

Full SAP Calculation Printout

Users Ref: 7869-0001-0001160

Issued on: 29.October.2008

Prop Type Ref:

Property: 80% stove as Hain Heating, 01, Example, example, example

TER: 22.13

DER: 8.54

SAP Rating: 75 C

SAP Energy Cost: £381

CO2 Emissions: 0.78 t/year

EI Rating: 94 A

Energy used: 138 kWh/m2/year

Ene1: 0

ZC: 0.00

Surveyor: 7869-0001, Matthew Carter, Tel: PE25 3ER, Fax: .

Address: Burton Lodge, Marine Avenue, Skegness, Lincolnshire

Client: 00227, Sune Nightingale, Srovesonline Limited, Capton, Dartmouth, Devon, TQ6 0JE, Tel: 0117 3026754

Software Version: EES SAP 2005.015.build.0019, March 2008 (Design System), BRE SAP Worksheet 9.81

Regs Type: SAP 2005, Regs Region: England and Wales (Part L1A 2006), Construction Type: New Build

CALCULATION DETAILS for survey reference no '7869-0001-0001160'

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SAP2005 input data (DesignData) -

Regs Region: England
Construction Type: NewBuild
Region: MI Midlands (15.5)
Orientation: N North
PropType: H House, D Detached
Storeys: 2
Property Age: 2008
Sheltered Sides: 2
Sunlight Shade: Average or unknown
Wall Perimeter: 35.00 m, 35.00 m
Floor Area: 65.00 m2, 65.00 m2
Living Floor Area: 20.00 m2
Storey Height: 2.50 m, 2.50 m
Doors
Front door: Solid Wood, uvalue: 3.00 (T), area: 1.89 m2
Windows
Front windows: Double, Low E, Soft Coat, PVC, 16 mm, North (0°), uvalue: 1.70 (T)
Side windows: Double, Low E, Soft Coat, PVC, 16 mm, East (270°), uvalue: 1.70 (T)
Rear windows: Double, Low E, Soft Coat, PVC, 16 mm, South (180°), uvalue: 1.70 (T)
Draught Lobby: No
Draught Proofing: 100%
Roof Lights
Pressure Test: Air permeability 8.00 m³/h.m² (assumed)
Mechanical Ventilation: None, Windows open during hot weather: Windows fully open
Cross ventilation possible: Yes
Fans, Chimneys, Flues: 3, 0, 1
Lighting: Low energy lighting in 50% of fixed outlets
Main Wall Type: U: 0.28 A: X(153.11 m2)
Extended Wall Types:
Timber Frame Wall Area: 0.00
Roof Main: U: 0.16 A: 65.00 m2
Main Floor Type: U: 0.20 A: 65.00 m2
Timber Floor: No Timber Floor
Thermal Mass: Simple Thermal Mass Parameter calculation:
Ground Floor Mass: Low - suspended timber floor
External Wall Mass: Low - timber/steel frame walls or masonry wall
Separating Wall Mass: Low - plasterboard on timber/steel stud
Internal Partition Mass: Low - plasterboard on timber/steel stud
Manufacturer's data: Clients choice, Pumped: pump in heated space
Main Heating: Manufacturer's data: Clients choice, to Clients Spec, 80.0%
Main Heating Manufacturer: CBD Programmer, room thermostat and TRVs
Heating Controls: Boiler interlock - Yes
Underfloor Heating: None
Secondary Heating: None
Manufacturer:
Thermal Store: None

Hot Water Heating: HWP From the primary heating system
Hot Water Cylinder: Yes, in heated space, With stat
Water heating separately timed: Yes
Hot Water Cylinder Insulation: Foam, Thickness: 50 mm, Pipes insulated
Hot Water Cylinder Volume: 210.00 litres
Solar Water Heating: None
Electricity Tariff: 7 - Hour Off Peak
PV Cells: None
Thermal Bridges: DefaultRobustConstr, Thermal bridging factor $y = 0.08$
Energy Saved:
Energy Used:
Terrain Type: Urban
Number of Wind Turbines: 0
Small-scale hydro generators: 0.00

