x 2.4000 (2b)	= 153.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 153.6000 (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					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)+(7a)+(7b)+(7c) =					Air changes per hour
Pressure test					0.0000 / (5) = 0.0000 (8)
Measured/design AP50					Yes
Infiltration rate					4.5000
Number of sides sheltered					0.2250 (18)
					1 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2081 (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	0.2654	0.2602	0.2550	0.2289	0.2237	0.1977	0.1977	0.1925	0.2081	0.2237	0.2341	0.2445 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (23a)
Effective ac	0.5154	0.5102	0.5050	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
upvc window (Uw = 1.40)			8.4300	1.3258	11.1761		(27)
FRENCH DOOR (Uw = 1.40)			3.5700	1.3258	4.7330		(27)
external door			3.0000	1.2000	3.6000		(26)
Heat Loss Floor 1			36.1300	0.1600	5.7808		(28a)
BRICK TF	63.6200	15.0000	48.6200	0.2300	11.1826		(29a)
CEILING	64.0000		64.0000	0.1400	8.9600		(30)
Total net area of external elements Aum(A, m ²)			163.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.4325		(33)
Party Wall 1			16.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.1148 (36)
Total fabric heat loss						(33) + (36) =	55.5473 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	26.1225	25.8588	25.5951	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440 (38)
Heat transfer coeff	81.6698	81.4061	81.1424	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913 (39)
Average = Sum(39)m / 12 =												81.0200 (39)
HLP	1.2761	1.2720	1.2678	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639 (40)
HLP (average)												1.2659 (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												2.0922 (42)
Average daily hot water use (litres/day)												83.8893 (43)
Daily hot water use	92.2782	88.9227	85.5671	82.2115	78.8559	75.5004	75.5004	78.8559	82.2115	85.5671	88.9227	92.2782 (44)
Energy conte	136.8460	119.6864	123.5056	107.6752	103.3169	89.1546	82.6149	94.8018	95.9340	111.8018	122.0404	132.5280 (45)
Energy content (annual)												1319.9055 (45)
Distribution loss (46)m = 0.15 x (45)m	20.5269	17.9530	18.5258	16.1513	15.4975	13.3732	12.3922	14.2203	14.3901	16.7703	18.3061	19.8792 (46)

												180.0000	(47)															
Store volume												1.6100	(48)															
a) If manufacturer declared loss factor is known (kWh/day):												0.5400	(49)															
Temperature factor from Table 2b												0.8694	(55)															
Enter (49) or (54) in (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	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)															
Total heat required for water heating calculated for each month																												
187.0598	165.0408	172.3237	149.5156	140.7364	125.1419	119.8017	132.9191	139.1251	160.6199	170.6344	182.7418	(62)																
Aperture area of solar collector												3.0000	(H1)															
Zero-loss collector efficiency												0.7000	(H2)															
Collector heat loss coefficient												1.8000	(H3)															
Collector 2nd order heat loss coefficient												0.0050	(H3a)															
Collector effective heat loss coefficient												1.8063	(H3b)															
Collector performance ratio												2.5804	(H4)															
Annual solar radiation per m ²												1079.5246	(H5)															
Overshading factor												0.8000	(H6)															
Solar energy available												1813.6014	(H7)															
Adjustment factor for showers												1.0000	(H7a)															
Solar-to-load ratio												1.3740	(H8)															
Utilisation factor												0.5170	(H9)															
Collector performance factor												0.8793	(H10)															
Dedicated solar storage volume												75.0000	(H11)															
Effective solar volume												75.0000	(H13)															
Daily hot water demand												83.8893	(H14)															
Volume ratio Veff/V												0.8940	(H15)															
Solar storage volume factor												0.9776	(H16)															
Solar input												-806.0164	(H17)															
Solar input												-23.3729	-39.0026	-66.4259	-89.0238	-109.9814	-108.1292	-106.7003	-93.2245	-73.0135	-49.8596	-27.7236	-19.5591	(63)				
												Solar input (sum o f months) = Sum(63)m =						-806.0164	(63)									
Output from w/h																												
163.6869	126.0382	105.8978	60.4918	30.7550	17.0127	13.1015	39.6946	66.1116	110.7602	142.9108	163.1827	(64)																
												Total per year (kWh/year) = Sum(64)m =						1039.6436	(64)									
Heat gains from water heating, kWh/month																												
85.6723	76.0792	80.1201	69.2743	64.2884	58.4337	57.2189	62.0155	66.4509	76.2286	79.4536	84.2366	(65)																

