ENERGY COUNCIL

Energy Conservation through Consultancy and Education

CUT ENERGY COSTS

7th May 2008

Mr. I. Mbachu
16 Saxon Street
Ancoats
Manchester
M40 7BY

Our ref.25168L3.

Dear Mr. I. Mbachu,

Detached House on land adjacent to 16 Saxon Street, Ancoats.

Thank you for returning a signed Appendix 1A; we have completed the following SAP evaluation and the results are detailed below: -

Our ref	Your reference	SAP	DER/TER $kgCO_2/m^2/yr$	Improvement above Building Regs 2006
25168	2B/2 Storey Detached house at land adjacent to 16 Saxon Street	85	20.83/27.83	25.04%

This SAP evaluation has been carried out against the thermal data listed in Appendix 1A (attached). To achieve Code Level 3 the building has to perform 25% better than a dwelling built to current Building Regulations.

Please find attached the Design Stage Certification, SAP Worksheet and Predicted Energy Assessment for the above dwelling; these ean now be forwarded to Building Control.

Trust this is satisfactory, thank you for your assistance.

Yours siucerely,
On Behalf of Energy Council

K Winstrom

Encl: Design Stage Certification
SAP Worksheet
PEA
Appendix 1A (agreed version)

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Appendix 1A – Design Final

Energy Evaluation Ref: 25168
Detached Dwelling at 16 Saxon Street, Ancoats, Manchester
Mr. I. Mbachu
Thermal and Fabric Data to achieve code level 3
Dwellings with masonry walls and electric heating using heat pumps

Item	Brief description	Confirm	Notes.
	The following information is required for the design submission (as per requirements of approved doc L1A).		Please note submission is now in two stages. **A) Design**, B) As installed
1	Ground floor is solid concrete with screed finish and insulation to achieve the U value stated opposite		Design Floor U = 0.17 W/m²K
2	Main external wall is masonry to achieve the U indicated. This has a brick finish		Wall to achieve U = 0.22 W/m²K
2A	No semi-exposed walls are present. Garage is external		
3	Conventional lofts are insulated to achieve the U value indicated opposite by use of 100mm quilt between joists and 300mm quilt across joists.		To achieve U=0.11 W/m²K
3A	No insulated sloping roofs are present		Conventional lofts only in house.
4	A wall mounted fan flued condensing system boiler with auto ignition is installed. This is a mains gas boiler.		SEDBUK 90.4%
5	The heating system has time and temperature zone control		
6	A 188ml hot water cylinder with 93ml dedicated thermal store is installed. This has 100mm spray foam insulation		
7	The central heating pump and boiler are inside the main fabric of the dwelling.		
8	The boiler has an interlock to switch it off when there is no demand from room thermostat(s).		
9	There is no secondary heating installed.		
10	Hot water can be provided independent of central heating.		
11	Radiators are installed in zone 1 and 2 and have TRV's fitted in some rooms.		
12	4.56m² (aperture area) glazed flat plate solar water heating panels are installed.		Collector heat loss co efficient is 3.8 Zero loss collector efficiency is 0.78 Panels face SE/SW
13	BRE accredited methods of limiting thermal bridging are installed at every junction in the main fabric. Therefore, the defined Y value is 0.08. At final stage please indicate BRE approved details spec.		Proof of this is required please refer to http://www.planningportal.gov.uk/england/professionals/en/1115314255826.html
14	All double glazed windows and patio type doors/windows are from UPVC with Low-e glass soft coating. Value is manufacturer's declaration.		No window will be worse than 1.4 W/m²K average glass and frame U value. Pls indicate if argon fill.
15	Frame factor, emissivity, and transmission factors are all undefined. Overhang depth/width over window is 0.1		
16	An insulated loft hatch is installed. This is well sealed		
17	Extract fans are installed in every wet area.		These are standard devices.
18	External doors have double glazing and are insulated to achieve U =1.1 W/m²K Manufacturers Declaration		Special Insulated door with thermal break.
18A	French doors are as item 13 above		
18B	Solid door to garage is special and achieves same U as item 18 above		
19	No open flues or chimneys are present anywhere.		
20	Building Regulations Part L1A 2006 apply.		
21	This SAP calculation presumes an air permeability of 6a/c at 50pa will be achieved when air tested.		Must be achieved
22	Low energy (LE) lights are installed to meet building regs. These are installed in most rooms.		One per 25m² of floor area. L=2, K=2, H=2
23	Cross ventilation is possible and the windows can be partly opened in summer to prevent overheating.		
24	An electric cooker /hob is present.		
25	Calculations for the U values stated above are in my possession and these have been carried out by the intended Insulation supplier.		The drawings will be updated before submission to the BC Officer to reflect the U values stated above.
26	Post code of site is M40 7BY. Dwelling faces North East.		*Post code and address must be correct otherwise no certificate can be issued.*
27	There is an external door to the kitchen although it is not present on the elevation.		
28	This work is for SAP/PEA and final EPC.		