SAP calculation (Existing Dwelling as Designed)

1. Overall house dimensions			
Ground floor	65.000 * 2.500	162.50	
First floor	65.000 * 2.500	162.50	
Total floor area	130.000		(5)
Total house volume		325.00	(6)
2. Ventilation rate			
Number of chimneys	0 * 40	0	
Number of flues	1 * 20	20	
Number of fans	3 * 10	30	
Flueless gas fire	0 * 40	0	
Infiltration		0.15	(10)
Pressure test value		8.00	(q50)
Infiltration rate		0.55	(19)
Sides sheltered		2	(20)
Shelter factor		0.85	(21)
Adjusted infiltration rate		0.47	(22)
Air change natural ventilation		0.61	(24)
Effective air change rate		0.61	(25)
3. Heat losses			
Doors Front door	1.890 * 3.000	5.67	
Doors Heat Loss total		5.67	(26)
Windows Front windows	8.000 * 1/[(1/ 1.700)+0.04]	12.73	
Windows Side windows	4.000 * 1/[(1/ 1.700)+0.04]	6.37	
Windows Rear windows	8.000 * 1/[(1/ 1.700)+0.04]	12.73	
Windows Heat Loss total		31.84	(27)
Roof Lights Heat Loss total		0.00	(27)
Ground floor 1	65.000 * 0.200	13.00	
Ground floor Heat Loss total		13.00	(28)
Main External wall type	153.110 * 0.280	42.87	(29)
Secondary walls Loss total		0.00	(29a)
Roof Main	65.000 * 0.160	10.40	(30)
Roof Loss total		10.40	(30)
Total area of elements		305.00	(32)
Fabric heat loss		103.78	(33)
Appendix K: Thermal bridging		0.08	(γ)
Effect of thermal bridges		24.40	(34)
Total fabric heat loss		128.18	(35)
Ventilation heat loss		65.51	(36)
Heat loss coefficient		193.69	(37)
Heat loss parameter (HLP)		1.49	(38)
4. Water heating energy requirements			
Energy of heated water		2459.98	(39)
Distribution loss		434.11	(40)
Tank volume		210.00	(43)
Hot Water storage loss factor		0.0152	(44)
Volume factor		0.830	(44a)
Temperature factor T		0.54	(44b)
Energy lost from tank		521.57	(45)
Energy lost from tank		521.57	(46)
If cyl contains solar storage		521.57	(47)

Primary circuit loss		360.00	(48)
Output from water heater		3775.66	(51)
Gains from water heating		1667.54	(52)
5. Internal gains			
Lighting, appliances, cooking and metabolic (Table 5)		714.84	(53)
Reduction of internal gains due to LE lighting (Appendix L)			
Correction factor for low-energy outlets		0.75	(C1)
Window 1	0.9 * 8.000 * 0.80 * 0.7 * 0.83 / 130.000	0.03	
Window 2	0.9 * 4.000 * 0.80 * 0.7 * 0.83 / 130.000	0.01	
Window 3	0.9 * 8.000 * 0.80 * 0.7 * 0.83 / 130.000	0.03	
Ratio of glass area to floor area		0.06	(GL)
Correction factor for daylighting		1.01	(C2)
Annual energy used for lighting in the house		915.36	(EL)
Reduction in lighting use due to low energy lights		305.12	(deltaEL)
Low energy lighting		-45.77	(53a)
Central heating pump		10.00	(53b)
Water heating		190.36	(54)
Total internal gains		869.43	(55)
6. Solar gains			
	Access Area Flux g FF Gains		
	Factor (m2)	(W)	
Windows 'N '	0.770 * 8.000 * 29.000 * 0.9 * 0.630 * 0.7	70.90	(56)
Windows1 'E '	0.770 * 4.000 * 48.000 * 0.9 * 0.630 * 0.7	58.68	(58)
Windows2 'S '	0.770 * 8.000 * 72.000 * 0.9 * 0.630 * 0.7	176.03	(60)
Total solar gains		305.61	(65)
Total gains, W		1175.04	(66)
Gains/loss ratio (GLR)		6.07	(67)
Utilisation factor		0.949	(68)
Useful gains, W		1114.58	(69)
7. Mean internal temperature			
Mean internal temperature of living zone (heating type = 3)		19.76	(70)
Temperature adjustment		0.00	(71)
Adjustment for gains		0.18	(72)
Adjusted room temperature		19.94	(73)
Temperature difference between zones		1.49	(74)
Living area fraction		0.154	(75)
Rest of house floor fraction		0.846	(76)
Mean internal temperature		18.68	(77)
8. Degree days			
Temperature raise from gains		5.75	(78)
Base temperature		12.92	(79)
Degree days		1542.73	(80)
9a. Energy requirements - individual heating systems, including micro-CHP			
Space heating requirement (useful)		7171.29	(81)
Model name : Clients choice			
Manufacturer: to Clients Spec			
MHS efficiency		80.0	
Main system efficiency		80.0	(83)
Secondary system efficiency		0.0	(84)
Space heating fuel - main HS		8964.12	(85)
Space heating fuel - secondary HS		0.00	(85a)
Efficiency of water heater		80.00	(86)
Energy required for water heating		3775.66	
Energy used for water heating		4719.58	(86a)
For each central heating pump		130.00	(87a)
Electricity for pumps, fans, ...		130.00	(87)
Electricity for lighting (50% fixed LEL)		915.36	(87g)
10a. Fuel costs - individual heating systems			
MHS heating cost	[8964.12 * 2.2000 * 0.01]	197.21	(88)

