Project Information

Building type End-terrace house

Reference Date

327 Greystoke Avenue Project

Bristol BS10 6BD

SAP 2009 worksheet for New extension to existing dwelling - calculation of energy ratings

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Ground floor (1)	41.00	2.40	98.40	(3a)
Ground floor (2)	20.00	2.40	48.00	(3b)
First floor	41.00	2.70	110.70	(3c)
Second floor	24.00	1.80	43.20	(3d)
	126.00			(4)
			300.30	(S)

2. Ventilation rate

											m³ per ho	ur
							main + s	eonda	ry + othe	r		
	er of chin						0 + 0 + 0		x 40		0.00	(6a)
	er of ope						0 + 0 + 0		x 20		0.00	(6b)
		rmittent f					3		x 10		30.00	(7a)
		sive vent					0		x 10		0.00	(7b)
Numbe	er of fluel	ess gas	fires				0		x 40		0.00	(7c)
											Air chang	jes per hour
											0.10	(8)
Pressu	ire test, a	assumed	q50						15.00			(17)
Air peri	meability	/									0.85	(18)
											2.00	(19)
											0.85	(20)
		incorpora modified									0.72	(21)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Monthly	y averag	e wind s	peed from	n Table	7			<u>'</u>	1			
5.40	5.10	5.10	4.50	4.10	3.90	3.70	3.70	4.20	4.50	4.80	5.10	
Wind F	actor			•		•			•		54.10	(22)
1.35	1.27	1.27	1.13	1.02	0.97	0.93	0.93	1.05	1.13	1.20	1.27	
1.00	1.21	1.21	1.10	1.02	0.57	0.55	0.55	1.00	1.10	1.20	13.53	(22a)
Adjuste	ed infiltra	ition rate	(allowing	g for she	Iter and	wind sp	eed)				13.33	(22a)
0.98	0.92	0.92	0.81	0.74	0.70	0.67	0.67	0.76	0.81	0.87	0.92	
	1	-			1	_		1		-	9.77	(22b)
		tural vent ange rate		ntermitte	nt extrac	ct fans						
0.98	0.92	0.92	0.83	0.77	0.75	0.72	0.72	0.79	0.83	0.88	0.92	(25)
												` '

3. Heat losses and heat loss parameter Element Net area U-value $A \times U$ kappa-value A x K Gross Openings A, m² W/m^2K W/K kJ/m²K area, m2 m² kJ/K 2.60 Window - Double-glazed, 1.730 1.50 (1.60) (27)air-filled, low-E, En=0.1, soft coat (South) dg Window - Double-glazed, 1.730 2.60 (27)1.50 (1.60) air-filled, low-E, En=0.1, soft coat (North) dg Window - Double-glazed, 1.260 1.50 (1.60) 1.89 (27)air-filled, low-E, En=0.1, soft coat (North) dg Window - Double-glazed, 1.260 1.50 (1.60) 1.89 (27)air-filled, low-E, En=0.1, soft coat (North) dq Window - Double-glazed, 3.700 7.17 (27)1.94 (2.10) air-filled, low-E, En=0.1, soft coat (South) dg Window - Double-glazed, 1.880 3.64 (27)1.94 (2.10) air-filled, low-E, En=0.1, soft coat (South) dg Window - Double-glazed. 1.250 2.42 (27)1.94 (2.10) air-filled, low-E, En=0.1, soft coat (South) Window - Double-glazed, 1.880 1.94 (2.10) 3.64 (27)air-filled, low-E, En=0.1, soft coat (North) Window - Double-glazed, 1.880 3.64 1.94 (2.10) (27)air-filled, low-E, En=0.1, soft coat (North) Window - Double-glazed, 0.660 1.94 (2.10) 1.28 (27)air-filled, low-E, En=0.1, soft coat (North) dg Window - Double-glazed, 0.630 1.22 (27)1.94 (2.10) air-filled, low-E, En=0.1, soft coat (East) dg Solid door 1.890 2.10 3.97 (26)dg Full glazed door -3.670 2.10 7.71 (26)Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg 4.07 9.00 Pitched roofs insulated between joists 37.00 0.11 333.00 (30)

