

breglobal

Measuring the environmental performance of construction materials:

The Green Guide to Specification – External cladding & Facades

BREEAM Materials, BRE Global

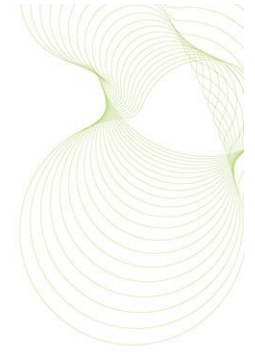
February 2009



Overview

- Sustainability context and buildings
- LCA and Environmental Profiles Methodology
- The Green Guide to Specification
- Use of the Green Guide – BREEAM and The Code
- Impacts of external cladding and facades

Sustainability – Why are we here?



Construction industry and buildings

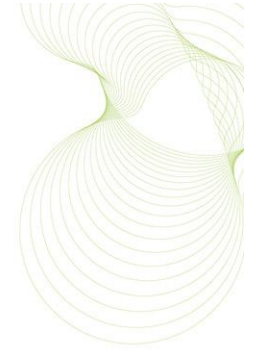
- Large impacts
 - Construction and demolition waste alone represents 32% of total UK waste (DEFRA)
 - the energy used in constructing, occupying and operating buildings represents approximately 50% of greenhouse gas emissions in the UK. (Environment Agency 2007)
 - Passenger transport vehicles account for a further 15% of CO₂ emissions. (EST)



Sustainability: How does this apply to buildings?



- Sustainability is a complex & political agenda
- Generally no agreed consensus
- Likely to always change depending upon context
- Lots of **Greenwash**
- No single tool for measuring sustainability
- Industry using many tools/methods/systems;
 - Life Cycle Assessment (LCA)
 - BREEAM
 - Code for Sustainable Homes (CSH)
 - Carbon Labelling & Footprinting
 - Whole Life Costing (WLC)
 - Environmental Product Declarations (EPD's)
 - Many others...

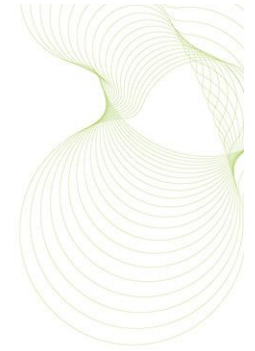


Looking at the product level...

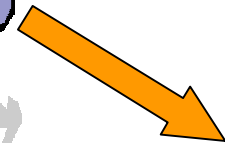
How do we measure environmental performance?

Life Cycle Assessment (LCA)

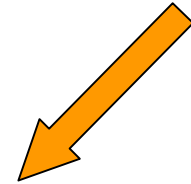
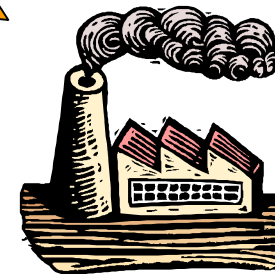
Life Cycle Assessment (LCA)



Extraction



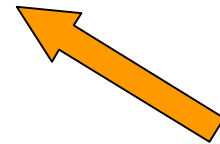
Creation



Environmental impacts



Maintenance



Disposal



How can LCA be used in the Industry?



- To measure existing performance and monitor improvements
- To assess benefits of innovative processes
- To compare materials which offer the similar functions, eg external wall constructions
- To compare building designs over their expected lifetimes
- Used in the BRE Environmental Profiles Methodology
- Applied in tools like The Green Guide to Specification

What is an Environmental Profile?



Measurement of the **environmental performance** of a material, product or system over a set time period.

- Extraction of raw materials & transport (“cradle to gate”)
- Production (“gate to gate”)
- Transport, installation and end of life (“gate to grave”)