SHS heating cost	[0.00 * 0.0000 * 0.01]	0.00	(89)
Water heating cost	[4719.58 * 2.2000 * 0.01]	103.83	(91)
Pump/fan energy	[130.00 * 7.6500 * 0.01]	9.95	(92)
Lighting energy	[915.36 * 7.6500 * 0.01]	70.02	(93)
Additional standing charges		0.00	(94)
Total energy cost		381.01	(97)
Total energy cost using Sedbuk db prices		480.49	
11. SAP rating			
Energy cost deflator		0.91	(98)
Energy cost factor		1.81	(99)
ECF unrounded = 1.80983035457428			
SAP value		74.73	
SAP value unrounded = 74.734768250143			
SAP Energy rating		75	(100)
SAP Energy rating band		C	
12a. Carbon dioxide emissions			
MHS heating CO2	[8964.12 * 0.0250]	224.10	(101)
WHS heating CO2	[4719.58 * 0.0250]	117.99	(103)
Space and water heating CO2		342.09	(107)
Pumps and fans CO2	[130.00 * 0.4220]	54.86	(108)
Lighting CO2	[915.36 * 0.4220]	386.28	(109)
Total CO2 emissions in kg/year		783.23	(112)
Dwelling's Carbon Factor		4.48	(CF)
Environmental Impact Rating		94.00	
Environmental Impact Rating rounded		94	
Environmental Impact Rating band		A	
13a. Primary energy			
MHS heating P.E.	[8964.12 * 1.1000]	9860.53	
WHS heating P.E.	[4719.58 * 1.1000]	5191.54	
Space and water heating P.E.		15052.07	
Pumps and fans P.E.	[130.00 * 2.8000]	364.00	(104)
Lighting P.E.	[915.36 * 2.8000]	2563.01	(104a)
Primary energy kWh/year		17979.07	
Primary energy kWh/m2/year		138.30	(105)

DER calculation (Existing Dwelling as Designed)