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	21.7679	21.8384	21.9094	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774
alpha	2.4512	2.4559	2.4606	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652
util living area												
	0.9126	0.8851	0.8428	0.7736	0.6717	0.5382	0.4159	0.4489	0.6186	0.7896	0.8825	0.9203 (86)
Tweekday	18.6919	18.7928	18.9414	19.1129	19.2558	19.3470	19.3799	19.3760	19.3200	19.1466	18.9006	18.6841
Tweekend	20.4476	20.4924	20.5591	20.6379	20.7074	20.7558	20.7765	20.7734	20.7394	20.6519	20.5377	20.4401
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	20.1475	20.2148	20.3196	20.4346	20.5484	20.6249	20.6551	20.6502	20.5930	20.4628	20.2782	20.1359 (87)
Th 2	19.8596	19.8629	19.8661	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692 (88)
util rest of house												
	0.9005	0.8696	0.8213	0.7413	0.6227	0.4651	0.3214	0.3540	0.5496	0.7530	0.8641	0.9093 (89)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

Tweekday	18.6919	18.7928	18.9414	19.1129	19.2558	19.3470	19.3799	19.3760	19.3200	19.1466	18.9006	18.6841
Tweekend	18.6919	18.7928	18.9414	19.1129	19.2558	19.3470	19.3799	19.3760	19.3200	19.1466	18.9006	18.6841
MIT 2	18.6919	18.7928	18.9414	19.1129	19.2558	19.3470	19.3799	19.3760	19.3200	19.1466	18.9006	18.6841 (90)
Living area fraction									fLA = Living area / (4) =			0.4578 (91)
MIT	19.3583	19.4438	19.5724	19.7180	19.8476	19.9320	19.9637	19.9594	19.9028	19.7492	19.5313	19.3487 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3583	19.4438	19.5724	19.7180	19.8476	19.9320	19.9637	19.9594	19.9028	19.7492	19.5313	19.3487 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8945	0.8632	0.8151	0.7366	0.6217	0.4695	0.3297	0.3620	0.5518	0.7487	0.8579	0.9035 (94)
Useful gains	564.6909	610.9097	625.0878	599.7104	521.4841	384.0943	258.6904	270.4058	395.1094	497.4590	529.4491	544.1592 (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	1229.8104	1183.9553	1060.7221	875.0808	659.0671	431.3149	272.0905	287.9209	469.3958	740.0916	1005.5832	1225.4014 (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	494.8489	385.0866	324.1120	198.2667	102.3617	0.0000	0.0000	0.0000	0.0000	180.5187	342.8166	506.8443 (98)
Space heating												2534.8554 (98)
Space heating per m2										(98) / (4) =		39.6071 (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 %)												252.2240 (206)
Efficiency of secondary/supplementary heating system, %												100.0000 (208)
Space heating requirement												1005.0018 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	494.8489	385.0866	324.1120	198.2667	102.3617	0.0000	0.0000	0.0000	0.0000	180.5187	342.8166	506.8443 (98)
Space heating efficiency (main heating system 1)	252.2240	252.2240	252.2240	252.2240	252.2240	0.0000	0.0000	0.0000	0.0000	252.2240	252.2240	252.2240 (210)
Space heating fuel (main heating system)	196.1942	152.6765	128.5017	78.6074	40.5837	0.0000	0.0000	0.0000	0.0000	71.5708	135.9175	200.9501 (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	163.6869	126.0382	105.8978	60.4918	30.7550	17.0127	13.1015	39.6946	66.1116	110.7602	142.9108	163.1827 (64)
Efficiency of water heater (217)m	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800 (216)
Fuel for water heating, kWh/month	51.8357	39.9133	33.5353	19.1563	9.7394	5.3875	4.1489	12.5703	20.9360	35.0751	45.2565	51.6761 (219)
Water heating fuel used												329.2304 (219)
Annual totals kWh/year												
Space heating fuel - main system												1005.0018 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 3.6075, total flow = 21.0000, SFP = 0.1718)												
mechanical ventilation fans (SFP = 0.1718)												32.1913 (230a)
pump for solar water heating												50.0000 (230g)
Total electricity for the above, kWh/year												82.1913 (231)
Electricity for lighting (calculated in Appendix L)												292.3277 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV Unit 0 (0.80 * 2.50 * 1080 * 0.80) =									-1727.2394			-1727.2394 (233)
Total delivered energy for all uses												-18.4882 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1005.0018	13.1900	132.5597 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	329.2304	13.1900	43.4255 (247)
Mechanical ventilation fans	32.1913	13.1900	4.2460 (249)
Pumps and fans for heating	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	50.0000	13.1900	6.5950 (249)
Energy for lighting	292.3277	13.1900	38.5580 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit	-1727.2394	13.1900	-227.8229 (252)
Total energy cost			-2.4386 (255)