	r heating		/ require	ements							kWh/year
	ed occupa average		r usage i	in litres r	er dav ∖	/d.avera	ae				2.88 108.10
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	er usage	in litres	per day t	or each	month	1		-		I.	
118.90	114.58	110.26	105.93	101.61	97.29	97.29	101.61	105.93	110.26	114.58	118.90
Energy	content o	of hot wa	ter used								
176.75	154.59	159.52	139.08	133.45	115.15	106.71	122.45	123.91	144.41	157.63	171.18
	content (tion loss	annual)	•		•				•	•	1704.83
26.51	23.19	23.93	20.86	20.02	17.27	16.01	18.37	18.59	21.66	23.64	25.68
	volume						210.00				
	cturer's c		cylinder	loss fact	or (kWh		1.91				
	ature Fa			(1.14/1./			0.5400				4.00
	lost from orage los		er cyllnae	er (KVVn/	day)						1.03
31.97	28.88	31.97	30.94	31.97	30.94	31.97	31.97	30.94	31.97	30.94	31.97
Net stor	age loss										
31.97	28.88	31.97	30.94	31.97	30.94	31.97	31.97	30.94	31.97	30.94	31.97
Primary	circuit lo	ss (annu	ial)								360.00
Primary	loss										
30.58	27.62	30.58	29.59	30.58	29.59	30.58	30.58	29.59	30.58	29.59	30.58
Total he	eat requir	ed for wa	ater heat	ing calcı	ılated fo	r each m	onth				
239.30	211.09	222.07	199.61	196.00	175.69	169.26	185.00	184.44	206.96	218.16	233.73
Output f	from wate	er heater	for each	month,	kWh/m	onth	,				
239.30	211.09	222.07	199.61	196.00	175.69	169.26	185.00	184.44	206.96	218.16	233.73
Heat ga	ins from	water he	eating, k\	Vh/mont	:h						2441.29
108.81	96.60	103.08	94.67	94.41	86.71	85.52	90.75	89.63	98.05	100.84	106.96
	-										

_		
_	Intorna	il anınc
IJ.	IIILEI II a	ıl gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts				•	,		•		,
173.03	173.03	173.03	173.03	173.03	173.03	173.03	173.03	173.03	173.03	173.03	173.03
Lighting	gains					•	,				,
69.83	62.02	50.44	38.19	28.54	24.10	26.04	33.85	45.43	57.68	67.32	71.77
Appliand	ces gains	3									
437.06	441.60	430.17	405.84	375.12	346.26	326.97	322.44	333.87	358.20	388.91	417.78
Cooking	gains						,				
55.19	55.19	55.19	55.19	55.19	55.19	55.19	55.19	55.19	55.19	55.19	55.19
Pumps a	and fans	gains			•	•	•		•		
10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Losses	e.g. evap	oration	negative	values)		•	•		•		
-115.35	-115.35	-115.35	-115.35	-115.35	-115.35	-115.35	-115.35	-115.35	-115.35	-115.35	-115.35
Water h	eating ga	ains									
146.25	143.75	138.55	131.48	126.90	120.44	114.95	121.98	124.48	131.79	140.05	143.76
Total int	ernal gai	ns					•				
776.00	770.23	742.02	698.37	653.43	613.66	590.82	601.13	626.64	670.54	719.15	756.17

6. Solar gains (calculation for January)

o. Solar gams (calculation for Samuary)	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (South) dg	0.9 x 1.730 47.32		0.77	25.0203
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg	0.9 x 1.730 10.73	0.63 x 0.70	0.77	5.6712
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg	0.9 x 1.260 10.73	0.63 x 0.70	0.77	4.1304
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg	0.9 x 1.260 10.73	0.63 x 0.70	0.77	4.1304
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (South) dg	0.9 x 3.700 47.32	0.63 x 0.70	0.77	53.5117
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (South) dg	0.9 x 1.880 47.32	0.63 x 0.70	0.77	27.1897
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (South) dg	0.9 x 1.250 47.32	0.63 x 0.70	0.77	18.0783
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg	0.9 x 1.880 10.73	0.63 x 0.70	0.77	6.1629
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg	0.9 x 1.880 10.73	0.63 x 0.70	0.77	6.1629