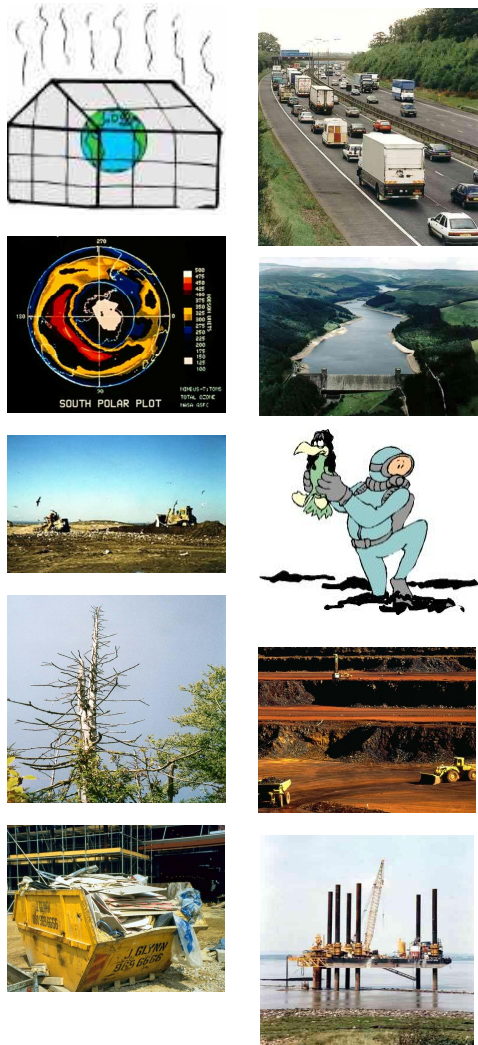
Achieved using Life Cycle Assessment (LCA)

Used in BRE 2007 Environmental Profiles Methodology

- **Level playing field for assessing construction products**

Outcome is a Type III Environmental Product Declaration (EPD) compliant with ISO 14025 (externally audited by UKAS)

Environmental Profiles 2008 Impact categories



Environmental Issue	Weighting (%)
Climate Change	21.6
Water extraction	11.7
Mineral resource depletion	9.8
Stratospheric ozone depletion	9.1
Human toxicity	8.6
Ecotoxicity to water	8.6
Nuclear waste	8.2
Ecotoxicity to land	8.0
Waste disposal	7.7
Fossil fuel depletion	3.3
Eutrophication	3.0
Photochemical ozone creation	0.20
Acidification	0.05

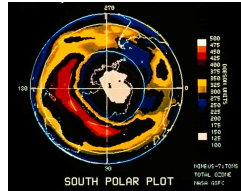
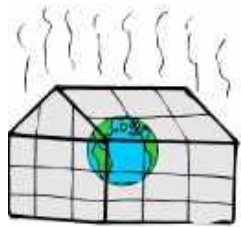
Derivation of Ecopoints



Issues

Measurement

Weighting



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The Environmental Profile – An independent product declaration



Issue	Characterised Data	Unit
Climate Change	25	kg CO2 eq. (100yr)
Acid Deposition	0.2	kg SO2 eq.
Ozone Depletion	0.000022	kg CFC11 eq.
Pollution to Air: Human Toxicity	0.32	kg tox.
Pollution to Air: Photochemical Ozone Creation Potential	0.030	kg ethene eq.
Pollution to Water: Human Toxicity	0	kg tox.
Pollution to Water: Ecotoxicity	500	m ³ tox.
Pollution to Water: Eutrophication	0.015	kg PO4 eq.
Fossil Fuel Depletion	0.018	toe
Minerals Extraction	0.02	tonnes
Water Extraction	720	litres
Waste Disposal	0.02	tonnes
Transport Pollution & Congestion: Freight	17	tonne.km

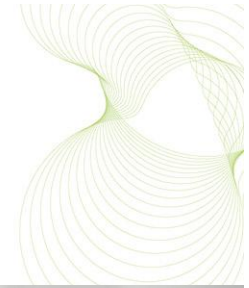
Issue	Normalised Data	UK Citizen's impacts
Climate Change	0.002	12300 kg CO2 eq. (100yr)
Acid Deposition	0.0034	58.9 kg SO2 eq.
Ozone Depletion	0.000077	0.286 kg CFC11 eq.
Pollution to Air: Human Toxicity	0.0035	90.7 kg tox.
Pollution to Air: Photochemical Ozone Creation Potential	0.0012	32.2 kg ethene eq.
Pollution to Water: Human Toxicity	0	0.0117 kg tox.
Pollution to Water: Ecotoxicity	0.0028	178000 m ³ tox.
Pollution to Water: Eutrophication	0.0019	8.01 kg PO4 eq.
Fossil Fuel Depletion	0.0043	4.00 toe
Minerals Extraction	0.004	5.04 tonnes
Water Extraction	0.0017	418000 litres
Waste Disposal	0.0028	7.19 tonnes
Transport Pollution & Congestion: Freight	0.0041	4140 tonne.km
Primary Energy	0.3	GJ
BRE Ecopoints Score	0.24	Ecopoints