11a. SAP rating - Individual heating systems

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

Energy cost deflator (Table 12):
 Energy cost factor (ECF) $[(255) \times (256)] / [(4) + 45.0] = 0.4200$ (256)
 SAP value -0.0094 (257)
 SAP rating (Section 12) 100.1311
 SAP band 100 (258)
 A

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	1005.0018	0.5190	521.5959 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	329.2304	0.5190	170.8706 (264)
Space and water heating			692.4665 (265)
Pumps and fans	82.1913	0.5190	42.6573 (267)
Energy for lighting	292.3277	0.5190	151.7181 (268)
Energy saving/generation technologies			
PV Unit	-1727.2394	0.5190	-896.4372 (269)
Total kg/year			-9.5954 (272)
CO2 emissions per m2			-0.1500 (273)
EI value			100.1180
EI rating			100 (274)
EI band			A

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	64.0000 (1b)	x 2.4000 (2b)	= 153.6000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 153.6000 (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					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)+(7a)+(7b)+(7c) =				0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					4.5000
Infiltration rate					0.2250 (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) =				0.2081 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.5000	4.5000	4.4000	3.9000	3.8000	3.4000	3.3000	3.3000	3.5000	3.8000	3.9000	4.1000 (22)
Wind factor	1.1250	1.1250	1.1000	0.9750	0.9500	0.8500	0.8250	0.8250	0.8750	0.9500	0.9750	1.0250 (22a)
Adj infilt rate	0.2341	0.2341	0.2289	0.2029	0.1977	0.1769	0.1717	0.1717	0.1821	0.1977	0.2029	0.2133 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation:												0.5000 (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
upvc window (Uw = 1.40)			8.4300	1.3258	11.1761		(27)
FRENCH DOOR (Uw = 1.40)			3.5700	1.3258	4.7330		(27)
external door			3.0000	1.2000	3.6000		(26)
Heat Loss Floor 1			36.1300	0.1600	5.7808		(28a)
BRICK TF	63.6200	15.0000	48.6200	0.2300	11.1826		(29a)
CEILING	64.0000		64.0000	0.1400	8.9600		(30)
Total net area of external elements Aum(A, m ²)			163.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.4325		(33)
Party Wall 1			16.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.1148 (36)
Total fabric heat loss							(33) + (36) = 55.5473 (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	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440	25.3440 (38)
Heat transfer coeff	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913	80.8913 (39)
Average = Sum(39)m / 12 =												80.8913 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639	1.2639 (40)
HLP (average)												1.2639 (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												2.0922 (42)
Average daily hot water use (litres/day)												83.8893 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	92.2782	88.9227	85.5671	82.2115	78.8559	75.5004	75.5004	78.8559	82.2115	85.5671	88.9227	92.2782 (44)
Energy conte	136.8460	119.6864	123.5056	107.6752	103.3169	89.1546	82.6149	94.8018	95.9340	111.8018	122.0404	132.5280 (45)
Energy content (annual)												Total = Sum(45)m = 1319.9055 (45)
Distribution loss (46)m = 0.15 x (45)m	20.5269	17.9530	18.5258	16.1513	15.4975	13.3732	12.3922	14.2203	14.3901	16.7703	18.3061	19.8792 (46)