1. Overall house dimensions			
Ground floor	65.000 * 2.500	162.50	
First floor	65.000 * 2.500	162.50	
Total floor area	130.000		(5)
Total house volume		325.00	(6)
2. Ventilation rate			
Number of chimneys	0 * 40	0	
Number of flues	1 * 20	20	
Number of fans	3 * 10	30	
Flueless gas fire	0 * 40	0	
Infiltration		0.15	(10)
Pressure test value		8.00	(q50)
Infiltration rate		0.55	(19)
Sides sheltered		2	(20)
Shelter factor		0.85	(21)
Adjusted infiltration rate		0.47	(22)
Air change natural ventilation		0.61	(24)
Effective air change rate		0.61	(25)
3. Heat losses			
Doors Front door	1.890 * 3.000	5.67	
Doors Heat Loss total		5.67	(26)
Windows Front windows	8.000 * 1/[(1/ 1.700)+0.04]	12.73	
Windows Side windows	4.000 * 1/[(1/ 1.700)+0.04]	6.37	
Windows Rear windows	8.000 * 1/[(1/ 1.700)+0.04]	12.73	
Windows Heat Loss total		31.84	(27)
Roof Lights Heat Loss total		0.00	(27)
Ground floor 1	65.000 * 0.200	13.00	
Ground floor Heat Loss total		13.00	(28)
Main External wall type	153.110 * 0.280	42.87	(29)
Secondary walls Loss total		0.00	(29a)
Roof Main	65.000 * 0.160	10.40	(30)
Roof Loss total		10.40	(30)
Total area of elements		305.00	(32)
Fabric heat loss		103.78	(33)
Appendix K: Thermal bridging		0.08	(γ)
Effect of thermal bridges		24.40	(34)
Total fabric heat loss		128.18	(35)
Ventilation heat loss		65.51	(36)
Heat loss coefficient		193.69	(37)
Heat loss parameter (HLP)		1.49	(38)
4. Water heating energy requirements			
Energy of heated water		2459.98	(39)
Distribution loss		434.11	(40)
Tank volume		210.00	(43)
Hot Water storage loss factor		0.0152	(44)
Volume factor		0.830	(44a)
Temperature factor T		0.54	(44b)
Energy lost from tank		521.57	(45)
Energy lost from tank		521.57	(46)
If cyl contains solar storage		521.57	(47)

Primary circuit loss		360.00	(48)
Output from water heater		3775.66	(51)
Gains from water heating		1667.54	(52)
5. Internal gains			
Lighting, appliances, cooking and metabolic (Table 5)		714.84	(53)
Reduction of internal gains due to LE lighting (Appendix L)			
Correction factor for low-energy outlets		0.85	(C1)
Window 1	0.9 * 8.000 * 0.80 * 0.7 * 0.83 / 130.000	0.03	
Window 2	0.9 * 4.000 * 0.80 * 0.7 * 0.83 / 130.000	0.01	
Window 3	0.9 * 8.000 * 0.80 * 0.7 * 0.83 / 130.000	0.03	
Ratio of glass area to floor area		0.06	(GL)
Correction factor for daylighting		1.01	(C2)
Annual energy used for lighting in the house		1037.41	(EL)
Reduction in lighting use due to low energy lights		183.07	(deltaEL)
Low energy lighting		-27.46	(53a)
Central heating pump		10.00	(53b)
Water heating		190.36	(54)
Total internal gains		887.74	(55)
6. Solar gains			
	Access Area Flux g FF Gains		
	Factor (m2)	(W)	
Windows 'N '	0.770 * 8.000 * 29.000 * 0.9 * 0.630 * 0.7	70.90	(56)
Windows1 'E '	0.770 * 4.000 * 48.000 * 0.9 * 0.630 * 0.7	58.68	(58)
Windows2 'S '	0.770 * 8.000 * 72.000 * 0.9 * 0.630 * 0.7	176.03	(60)
Total solar gains		305.61	(65)
Total gains, W		1193.35	(66)
Gains/loss ratio (GLR)		6.16	(67)
Utilisation factor		0.946	(68)
Useful gains, W		1129.08	(69)
7. Mean internal temperature			
Mean internal temperature of living zone (heating type = 3)		19.76	(70)
Temperature adjustment		0.00	(71)
Adjustment for gains		0.18	(72)
Adjusted room temperature		19.94	(73)
Temperature difference between zones		1.49	(74)
Living area fraction		0.154	(75)
Rest of house floor fraction		0.846	(76)
Mean internal temperature		18.68	(77)
8. Degree days			
Temperature raise from gains		5.83	(78)
Base temperature		12.85	(79)
Degree days		1527.90	(80)
9a. Energy requirements - individual heating systems, including micro-CHP			
Space heating requirement (useful)		7102.36	(81)
Fraction of heat from secondary system		0.10	(82)
Model name : Clients choice			
Manufacturer: to Clients Spec			
MHS efficiency		80.0	
Main system efficiency		80.0	(83)
Secondary system efficiency		100.0	(84)
Space heating fuel - main HS		7990.16	(85)
Space heating fuel - secondary HS		710.24	(85a)
Efficiency of water heater		80.00	(86)
Energy required for water heating		3775.66	
Energy used for water heating		4719.58	(86a)
For each central heating pump		130.00	(87a)
Electricity for pumps, fans, ...		130.00	(87)
Electricity for lighting (30% fixed LEL)		1037.41	(87g)
10a. Fuel costs - individual heating systems			