Appendix No:	200a	Valid From:	16/06/03	Valid To:	15/06/06
Issue No:	1				
Signed on behalf of BRE Certification:		RA Zammitt			

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BRE Global: Certified Environmental Profiles

- Sister company to BRE (previously BRE Certification)
- Data verification process – evidence
- Supports external claims
- Environmental Profiles valid 3 years
- An independent environmental product declaration
- Whole process revolves around:
 - Product manufacture data
 - Data verification (Factory site audit)
 - Data modelling – LCA methodology



What do you do with an Environmental Profile? Comparison at a building element level



Bricks vs bricks



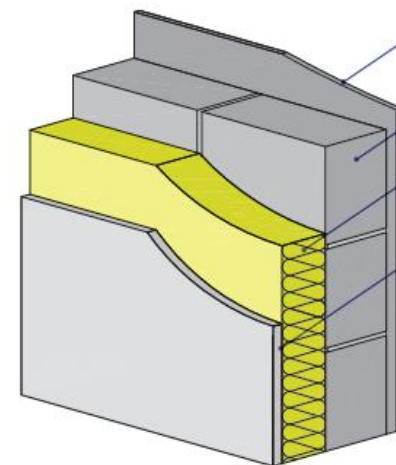
Wall specifications

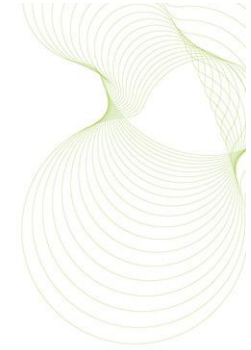


Blocks vs blocks



VS





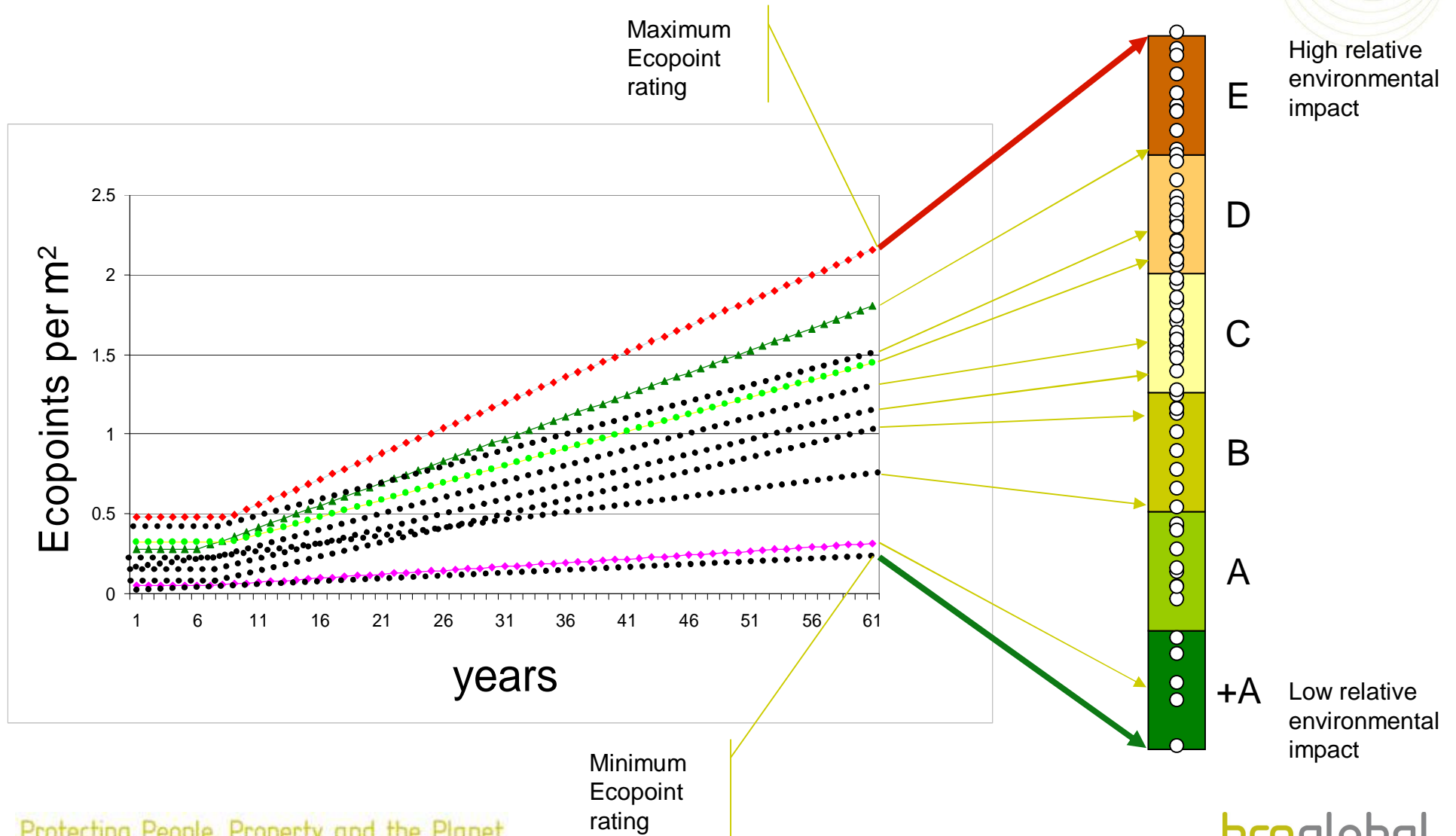
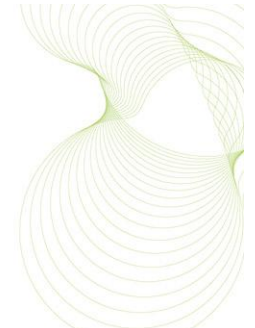
The Green Guide to Specification