Water storage loss:																								
Store volume												180.0000	(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	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)												
Total heat required for water heating calculated for each month																								
187.0598	165.0408	172.3237	149.5156	140.7364	125.1419	119.8017	132.9191	139.1251	160.6199	170.6344	182.7418	(62)												
Aperture area of solar collector												3.0000	(H1)											
Zero-loss collector efficiency												0.7000	(H2)											
Collector heat loss coefficient												1.8000	(H3)											
Collector 2nd order heat loss coefficient												0.0050	(H3a)											
Collector effective heat loss coefficient												1.8063	(H3b)											
Collector performance ratio												2.5804	(H4)											
Annual solar radiation per m2												1185.6484	(H5)											
Overshading factor												0.8000	(H6)											
Solar energy available												1991.8893	(H7)											
Adjustment factor for showers												1.0000	(H7a)											
Solar-to-load ratio												1.5091	(H8)											
Utilisation factor												0.4845	(H9)											
Collector performance factor												0.8793	(H10)											
Dedicated solar storage volume												75.0000	(H11)											
Effective solar volume												75.0000	(H13)											
Daily hot water demand												83.8893	(H14)											
Volume ratio Veff/V												0.8940	(H15)											
Solar storage volume factor												0.9776	(H16)											
Solar input												-829.5896	(H17)											
Solar input												-23.2664	-39.4287	-67.3650	-92.1570	-107.2918	-113.9716	-108.4334	-96.7136	-76.6133	-51.7607	-31.0692	-21.5188	(63)
												Solar input (sum o f months) = Sum(63)m =						-829.5896	(63)					
Output from w/h																								
163.7933	125.6121	104.9586	57.3586	33.4445	11.1703	11.3683	36.2056	62.5118	108.8592	139.5652	161.2230	(64)												
												Total per year (kWh/year) = Sum(64)m =						1016.0705	(64)					
Heat gains from water heating, kWh/month																								
85.6723	76.0792	80.1201	69.2743	64.2884	58.4337	57.2189	62.0155	66.4509	76.2286	79.4536	84.2366	(65)												

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309	125.5309 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	41.3820	36.7551	29.8913	22.6296	16.9159	14.2811	15.4313	20.0581	26.9220	34.1837	39.8974	42.5322 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	273.0011	275.8340	268.6952	253.4975	234.3132	216.2826	204.2371	201.4042	208.5430	223.7407	242.9250	260.9556 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453	49.6453 (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)	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873	-83.6873 (71)
Water heating gains (Table 5)	115.1510	113.2131	107.6882	96.2143	86.4092	81.1580	76.9072	83.3541	92.2930	102.4577	110.3523	113.2212 (72)
Total internal gains	521.0230	517.2912	497.7636	463.8304	429.1272	403.2106	388.0644	396.3053	419.2469	451.8709	484.6636	508.1979 (73)

[Jan]				Area	Solar flux		g		FF		Access		Gains	
				m2	Table 6a		Specific data		Specific data		factor		W	
					or Table 6b		or Table 6b		or Table 6c		Table 6d			
North				1.7100		11.3201		0.7200		0.7000		0.7700		6.7610 (74)
South				3.3500		49.0238		0.7200		0.7000		0.7700		57.3608 (78)
Southwest				2.1400		38.7358		0.7200		0.7000		0.7700		28.9528 (79)
West				1.2300		21.0039		0.7200		0.7000		0.7700		9.0234 (80)
North				3.5700		11.3201		0.7200		0.7000		0.7700		14.1151 (74)
Solar gains	116.2131	203.8736	289.4440	385.7448	426.0948	466.5637	429.8372	387.3671	330.6685	233.8410	157.2265	109.6201	(83)	
Total gains	637.2361	721.1648	787.2077	849.5752	855.2220	869.7743	817.9016	783.6724	749.9153	685.7119	641.8900	617.8180	(84)	

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, n11,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774	21.9774
alpha	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652	2.4652
util living area												
	0.9105	0.8819	0.8339	0.7571	0.6605	0.5028	0.4017	0.4241	0.6064	0.7829	0.8742	0.9164 (86)
Tweekday	18.7164	18.8077	18.9646	19.1318	19.2635	19.3559	19.3808	19.3787	19.3221	19.1497	18.9159	18.6953
Tweekend	20.4549	20.4966	20.5687	20.6472	20.7115	20.7615	20.7775	20.7756	20.7410	20.6537	20.5449	20.4453
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	20.1587	20.2214	20.3343	20.4491	20.5548	20.6337	20.6565	20.6537	20.5955	20.4656	20.2894	20.1438 (87)
Th 2	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692	19.8692 (88)
util rest of house												
	0.8983	0.8663	0.8115	0.7235	0.6105	0.4293	0.3095	0.3305	0.5384	0.7461	0.8549	0.9049 (89)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