As agreed with Mr. I. Mbachu on 02/05/08

NHER

SAP Worksheet: Design - Final

This Design submission has been carried out by an Authorised SAP Assessor. It has been prepared from plans and specifications and may not reflect the property as constructed.

Assessor Name	Mr Jeff Gibson	**Assessor Number**	363
Client	TBA		
Date Last Modified	07/05/2008		
Address	Land adjacent to 16 Saxon Street,Ancoats,Manchester,Greater Manchester,M40 7BY		

1. Overall dwelling dimensions

	Area (m^2)		Average storey height (m)		Volume (m^3)	
Ground Floor	56.54	(1a) ×	2.50	=	141.35	(1)
First Floor	30.85	(2a) ×	2.80	=	86.38	(2)
Total floor area (1a)+(2a)+(3a)+(4a)+(4b)+(4d)+(4f)+(4h) =	87.39	(5)				
Dwelling volume			(1)+(2)+(3)+(4)+(4c)+(4e)+(4g)+(4i) =		227.73	(6)

2: Ventilation rate

			m^3 per hour	
Number of chimneys	0	× 40 =	0	(7)
Number of open flues	0	× 20 =	0	(8)
Number of intermittent fans or passive vents	3	× 10 =	30	(9)
Number of flueless gas fires	0	× 40 =	0	(9a)

			Air changes per hour	
Infiltration due to chimneys, flues and fans = (7)+(8)+(9)+(9a) =	30	÷ box (6) =	0.13	(18)
If a pressurisation test has been carried out, proceed to box (19)				
Number of storeys in the dwelling	2	(11)		
Additional infiltration		[(11) - 1] × 0.1 =	N/A	(12)
Structural infiltration: *0.25 for steel or timber frame or 0.35 for masonry construction*			N/A	(13)
If suspended wooden floor, *enter 0.2 (unsealed) or 0.1 (sealed)*, else enter 0			N/A	(14)
If no draught lobby, enter 0.05, else enter 0			N/A	(15)
Percentage of windows and doors draught stripped	N/A	(16)		
Enter 100 in box (16) for new dwellings which are to comply with Building Regulations				
Window infiltration		0.25 - [0.2 × (16) ÷ 100] =	N/A	(17)
Infiltration rate		(10)+(12)+(13)+(14)+(15)+(17) =	N/A	(18)
If based on air permeability value, then [q_{50} ÷ 20] + (10) in box (19), otherwise (19) = (18)			0.43	(19)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used				
Number of sides on which sheltered			2	(20)
(Enter 2 in box (20) for new dwellings where location is not shown)				

Shelter factor	1 - [0.075 × (20)] =	0.85	(21)
Adjusted infiltration rate	(19) × (21) =	0.37	(22)
Calculate effective air change rate for the applicable case			
If balanced whole house mechanical ventilation system	air throughput (aeh) =	N/A	(22a)
If balanced with heat recovery	efficiency in % allowing for in-use factor =	N/A	(22b)
a) If balanced whole house mechanical ventilation with heat recovery	(22) + (22a) × [1 – (22b) / 100] =	N/A	(23)
b) If balanced whole house mechanical ventilation without heat recovery	(22) + (22a) =	N/A	(23a)
c) If whole house extract ventilation or positive input ventilation from outside *if (22) < 0.25, then (23b) = 0.5; otherwise (23b) = 0.25 + (22)*		N/A	(23b)
d) If natural ventilation or whole house positive input ventilation from loft *if (22) ≥ 1, then (24) = (22); otherwise (24) = 0.5 + [(22)² × 0.5]*		0.57	(24)
Effective air change rate - enter (23) or (23a) or (23b) or (24) in box (25)		0.57	(25)