- Ecopoints for building materials placed into specifications
- Environmental impacts of building elements
- Based on LCA
- A+ to E rating

www.thegreenguide.org.uk

The screenshot shows the Breglobal website interface for 'THE GREEN GUIDE TO SPECIFICATION'. The header includes the 'breglobal' logo and the title 'THE GREEN GUIDE TO SPECIFICATION'. A navigation menu on the left lists: '< Back to BRE', 'Home', 'Introduction to The Green Guide', 'Sponsors', 'Publications and Tools', 'How the Green Guide was compiled', 'How to use the Green Guide to Specification', 'Register', and 'Login'. The main content area is titled 'Green Guide 2008 ratings' and features a 'Building type >' dropdown menu set to 'Commercial'. Below this, it prompts the user to 'Please select an element' with several buttons: 'Upper Floor Construction', 'Internal Wall', 'External Wall Construction', 'Insulation', 'Commercial Windows', 'Roof Construction', and 'Landscaping'. A 'CONTACT' box in the top right corner provides contact information: 'E: Green Guide Helpdesk' and 'T: +44 (0)1923 664 462'. The footer contains the copyright notice: '© Copyright BRE 2008 | Terms, Conditions and Privacy policy'.

The Ecopoint and A+ to E ratings

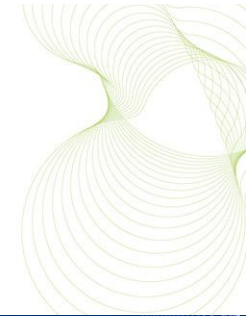


The Green Guide to Specification

- Green Guide update
 - Online & Paper publication

www.thegreenguide.org.uk

- 1500+ generic specifications each with summary Ratings
- Ratings A+ to E
- 13 impact category ratings
- Six building types
- FREE access
- Ongoing development



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< Back to BRE

Home

Introduction to The Green Guide

Publications and Tools

How the Green Guide was compiled

How to use the Green Guide to Specification

Green Guide 2008 Ratings

Welcome to The Green Guide to Specification Online

Green Guide online provides designers and specifiers with easy-to-use guidance on how to make the best environmental choices when selecting construction materials and components.

In the Green Guide online, building materials and components are assessed in terms of their environmental impact across their entire life cycle - from 'cradle to grave'. This accessible and reliable information will be of great assistance to all those involved in the design, construction and management of buildings as they work to reduce the environmental burden of their properties.

The specifications shown throughout the Green Guide should not, however be used as a basis for on-site construction. They are of generic nature only and are used to illustrate a range of typical materials. Although every effort has been made to ensure that the information given here is accurate, our knowledge and understanding continues to evolve. The Green Guide ratings shown here represent our best efforts to provide objective, helpful guidance to enable the specifier to make more informed choices based on the data and methodologies available at this present time.