MHS heating cost	[7990.16 * 2.2000 * 0.01]	175.78	(88)
SHS heating cost	[710.24 * 7.6500 * 0.01]	54.33	(89)
Water heating cost	[4719.58 * 2.2000 * 0.01]	103.83	(91)
Pump/fan energy	[130.00 * 7.6500 * 0.01]	9.95	(92)
Lighting energy	[1037.41 * 7.6500 * 0.01]	79.36	(93)
Additional standing charges		0.00	(94)
Total energy cost		423.25	(97)
Total energy cost using Sedbuk db prices		541.40	

12a. Carbon dioxide emissions

MHS heating CO2	[7990.16 * 0.0250]	199.75	(101)
SHS heating CO2	[710.24 * 0.4220]	299.72	(102)
WHS heating CO2	[4719.58 * 0.0250]	117.99	(103)
Space and water heating CO2		617.46	(107)
Pumps and fans CO2	[130.00 * 0.4220]	54.86	(108)
Lighting CO2	[1037.41 * 0.4220]	437.79	(109)
Total CO2 emissions in kg/year		1110.11	(112)

Dwelling's Carbon Emission Rate (DER) - orientation: N		8.54	(113)
Dwelling's Carbon Factor		6.34	(CF)
Environmental Impact Rating		91.50	
Environmental Impact Rating rounded		91	
Environmental Impact Rating band		B	

TER calculation (Existing Dwelling as Designed)

1. Overall house dimensions			
Ground floor	65.000 * 2.500	162.50	
First floor	65.000 * 2.500	162.50	
Total floor area	130.000		(5)
Total house volume		325.00	(6)
2. Ventilation rate			
Number of chimneys	0 * 40	0	
Number of flues	0 * 20	0	
Number of fans	3 * 10	30	
Flueless gas fire	0 * 40	0	
Infiltration		0.09	(10)
Pressure test value		10.00	(q50)
Infiltration rate		0.59	(19)
Sides sheltered		2	(20)
Shelter factor		0.85	(21)
Adjusted infiltration rate		0.50	(22)
Air change natural ventilation		0.63	(24)
Effective air change rate		0.63	(25)
3. Heat losses			
Doors One opaque door	1.850 * 2.000	3.70	
Doors Heat Loss total		3.70	(26)
Windows Double glazed, low-E	30.650 * 1/[(1/ 2.000)+0.04]	56.76	
Windows Heat Loss total		56.76	(27)
Roof Lights Heat Loss total		0.00	(27)
Ground floor 1	65.000 * 0.250	16.25	
Ground floor Heat Loss total		16.25	(28)
Main External wall type	142.500 * 0.350	49.88	(29)
Secondary walls Loss total		0.00	(29a)
Roof Main	65.000 * 0.160	10.40	(30)
Roof Loss total		10.40	(30)
Total area of elements		305.00	(32)
Fabric heat loss		136.98	(33)
Appendix K: Thermal bridging		0.11	(y)
Effect of thermal bridges		33.55	(34)
Total fabric heat loss		170.53	(35)
Ventilation heat loss		67.22	(36)
Heat loss coefficient		237.75	(37)
Heat loss parameter (HLP)		1.83	(38)
4. Water heating energy requirements			
Energy of heated water		2459.98	(39)
Distribution loss		434.11	(40)
Tank volume		150.00	(43)
Hot Water storage loss factor		0.0191	(44)
Volume factor		0.928	(44a)
Temperature factor T		0.54	(44b)
Energy lost from tank		524.28	(45)
Energy lost from tank		524.28	(46)
If cyl contains solar storage		524.28	(47)
Primary circuit loss		610.00	(48)
Output from water heater		4028.38	(51)