Lighting calculations

FF x Shading Area

6. Solar gains (calculation for January)	A 0 Fl	0 55	Ob - din	0-:	
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg	Area & Flux 0.9 x 0.660 10.73	g & FF 0.63 x 0.70	Shading 0.77	Gains 2.1636	
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (East)	0.9 x 0.630 19.87	0.63 x 0.70	0.77	3.8262	
dg Solid door	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000	
dg Full glazed door - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg	0.9 x 3.670 10.73	0.63 x 0.70	0.77	12.0307	(00.4)
Total solar gains, January				168.08	(83-1)
Solar gains 168.08 286.11 384.02 498.64 589.04 62	24.35 600.34 522.8	81 430.70 325	.74 201.29	142 06	(83)
Total gains	24.33 000.34 322.0	51 430.70 325	.74 201.29	143.00	(03)
944.08 1056.34 1126.04 1197.01 1242.47 12	238.00 1191.17 1123	.94 1057.34 996	.28 920.44	900.03	(84)
		1			
Lighting calculations	•		FF 01 1		
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (South)	Area 0.9 x 1.73	g 0.80	FF x Shadi 0.70 x 0.83		
dg Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North)	0.9 x 1.73	0.80	0.70 x 0.83	0.72	
dg Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg	0.9 x 1.26	0.80	0.70 x 0.83	0.53	
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg	0.9 x 1.26	0.80	0.70 x 0.83	0.53	
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (South)	0.9 x 3.70	0.80	0.70 x 0.83	1.55	
dg Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (South)	0.9 x 1.88	0.80	0.70 x 0.83	0.79	
dg Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (South)	0.9 x 1.25	0.80	0.70 x 0.83	0.52	
dg Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North)	0.9 x 1.88	0.80	0.70 x 0.83	0.79	
dg Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North)	0.9 x 1.88	0.80	0.70 x 0.83	0.79	
dg Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) dg	0.9 x 0.66	0.80	0.70 x 0.83	0.28	

Lighting calculations

Area FF x Shading g 0.80 0.9 x 0.63 Window - Double-glazed, air-filled, low-E, 0.70×0.83 0.26 En=0.1, soft coat (East)

GL = 7.47 / 126.00 = 0.059

C1 = 0.500

C2 = 1.027EI = 493

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)Heating system responsiveness 1.00

Heating	j system	responsi	veness								1.00
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	<u>'</u>		•	•	•	•	•		•	1	
12.17	12.39	12.39	12.82	13.08	13.21	13.33	13.33	13.02	12.82	12.61	12.39
alpha	<u>'</u>		•	•	•	•	•		•	1	
1.81	1.83	1.83	1.85	1.87	1.88	1.89	1.89	1.87	1.85	1.84	1.83
Utilisati	on factor	for gains	s for livin	g area		•	•			•	
0.96	0.95	0.93	0.90	0.84	0.75	0.62	0.64	0.81	0.90	0.95	0.96
Mean ir	nternal te	mperatu	re in livin	ig area T	1	•	•	•	•	-1	
17.12	17.41	17.97	18.62	19.48	20.19	20.64	20.62	20.00	19.03	17.89	17.24
Tempe	rature du	ring heat	ting perio	ds in res	st of dwe	iling Th2	2	1	•	1	
19.16	19.19	19.19	19.23	19.26	19.27	19.29	19.29	19.25	19.23	19.21	19.19
Utilisati	on factor	for gains	s for rest	of dwell	ing	•	•		•		
0.95	0.93	0.91	0.87	0.79	0.65	0.44	0.46	0.72	0.87	0.93	0.95
Mean ir	nternal te	mperatu	re in the	rest of d	welling 7	Γ2	•				
15.81	16.10	16.66	17.33	18.17	18.82	19.17	19.17	18.66	17.73	16.60	15.94
	area fracti nternal te				dwelling)					0.19
16.06	16.35	16.91	17.57	18.42	19.08	19.45	19.44	18.91	17.98	16.84	16.19
Apply a	djustmen	t to the i	mean int	ernal ten	nperatur	e, where	appropr	iate		1	
16.06	16.35	16.91	17.57	18.42	19.08	19.45	19.44	18.91	17.98	16.84	16.19