3. Heat losses and heat loss parameter

ELEMENT	Area (m²)		U - value		AXU (W/K)	
Doors	6.12	×	1.10	=	6.73	(26)
Windows *	18.20	×	1.33	=	24.13	(27)
Ground Floor	56.54	×	0.17	=	9.61	(28)
Walls	132.78	×	0.22	=	29.21	(29)
Roof	57.20	×	0.11	=	6.29	(30)
Total area of elements ΣA, m²	270.84	(32)				

** for windows and rooflights use effective window U-value calculated as given in paragraph 3.2*

Fabric heat loss, W/K	(26)+(27)+(27a)+(27b)+(28)+(29)+(29a)+(30)+(30a)+(31) =	75.98 (33)
Thermal bridges - Σ (lxΨ) calculated using Appendix K *if details of thermal bridging are not known calculate y × (32) [see Appendix K] and enter in box (34)*		21.67 (34)
Total fabric heat loss	(33)+(34) =	97.64 (35)
Ventilation heat loss	(25) × 0.33 × (6) =	42.64 (36)
Heat loss coefficient, W/K	(35)+(36) =	140.28 (37)
Heat loss parameter (HLP), W/m²K	(37) ÷ (5) =	1.61 (38)

4. Water heating energy requirement **kWh/year**

Energy content of hot water used from Table 1 column (b)	1942.48 (39)
Distribution loss from Table 1 column (c) *If instantaneous water heating at point of use, enter "0" in boxes (40) to (45)* *For community heating use Table 1 (c) whether or not hot water tank is present*	342.79 (40)
Water storage loss:	
a) If manufacturer's declared loss factor is known (kWh/day):	N/A (41)
Temperature factor from Table 2b	N/A (41a)

Energy lost from water storage, kWh/year	(41)x(41a)x365 =	N/A	(42)

b) If manufacturer's declared cylinder loss factor is not known:

Cylinder volume (litres) including any solar storage within same cylinder *If community heating and no tank in dwelling, enter 110 litres in box (43)* *Otherwise, if no stored hot water (this includes instantaneous combi boilers), enter '0' in box (43)*		188.00	(43)
Hot water storage loss factor from Table 2 (kWh/litre/day) *If community heating and no tank in dwelling, use cylinder loss from Table 2 for 50 mm factory insulation in box (44)*		0.01	(44)
Volume factor from Table 2a		0.86	(44a)
Temperature factor from Table 2b		0.54	(44b)
Energy lost from water storage, kWh/year	(43)x(44)x(44a)x(44b)x365 =	328.25	(45)
Enter (42) or (45) in box (46)		328.25	(46)
If cylinder contains dedicated solar storage, box (47) = (46) x [(43) - (H11)] / (43), else (47) = (46)		162.38	(47)
Primary circuit loss from Table 3		360.00	(48)
Combi loss from Table 3a (enter "0" if no combi boiler)		0.00	(49)
Solar DHW input calculated using Appendix H (enter "0" if no solar collector)		1210.53	(50)
Output from water heater, kWh/year	(39)+(40)+(47)+(48)+(49)-(50) =	1597.12	(51)
Heat gains from water heating *include (47) in calculation of (52) only if cylinder is in the dwelling or hot water is from community heating*	0.25 x [(39)+(49)]+0.8x[(40)+(47)+(48)] =	1177.75	(52)

5. Internal gains

		Watts	
Lights, appliances, cooking and metabolic (Table 5)		515.47	(53)
Reduction of internal gains due to low energy lighting (calculated in Appendix L)		58.52	(53a)
Additional gains from Table 5a		10.00	(53b)
Water heating	(52) ÷ 8.76 =	134.45	(54)
Total internal gains	(53) + (53b) + (54) - (53a) =	601.41	(55)

6. Solar gains

	Access factor Table 6d		Area m²		Flux Table 6a		g Table 6b		FF Table 6c		Gains (W)	
South East	0.77	x	1.80	x	64.00	x	0.20		1.00	=	17.74	(58)
North East	0.77	x	3.24	x	34.00	x 0.9 x	0.63	x	0.80	=	38.48	(61)
North East	0.77	x	2.50	x	34.00	x	0.20		1.00	=	13.09	(61)
South West	0.77	x	10.66	x	64.00	x	0.20		1.00	=	105.06	(63)