Gains from water heating		1869.71	(52)
5. Internal gains			
Lighting, appliances, cooking and metabolic (Table 5)		714.84	(53)
Reduction of internal gains due to LE lighting (Appendix L)			
Correction factor for low-energy outlets		0.85	(C1)
Window 1	$0.9 * 30.650 * 0.80 * 0.7 * 0.83 / 130.000$	0.10	
Ratio of glass area to floor area		0.10	(GL)
Correction factor for daylighting		0.96	(C2)
Annual energy used for lighting in the house		986.54	(EL)
Reduction in lighting use due to low energy lights		174.10	(deltaEL)
Low energy lighting		-26.11	(53a)
Central heating pump		10.00	(53b)
Water heating		213.44	(54)
Total internal gains		912.16	(55)
6. Solar gains			
	Access Factor	Area (m2)	Flux g
			FF
Windows 'E '	$0.770 * 30.650 * 48.000 * 0.9 * 0.720 * 0.7$		Gains (W)
Windows 'E '			513.85
Total solar gains			513.85
Total gains, W			1426.01
Gains/loss ratio (GLR)			6.00
Utilisation factor			0.950
Useful gains, W			1355.09
7. Mean internal temperature			
Mean internal temperature of living zone (heating type = 1)		18.86	(70)
Temperature adjustment		0.00	(71)
Adjustment for gains		0.34	(72)
Adjusted room temperature		19.20	(73)
Temperature difference between zones		1.54	(74)
Living area fraction		0.154	(75)
Rest of house floor fraction		0.846	(76)
Mean internal temperature		17.89	(77)
8. Degree days			
Temperature raise from gains		5.70	(78)
Base temperature		12.20	(79)
Degree days		1386.01	(80)
9a. Energy requirements - individual heating systems, including micro-CHP			
Space heating requirement (useful)		7908.65	(81)
Fraction of heat from secondary system		0.10	(82)
Model name : Clients choice			
Manufacturer: to Clients Spec			
MHS efficiency		78.0	
Main system efficiency		78.0	(83)
Secondary system efficiency		100.0	(84)
Space heating fuel - main HS		9125.37	(85)
Space heating fuel - secondary HS		790.87	(85a)
Efficiency of water heater		78.00	(86)
Energy required for water heating		4028.38	
Energy used for water heating		5164.58	(86a)
For each central heating pump		130.00	(87a)
For each boiler with F.A.F		45.00	(87b)
Electricity for pumps, fans, ...		175.00	(87)
Electricity for lighting (30% fixed LEL)		986.54	(87g)
12a. Carbon dioxide emissions			
MHS heating CO2	[9125.37 * 0.1940]	1770.32	(101)
SHS heating CO2	[790.87 * 0.4220]	333.75	(102)
WHS heating CO2	[5164.58 * 0.1940]	1001.93	(103)
Space and water heating CO2		3106.00	(107)

Pumps and fans CO2	[175.00 * 0.4220]	73.85	(108)
Lighting CO2	[986.54 * 0.4220]	416.32	(109)
Total CO2 emissions in kg/year		3596.17	(112)
Dwelling's Carbon Factor		20.55	(CF)
Environmental Impact Rating		72.46	
Environmental Impact Rating rounded		72	
Environmental Impact Rating band		C	
CO2 for heating and hot water		3179.85	(CH)
CO2 emissions from internal lighting		416.32	(CL)
ADL1A - Table 1 Fuel factor		1.00	(FuelFactor)
Level of reduction in CO2 - Improvement factor		20	(%)
Total floor area		130.00	(TFA)
Target Carbon Dioxide Emission Rate		22.13	(TER)