Tweekday	18.7164	18.8077	18.9646	19.1318	19.2635	19.3559	19.3808	19.3787	19.3221	19.1497	18.9159	18.6953
Tweekend	18.7164	18.8077	18.9646	19.1318	19.2635	19.3559	19.3808	19.3787	19.3221	19.1497	18.9159	18.6953
MIT 2	18.7164	18.8077	18.9646	19.1318	19.2635	19.3559	19.3808	19.3787	19.3221	19.1497	18.9159	18.6953 (90)
Living area fraction									fLA = Living area / (4) =			0.4578 (91)
MIT	19.3767	19.4549	19.5917	19.7349	19.8547	19.9409	19.9649	19.9624	19.9051	19.7521	19.5447	19.3585 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3767	19.4549	19.5917	19.7349	19.8547	19.9409	19.9649	19.9624	19.9051	19.7521	19.5447	19.3585 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8922	0.8600	0.8054	0.7191	0.6098	0.4342	0.3177	0.3387	0.5407	0.7418	0.8487	0.8990 (94)
Useful gains	568.5722	620.1660	634.0196	610.9718	521.5347	377.6961	259.8606	265.4175	405.5095	508.6791	544.7536	555.4461 (95)
Ext temp.	4.3000	4.8000	6.6000	9.0000	11.8000	14.8000	16.6000	16.5000	14.0000	10.5000	7.1000	4.2000 (96)
Heat loss rate W												
	1219.5720	1185.4514	1050.9155	868.3600	651.5522	415.8521	272.1891	280.0768	477.6703	748.4180	1006.6654	1226.1895 (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												
	484.3439	379.8718	310.1705	185.3195	96.7330	0.0000	0.0000	0.0000	0.0000	178.3657	332.5765	499.0331 (98)
Space heating												2466.4140 (98)
Space heating per m2												38.5377 (99)
										(98) / (4) =		

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 %)												251.8648 (206)
Efficiency of secondary/supplementary heating system, %												100.0000 (208)
Space heating requirement												979.2609 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	484.3439	379.8718	310.1705	185.3195	96.7330	0.0000	0.0000	0.0000	0.0000	178.3657	332.5765	499.0331 (98)
Space heating efficiency (main heating system 1)	251.8648	251.8648	251.8648	251.8648	251.8648	0.0000	0.0000	0.0000	0.0000	251.8648	251.8648	251.8648 (210)
Space heating fuel (main heating system)	192.3031	150.8237	123.1496	73.5789	38.4067	0.0000	0.0000	0.0000	0.0000	70.8180	132.0456	198.1353 (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	163.7933	125.6121	104.9586	57.3586	33.4445	11.1703	11.3683	36.2056	62.5118	108.8592	139.5652	161.2230 (64)
Efficiency of water heater	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800 (216)
(217)m	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800	315.7800 (217)
Fuel for water heating, kWh/month	51.8694	39.7784	33.2379	18.1641	10.5911	3.5374	3.6001	11.4654	19.7960	34.4731	44.1970	51.0555 (219)
Water heating fuel used												321.7653 (219)
Annual totals kWh/year												
Space heating fuel - main system												979.2609 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 3.6075, total flow = 21.0000, SFP = 0.1718)												
mechanical ventilation fans (SFP = 0.1718)												32.1913 (230a)
pump for solar water heating												50.0000 (230g)
Total electricity for the above, kWh/year												82.1913 (231)
Electricity for lighting (calculated in Appendix L)												292.3277 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV Unit 0 (0.80 * 2.50 * 1186 * 0.80) =									-1897.0374			-1897.0374 (233)
Total delivered energy for all uses												-221.4922 (238)