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatio	n factor	for gains	5			•	•		•		
0.92	0.91	0.88	0.84	0.76	0.64	0.46	0.48	0.70	0.84	0.91	0.93
Useful g	ains		,			•					
872.88	958.86	991.71	1007.99	948.49	790.93	548.14	537.20	742.13	833.06	834.15	834.04
Monthly	average	externa	tempera	ature							
4.50	5.00	6.80	8.70	11.70	14.60	16.90	16.90	14.30	10.80	7.00	4.90
Heat los	s rate fo	r mean i	nternal te	emperati	ire		•				
3323.7	3206.1	2855.9	2423.4	1797.22	1186.39	670.26	667.34	1240.33	1961.17	2733.0	3187.9
Space h	eating re	quireme	nt for ea	ch mont	h, kWh/r	nonth					
1823.37	1510.16	1386.94	1019.08	631.46	-	-	-	-	839.32	1367.14	1751.25
	ace heat					ar) (Octo	ober to N	lay)	•		10328.71
Space h	eating re	equireme	nt per m	² (kWh/r	n²/year)						81.97

8c. Space cooling requirement - not applicable

9a. Energy requirements

9a. Energy requirements	kWh/year	
No secondary heating system selected Fraction of space heat from main system(s) Efficiency of main heating system 1.0000 92.70%	(202) (206)	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov	Dec	
Space heating requirement		
1823.37 1510.16 1386.94 1019.08 631.46 839.32 1367.	14 1751.25 (98)	
Appendix Q - monthly energy saved (main heating system 1)		
0.00 0.00 0.00 0.00 - - - - 0.00 0.00	0.00 (210))
Space heating fuel (main heating system 1)		
1966.96 1629.08 1496.16 1099.33 681.18 905.41 1474.	301889.15 (211))
Appendix Q - monthly energy saved (main heating system 2)		
0.00 0.00 0.00 0.00 - - - - 0.00 0.00	0.00 (212))
Space heating fuel (main heating system 2)		
0.00 0.00 0.00 0.00 - - - - 0.00 0.00	0.00 (213))
Appendix Q - monthly energy saved (secondary heating system)		
0.00 0.00 0.00 0.00 - - - - 0.00 0.00	0.00 (214))
Space heating fuel (secondary)		
0.00 0.00 0.00 0.00 - - - - 0.00 0.00	0.00 (215))
Water heating		
Water heating requirement		
239.30 211.09 222.07 199.61 196.00 175.69 169.26 185.00 184.44 206.96 218.1	, ,	
Efficiency of water heater	79.00 (216)	•
90.87 90.77 90.53 90.14 89.04 79.00 79.00 79.00 79.00 89.63 90.54	90.84 (217))
Water heating fuel		
263.34 232.55 245.29 221.44 220.12 222.39 214.25 234.17 233.47 230.91 240.9	6 257.28 (219))
Annual totals Space heating fuel used, main system 1 Space heating fuel (secondary) Water heating fuel Electricity for pumps, fans and electric keep-hot	kWh/year 11142.08 (211) 0.00 (215) 2816.17 (219))
central heating pump boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting (100.00% fixed LEL) Energy saving/generation technologies Appendix Q -	130.00 (230c 45.00 (230c 175.00 (231) 493.29 (232)	e))
Energy saved or generated (): Energy used (): Total delivered energy for all uses	0.000 (236a 0.000 (237a 14626.54 (238)	a)
	, ,	

10a. Fue	l costs	usina	Table	12 r	rices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	11142.082	3.100	345.40	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Water heating cost	2816.17	3.100	87.30	(247)
Mech vent fans cost	0.000	11.460	0.00	(249)
Pump/fan energy cost	175.000	11.460	20.05	(249)
Energy for lighting	493.286	11.460	56.53	(250)
Additional standing charges			106.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			615.29	(255)
11a. SAP rating				
			0.47	(256)
OAD			1.69	(257)
SAP value			76.41	(050)
0451			76	(258)
SAP band			С	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	11142.08	0.198	2206.13	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.517	0.00	(263)
Water heating	2816.17	0.198	557.60	(264)
Space and water heating			2763.73	(265)
Electricity for pumps and fans	175.00	0.517	90.48	(267)
Electricity for lighting	493.29	0.517	255.03	(268)
Electricity generated - PVs	0.00	0.529	0.00	(269)
Electricity generated - μCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			3109.24	(272)
			kg/m²/year	
CO2 emissions per m ²			24.68	(273)
El value			75.64	(273a)
El rating			76	(274)
El band			С	