Regulation compliance checklist

1 TER and DER	OK
1.1 Target Carbon Dioxide Emission Rate	
Main fuel - Renewable energy, Fuel factor = 1.00, TER = 22.13	
1.2 Dwelling Carbon Dioxide Emission Rate - DER = 8.54	
1.3 DER 8.54 < TER 22.13	
2.1 Fabric U-values	OK
Wall 0.28 (0.35) 0.28 (0.70) OK	
Roof 0.16 (0.25) 0.16 (0.35) OK	
Floor 0.20 (0.25) 0.20 (0.70) OK	
Openings 1.81 (2.20) 3.00 (3.30) OK	
2.3 Heating efficiency	OK
Manufacturer's data: Clients choice, Pumped: pump in heated space	
Efficiency - Manufacturer data: 80.0%	
Minimum permitted: 45.0% - OK	
Secondary heating: None	
2.4 Cylinder insulation	OK
Volume = 210 litres	
Nominal cylinder loss: 2.65 kWh/day	
Permitted by DHCG: 3.20 kWh/day - OK	
Primary pipework insulated: Yes - OK	
2.5 Controls	OK
Programmer, room thermostat and TRVs - OK	
Cylinder thermostat - OK, Separate water control - OK	
2.7 Low energy lighting	OK
Light fittings: 20, L.E.L. fittings: 10 = 50.00% > 25% - OK	
L.E.L. fittings required per 25m2 or part of TFA: 6 < 10 - OK	
2.8 External lighting	OK
External lights: None	
3.1 Summertime temperature	OK
Region: Midlands (15.5)	
Thermal mass parameter = 5.0	
Ventilation rate in hot weather = 8.0	
Overheating risk (Orientation 'N') = Not significant - OK	
4.1 Key features	
Openings U-value 1.70 < 1.80	
Boiler efficiency 80.0% (> 49.0%)	
Main Heating Fuel: W Wood logs	
4.5 Design air permeability	OK
Design air permeability = 8.0	
Overall result:	OK

Recommendation Level E

E Low energy lighting : 100%
Recommendation result : Recommended
E Recommendation no : 101
E Recommendation text : Low energy lighting for all fixed outlets
CO2 emissions : 659.943
Total energy cost (_97) : 362.482
SAP rating : 76 (76.080)
E Recommendation : SAP change (76.080 - 74.735), increase = 1.345

Recommendation Level N

N Solar Panel : installed
Recommendation result : Recommended
N Recommendation no : 102
N Recommendation text : Solar water heating
CO2 emissions : 654.629
Total energy cost (_97) : 335.692
SAP rating : 78 (78.025)
N Recommendation : SAP change (78.025 - 76.080), increase = 1.945

Recommendation Level U

U Photovoltaics : 2.5 kWp
Recommendation result : Recommended
U Recommendation no : 103
U Recommendation text : Solar photovoltaic panels, 2.5 kWp
CO2 emissions : -292.340
Total energy cost (_97) : 224.407
SAP rating : 86 (86.103)
U Recommendation : SAP change (86.103 - 78.025), increase = 8.078

Recommendation Level

V Wind turbine : blade diameter 1.75 m
Recommendation result : Recommended
V Recommendation no : 104
V Recommendation text : Wind turbine
CO2 emissions : -319.100
Total energy cost (_97) : 221.078
SAP rating : 86 (86.345)
V Recommendation : SAP change (86.345 - 86.103), increase = 0.242
EffectTooSmall

Recommendation Total

E Low energy lighting	: 100%
N Solar Panel	: installed
U Photovoltaics	: 2.5 kWp
Recommendation result	: Recommended
U Recommendation no	: 103
U Recommendation text	: Solar photovoltaic panels, 2.5 kWp
CO2 emissions	: -292.340
Total energy cost (_97)	: 224.407
SAP rating	: 86 (86.103)