10a. Fuel costs - using BEDF prices (506)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	979.2609	20.4300	200.0630 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	321.7653	20.4300	65.7367 (247)
Mechanical ventilation fans	32.1913	20.4300	6.5767 (249)
Pumps and fans for heating	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	50.0000	20.4300	10.2150 (249)
Energy for lighting	292.3277	20.4300	59.7226 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit	-1897.0374	20.4300	-387.5647 (252)
Total energy cost			-45.2509 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	979.2609	0.5190	508.2364 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	321.7653	0.5190	166.9962 (264)
Space and water heating			675.2326 (265)
Pumps and fans	82.1913	0.5190	42.6573 (267)
Energy for lighting	292.3277	0.5190	151.7181 (268)
Energy saving/generation technologies			
PV Unit	-1897.0374	0.5190	-984.5624 (269)
Total kg/year			-114.9544 (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	979.2609	3.0700	3006.3310 (261)
Space heating - secondary	0.0000	3.0700	0.0000 (263)
Water heating (other fuel)	321.7653	3.0700	987.8195 (264)
Space and water heating			3994.1505 (265)
Pumps and fans	82.1913	3.0700	252.3272 (267)
Energy for lighting	292.3277	3.0700	897.4462 (268)
Energy saving/generation technologies			
PV Unit	-1897.0374	3.0700	-5823.9049 (269)
Primary energy kWh/year			-679.9810 (272)
Primary energy kWh/m2/year			-10.6247 (273)

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Property Reference	HOUSE TYPE D1	Issued on Date	09/11/2022
Assessment Reference	GRANT ASHP	Prop Type Ref	
Property			

SAP Rating	86 B	DER	17.14	TER	29.87
Environmental	88 B	% DER<TER	42.61		
CO ₂ Emissions (t/year)	0.99	DFEE	50.86	TFEE	57.62
General Requirements Compliance	Pass	% DFEE<TFEE	11.73		

Assessor Details	Mr. Neil Jones, S J Roberts Construction Limited, Tel: 01743 891858, neil.jones@sjroberts.com	Assessor ID	K559-0001
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Client	
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SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	29.87	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	17.14	kgCO ₂ /m ²	Pass
	-12.73 (-42.6%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	57.62	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	50.86	kWh/m ² /yr	
	-6.7 (-11.6%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.23 (max. 0.30)	0.23 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	Pass
Roof	0.14 (max. 0.20)	0.14 (max. 0.35)	Pass
Openings	1.36 (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	4.50 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Grant AERONA3 HPID6R32	
Secondary heating system	None	

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.61 kWh/day Permitted by DBSCG 2.10	Pass
Primary pipework insulated	Yes	Pass

6 Controls

Space heating controls	Time and temperature zone control	Pass
Hot water controls	Cylinderstat	Pass
	Independent timer for DHW	Pass

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system (decentralised)		
Specific fan power	0.1300 0.1600	
Maximum	0.7	Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Midlands)	Slight	Pass
Based on:		
Overshading	Average	
Windows facing North	5.28 m ² , No overhang	
Windows facing South	3.35 m ² , No overhang	
Windows facing South West	2.14 m ² , No overhang	
Windows facing West	1.23 m ² , No overhang	
Air change rate	5.00 ach	
Blinds/curtains	None	

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type	U-value		
Filled Cavity with Edge Sealing	0.00	W/m ² K	Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals	4.50 (design value)	
Maximum	10.0	Pass

10 Key features

Party wall U-value	0.00	W/m ² K
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This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Property Reference	HOUSE TYPE D1	Issued on Date	09/11/2022
Assessment Reference	GRANT ASHP	Prop Type Ref	
Property			

SAP Rating	86 B	DER	17.14	TER	29.87
Environmental	88 B	% DER<TER	42.61		
CO ₂ Emissions (t/year)	0.99	DFEE	50.86	TFEE	57.62
General Requirements Compliance	Pass	% DFEE<TFEE	11.73		

Assessor Details	Mr. Neil Jones, S J Roberts Construction Limited, Tel: 01743 891858, neil.jones@sjroberts.com	Assessor ID	K559-0001
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Client	
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SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	South
Property Tenure	Rented (social)
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	Bungalow, Semi-Detached
2.0 Number of Storeys	1
3.0 Date Built	2022
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements				
	Ground Floor:	Heat Loss Perimeter 26.51 m	Internal Floor Area 64.00 m ²	Average Storey Height 2.40 m