Total solar gains:	[(56) + ... + (64)]	= 174.37	(65)

Note: for new dwellings where overshading is not known the solar access factor is '0.77'

Total gains, W	(55) + (65) =	775.78	(66)

Gain/loss ratio (GLR)	(66) ÷ (37) =	5.53	(67)
Utilisation factor (Table 7, using GLR in box (67))		0.96	(68)
Useful gains, W	(66) × (68) =	745.84	(69)

7. Mean internal temperature

		°C	
Mean internal temperature of the living area (Table 8)		18.87	(70)
Temperature adjustment from Table 4e, where appropriate		0.00	(71)
Adjustment for gains *R is obtained from the 'responsiveness' column of Table 4a or Table 4d*	{[(69) ÷ (37)] - 4.0} × 0.2 ×R =	0.26	(72)
Adjusted living room temperature	(70) + (71) + (72) =	19.14	(73)
Temperature difference between zones (Table 9)		1.95	(74)
Living area fraction (0 to 1.0)	living room area ÷ (5) =	0.35	(75)
Rest-of-house fraction	1 - (75) =	0.65	(76)
Mean internal temperature	(73) - [(74) × (76)] =	17.87	(77)

8. Degree days

Temperature rise from gains	(69) ÷ (37) =	5.32	(78)
Base temperature	(77) - (78) =	12.56	(79)
Degree-days, *use box (79) and Table 10*		1462.37	(80)

9. Space heating requirements

Space heating requirement (useful), kWh/year	0.024 × (80) × (37) =	4923.36	(81)

For range cooker boilers where efficiency is obtained from the Boiler Efficiency Database or manufacturer's declared value, multiply the result in box (81) by (1 - Φ case/Φwater) where Φ case is the heat emission from the case of the range cooker at fullload (in kW); and Φ water is the heat transferred to water at full load (in kW).Φ case and Φ water are obtained from the database record for the range cooker boiler or manufacturer's declared value.

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

Note: when space and water heating is provided by community heating use the alternative worksheet 9b

Space heating:

Fraction of heat from secondary/supplementary system (*use value from Table 11, Table 12a or Appendix F)*		0.00	(82)
Efficiency of main heating system, %		90.40	(83)
(SEDBUK or from Table 4a or 4b, adjusted where appropriate by the amount shown in the 'efficiency adjustment' column of Table 4c)			
Efficiency of secondary/supplementary heating system, % (use value from Table 4a or Appendix E)		0.00	(84)
Space heating fuel (main) requirement, kWh/year	[1- (82)] × (81) ×100 ÷ (83) =	5446.19	(85)
Space heating fuel (secondary), kWh/year	(82) × (81) ×100 ÷ (84) =	N/A	(85a)

Water heating:

Efficiency of water heater, %		90.40	(86)
(SEDBUK or from Table 4a or 4b, adjusted where appropriate by the amount shown in the 'efficiency adjustment' column of Table 4c)			
Energy required for water heating, kWh/year	(51) x 100 ÷ (86) =	1766.72	(86a)

Electricity for pumps and fans:	**kWh/year**	
each central heating pump, (Table 4f)	130.00	(87a)
each boiler with a fan-assisted flue (Table 4f)	45.00	(87b)
warm air heating system fans (Table 4f)	0.00	(87c)
mechanical ventilation -balanced, extract or positive input from outside (Table 4f)	0.00	(87d)
maintaining keep-hot facility for gas combi boiler (Table 4f)	0.00	(87e)
pump for solar water heating (Table 4f)	0.00	(87f)
Total electricity for the above equipment, kWh/year (87a)+(87b)+(87c)+(87d)+(87e)+(87f) =	175.00	(87)

10a. Fuel costs - individual heating systems

	Fuel kWh/year		Fuel price (Table 12)		Fuel cost £/year	
Space heating - main system	(85)	x	1.63	x0.01 =	88.77	(88)
Space heating - secondary	(85a)	x	N/A	x 0.01 =	0.00	(89)
Water heating						
Water heating cost (electric, off-peak tariff)						
On-peak fraction (Table 13, or Appendix F for electric CPSUs)			0.00	(90)		
Off-peak fraction	1.0 - (90) =		1.00	(90a)		
			Fuel price			
On-peak cost	(86a) x (90)	x	N/A	x 0.01 =	0.00	(91)
Off-peak cost	(86a) x (90a)	x	N/A	x 0.01 =	0.00	(91a)
Water heating cost (other fuel)	(86a)	x	1.63	x 0.01 =	28.80	(91b)
Pump and fan energy cost	(87)	x	7.12	x 0.01 =	12.46	(92)
Energy for lighting (calculated in Appendix L)	390.11	x	7.12	x 0.01 =	27.78	(93)
Additional standing charges (Table 12)					34.00	(94)