13a. Primary energy

	Energy	Primary	P. Energy	
	kWh/year	factor	(kWh/yea	r)
Space heating, main	11142.08	1.020	11364.92	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	2.920	0.00	(263)
Water heating	2816.17	1.020	2872.50	(264)
Space and water heating			14237.42	(265)
Electricity for pumps/fans	175.00	2.920	511.00	(267)
Electricity for lighting	493.29	2.920	1440.40	(268)
Electricity generated - PV	0.00	2.920	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Electricity generated - wind	0.00	2.920	0.00	(269)
New energy-saving technology :				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Primary energy kWh/year			16188.82	(272)
Primary energy kWh/m²/year			128.48	(273)

Project Information

Building type End-terrace house

Reference Date

Project 327 Greystoke Avenue

Bristol BS10 6BD

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2010 Edition

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New extension to existing dwelling

1 TER and DER

Fuel for main heating system: Gas (mains) (fuel factor = 1.00)

Target Carbon Dioxide Emission Rate
Dwelling Carbon Dioxide Emission Rate
Excess emissions = 9.44kg/m² (57.8%)

TER = 16.34 DER = 25.78

Fail

2a Thermal bridging

Thermal bridging calculated using default y-value of 0.15

2b Fabric U-values

Element Average Highest Wall 0.80 (max. 0.30) 1.20 (max. 0.70) Fail Floor 0.30 (max. 0.25) 0.35 (max. 0.70) Fail Roof 0.14 (max. 0.20) 0.18 (max. 0.35) OK Openings 1.96 (max. 2.00) 2.10 (max. 3.30) OK

3 Air permeability

Air permeability at 50 pascals: 15.00 Maximum: 15.00

Fail

OK

4 Heating efficiency

Main heating system:

Boiler and radiators, mains gas

Worcester GREENSTAR

Source of efficiency:

from boiler database

Worcester GREENSTAR 24Ri ErP+

Efficiency: 89.7% SEDBUK2009

Minimum: 88.0%

Secondary heating system:

None -

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5 Cylinder insulation Hot water storage Manufacturer's declared cylinder loss factor (kWh/day) Permitted by DBSCG 2.30 OK Primary pipework insulated Fail 6 Controls (Also refer to "Domestic Building Services Compliance Guide" by the DCLG) Programmer + roomstat + TRVs Space heating controls OK Cylinderstat - Yes OK Independent timer for DHW - Yes OK **Boiler Interlock** OK 7 Low energy lights Percentage of fixed lights with low-energy fittings: 100.0% Minimum: 75.0% OK 8 Mechanical ventilation Not applicable 9 Summertime temperature Overheating risk (Severn Valley): OK Not significant OK Based on: Thermal mass parameter: 100.00 Overshading: Average or unknown (20-60 % sky blocked) Orientation: South Ventilation rate: Blinds/curtains: None with blinds/shutters closed 0.00% of daylight hours 10 Key features Party wall U-value 0.00 W/m²K Pitched roofs insulated between joists U-value 0.11 W/m²K

Predicted Energy Assessment

327 Greystoke Avenue Bristol BS10 6BD Dwelling type: End-terrace house
Date of assessment: 11 February 2022

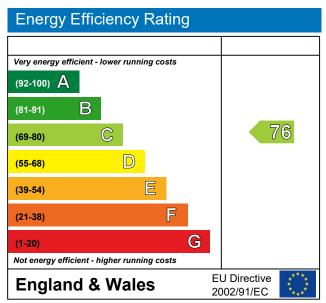
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Produced by Complete Energy Consultancy Ltd

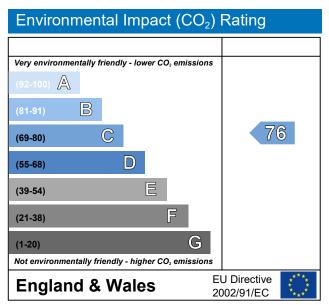
Total floor area: 126 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2009 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 (CO₂) emissions.



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.



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.