7.0 Living Area	29.30	m ²
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8.0 Thermal Mass Parameter	Simple calculation - Low	
Thermal Mass	100.00	kJ/m ² K

9.0 External Walls				
Description	Type	U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
BRICK TF	Timber Frame	0.23	63.62	48.62

9.1 Party Walls				
Description	Type	Construction	U-Value (W/m ² K)	Area (m ²)
Party Wall 1	Filled Cavity with Edge Sealing		0.00	16.13

10.0 External Roofs				
Description	Type	U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
CEILING	External Plane Roof	0.14	64.00	64.00

11.0 Heat Loss Floors				
Description	Type	Construction	U-Value (W/m ² K)	Area (m ²)
Heat Loss Floor 1	Ground Floor - Solid		0.16	36.13

12.0 Opening Types

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
upvc window	Manufacture r	Window	Double Low-E Hard 0.15			0.72		0.70	1.40
FRENCH DOOR	Manufacture r	Window	Double Low-E Hard 0.15			0.72		0.70	1.40
external door	Manufacture r	Solid Door							1.20
REAR DOOR	Manufacture r	Half Glazed Door	Double Low-E Hard 0.15			0.72		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
FRONT WINDOW	Window	[1] BRICK TF	South	None	0.00					3.35	
REAR WINDOW	Window	[1] BRICK TF	North	None	0.00					1.71	
GABLE WINDOW	Window	[1] BRICK TF	West	None	0.00					1.23	
FRONT DOOR	Solid Door	[1] BRICK TF	South							3.00	
FRENCH DOOR	Window	[1] BRICK TF	North	None	0.00					3.57	
FRONT GABLE	Window	[1] BRICK TF	South West	None	0.00					2.14	

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	Reference:
Independently assessed	E2 Other lintels (including other steel lintels)	9.82	0.141	Yes	TRADA
Independently assessed	E3 Sill	6.70	0.027	No	TRADA
Independently assessed	E4 Jamb	23.42	0.038	Yes	TRADA
Independently assessed	E5 Ground floor (normal)	26.51	0.131	Yes	TRADA
Independently assessed	E10 Eaves (insulation at ceiling level)	11.40	0.060	No	TRADA
Independently assessed	E12 Gable (insulation at ceiling level)	14.50	0.062	No	TRADA
Independently assessed	E16 Corner (normal)	4.80	0.058	Yes	TRADA
Independently assessed	E18 Party wall between dwellings	4.80	0.119	Yes	TRADA
Independently assessed	P1 Party wall - Ground floor	6.72	0.119	No	TRADA
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	6.72	0.000	No	
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	6.72	0.142	No	TRADA

Y-value	0.062	W/m²K
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18.0 Pressure Testing

Designed AP ₅₀	4.50	m³/(h.m²) @ 50 Pa
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Property Tested ?		
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As Built AP ₅₀		m³/(h.m²) @ 50 Pa
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19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows fully open
Cross ventilation possible	No
Night Ventilation	No
Air change rate	5.00

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500275
Duct Type	Rigid

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	Through Wall Fan Kitchen	1
0.16	In Room Fan Other Wet Room	1

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				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System

No

22.0 Lighting

Internal

Total number of light fittings	16	
Total number of L.E.L. fittings	16	
Percentage of L.E.L. fittings	100.00	%

External

External lights fitted	Yes
Light and motion sensor	Yes

23.0 Electricity Tariff

Standard

24.0 Main Heating 1

	Database	
Description	ASHP	
Percentage of Heat	100	%
Database Ref. No.	103763	
Fuel Type	Electricity	
Main Heating	PET	
SAP Code	224	
In Winter	265.5	
In Summer	332.4	
Controls	CHD Time and temperature zone control	
PCDF Controls	0	
Sap Code	2207	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators and Underfloor	
Underfloor Heating	Yes - Pipes in Concrete	
Flow Temperature	36° - 45°C	

25.0 Main Heating 2

None

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Community Heating	None
28.0 Water Heating	HWP From main heating 1
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901
Immersion Only Heating Hot Water	No
29.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Measured Loss
Cylinder Volume	180.00
Loss	1.61
Pipes insulation	Fully insulated primary pipework
31.0 Thermal Store	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 water heating	£4,000 - £6,000	£47	B 88	
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£388	A 100	