Renewable and energy-saving technologies (Appendices M and N)

PV

Energy produced or saved, kWh/year	0.00	(95)				
Cost of energy produced or saved, £/year	(95)	×	0.00	× 0.01 =	N/A	(95a)

Wind

Energy produced or saved, kWh/year	0.00	(95b1)				
Cost of energy produced or saved, £/year	(95b1)	×	0.00	× 0.01 =	N/A	(95b)

Micro CHP

Energy produeed or saved, kWh/year	N/A	(95c1)				
Cost of energy produced or saved, £/year	(95c1)	×	N/A	× 0.01 =	N/A	(95c)
Energy consumed by the technology, kWh/year	N/A	(96)				
Cost of energy consumed, £/year	(96)	×	N/A	×0.01 =	N/A	(96a)

Special features (Appendix Q)

Energy produced or saved, kWh/year	N/A	(s1)				
Cost of energy produeed or saved, £/ycar	(s1)	×	N/A	× 0.01 =	N/A	(s1a)
Energy consumed by the technology, kWh/year	N/A	(s2)				
Cost of energy consumed, £/year	(s2)	×	N/A	×0.01 =	N/A	(s2a)

Total energy cost (88)+(89)+(91)+(91a)+(91b)+(92)+(93)+(94)-(95a)-(95b)-(95c)+(96a)-(s.a)+(s2a) = 191.81 (97)

11a. SAP rating - individual heating systems

Energy cost deflator (SAP 2005)		0.91	(98)
Energy cost factor (ECF)	{[(97) x (98)] - 30.0} ÷ {(5) + 45.0} =	1.09	(99)
SAP rating (Table 14)		85	(100)
SAP band		B	

12a. Carbon dioxide emissions rate for individual heating systems (including micro-CHP) and community heating without CHP

Individual heating system:	**Energy** kWh/year		**Emission factor** kg CO_2/kWh		**Emissions** kgCO_2/year	
Space heating main from box (85)	5446.19	×	0.194	=	1056.56	(101)
Space heating secondary from box (85a)	N/A	×	N/A	=	0.00	(102)
Energy for water heatiug from box (86a)	1766.72	×	0.194	=	342.74	(103)
Commnnity scheme:						
Efficiency of community boilers % *use actual efficiency if known, or value in Table 4a*					N/A	(104)
Energy for space heating (87*) x 100 ÷ (104) =	N/A	×	N/A	=	N/A	(105)
Energy for water heating (51) or [(87b*) x 100 ÷ (104)] =	N/A	×	N/A	=	N/A	(106)
Space and water heating	[(101) + (102) + (103)] or [(105) + (106)] =				1399.31	(107)

Electricity for pumps and fans from box (87) or (88*)	175.00	×	0.422	=	73.85	(108)
Energy for lighting from Appendix L	390.11	×	0.422	=	164.63	(109)
Energy produced or saved in dwelling (Appendices M and N)						
PV energy produced or saved	(95) or (95*)	×	N/A	=	N/A	(110)
Wind energy produced or saved	(95b1) or (95b1*)	×	N/A	=	N/A	(110b)
Micro-CHP energy produced or saved	(95c1) or (95c1*)	×	N/A	=	N/A	(110c)
Micro-CHP energy consumed	(96) or (96*)	×	N/A	=	0.00	(111)
Energy produced or saved in dwelling (Appendix Q)	(s1) or (s1*)	×	N/A	=	0.00	(s1a)
Energy consumed by the technology (Appendix Q)	(s2) or (s2*)	×	N/A	=	0.00	(s2a)
Total CO_2 kg/year	(107) + (108) + (109) - (110) + (111) - (s1a) + (s2a)			=	1637.78	(112)
Carbon dioxide emissions rate			(112) ÷ (5)	=	18.74	(113)
EI rating					83	
EI band					B	

13a. Primary energy, for individnal heating systems (including micro-CHP) and community heating without CHP

Individnal heating system:	**Energy** kWh/year		**Primary energy factor**		**Primary energy** (kWh/year)	
Space heating main from box (85)	5446.19	×	1.150	=	6263.12	
Space heating secondary from box (85a)	N/A	×	N/A	=	0.00	
Energy for water heating from box (86a)	1766.72	×	1.150	=	2031.73	
Community scheme:						
Efficiency of community boilers % N/A (104) *use actual efficiency if known, or value in Table 4a*						
Energy for space heating (87*) × 100 ÷ (104) =	N/A	×	N/A	=	N/A	
Energy for water heating (87b*) × 100 ÷ (104) =	N/A	×	N/A	=	N/A	
Space and water heating					8294.85	
Electricity for pumps and fans from box (87) or (88*)	175.00	×	2.800	=	490.00	
Energy for lighting from Appendix L	390.11	×	2.800	=	1092.31	
Energy produced or saved in dwelling (Appendices M and N)						
PV energy produced or saved	(95) or (95*)	×	N/A	=	N/A	
Wind energy produced or saved	(95b1) or (95b1*)	×	N/A	=	N/A	
Micro-CHP energy produced or saved	(95c1) or (95c1*)	×	N/A	=	N/A	
Micro-CHP energy consumed	(96) or (96*)	×	N/A	=	0.00	
Energy produced or saved in dwelling (Appendix Q)	(s1) or (s1*)	×	N/A	=	0.00	
Energy consumed by the above technology (Appendix Q)	(s2) or (s2*)	×	N/A	=	0.00	

Primary energy kWh/year	9877.16
Primary energy kWh/m²/year	113.02

Predicted Energy Assessment

16 Land adjacent to
Saxon Street
Ancoats
Manchester
M40 7BY

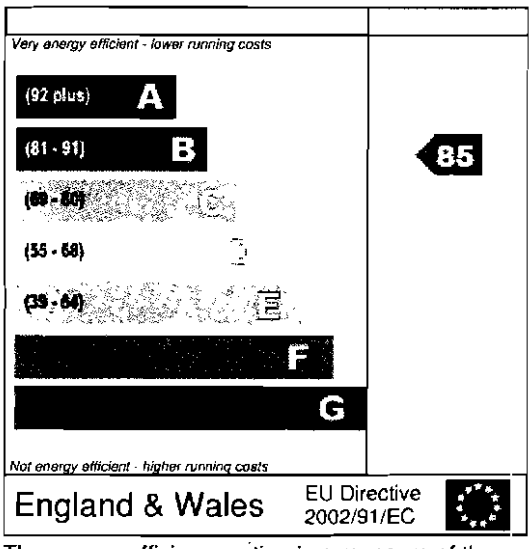
Dwelling type: Detached house
Date of assessment: 7 May 2008
Produced by: Mr Matthew Gibson

Total floor area: 87 m²

This document is a Predicted Energy Assessment required to be included in a Home Information Pack 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, the Pack should be updated to include information about the energy performance of the completed property.

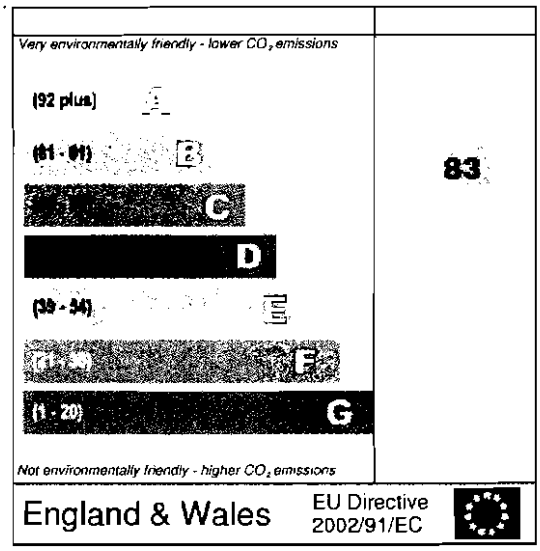
Energy performance has been assessed using the SAP 2005 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.

Energy Efficiency Rating



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

Environmental Impact (CO_2) Rating



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