The Green Guide online has been developed alongside the printed version which will be published later this year. The Green Guide online offers a flexible and adaptable medium and will be updated on a regular basis.



CONTACT

E: Green Guide Helpdesk
T: +44 (0)1923 664 462
 or via one of our [local offices](#)

EXTERNAL LINKS:




[GreenBookLive](#) - information on all current Certified Environmental Profiles



In partnership with



Building Type?



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Green Guide 2008 Ratings

Green Guide 2008 ratings

The Green Guide 2008 ratings can be accessed by following a series of steps to allow you to select the most appropriate range of ratings, starting with the type of building in which the element will sit.

Some ratings apply to more than one building type and this will be stated at element selection stage.

The ratings can be viewed on screen or printed.

Note that ratings are copyright BRE and should not be reproduced in any publicly accessible format without the express permission of BRE. Please email the Green Guide Helpdesk.

CONTACT

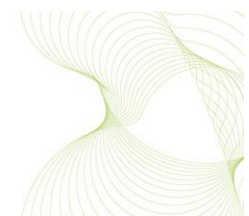
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Please select a building type

Domestic	Health	Industrial
Commercial	Retail	Education

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Element?



- < Back to BRE
- Home
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- Publications and Tools
- How the Green Guide was compiled
- How to use the Green Guide to Specification
- Green Guide 2008 Ratings**

Green Guide 2008 ratings

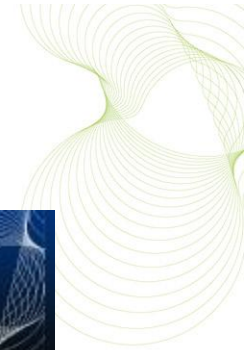
Building type > **Domestic**


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Please select an element

- Upper Floor Construction
- Ground Floor Construction
- Internal Wall
- Domestic Windows
- Roofing
- External Wall Construction
- Insulation
- Party Wall
- Party Floor
- Landscaping

Element details



THE GREEN GUIDE TO SPECIFICATION

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Green Guide 2008 Ratings

Green Guide 2008 ratings

Building type > **Domestic**

Category > **External Wall Construction**

External Walls

External wall ratings are the same for the following building types:
Domestic, Health, Commercial, Retail, Industrial, Education

Functional unit for External Walls:
1m² of external wall construction, to satisfy current building regulations, and a U value of 0.3 W/m²K. Where relevant, the specification will also include an internal wall finish.

Variation for retail/industrial
1m² of external wall construction, to satisfy current building regulations, and a U value of 0.3 W/m²K.

Perhaps more than any decision facing the designer, the choice of the external wall specification is subject to the widest range of practical, economic and visual considerations, some of which may be beyond the control of the design team.

External walls can have a significant contribution to the impacts of



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Sub-Section of Elements



Please select the element type of **External Wall**
Construction ratings you wish to review:

Blockwork Cavity Wall	Rendered or Fairfaced Blockwork Cavity Wall	Brickwork on Framed Construction
Rendered or Fairfaced Blockwork	Cladding on Framed Construction	Cladding on Masonry
Rainscreen Cladding	Insulated Cladding	Insulated Render Systems
Curtainwalling	Loadbearing Precast Concrete	

Element

Sub-Section

Specification ratings



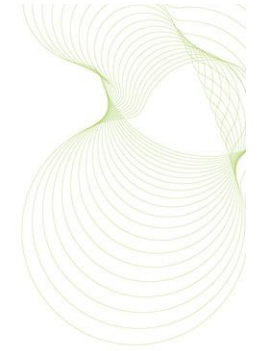
< Back to BRE Home Introduction to The Green Guide Sponsors Publications and Tools How the Green Guide was compiled How to use the Green Guide to Specification Register Login Green Guide 2008 Ratings	<p>Green Guide 2008 ratings</p> <p>Building type > Domestic</p> <p>Category > External Wall Construction</p> <p>Sub-category > Loadbearing Precast Concrete</p> <p>Element type > Loadbearing Precast Concrete Systems</p> <table border="1"> <thead> <tr> <th></th> <th>Element number</th> <th>Summary rating</th> </tr> </thead> <tbody> <tr> <td>Brick faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint</td> <td>806230679</td> <td>C</td> </tr> <tr> <td>Brick faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint</td> <td>806230687</td> <td>C</td> </tr> <tr> <td>Brick faced precast concrete sandwich panel, plaster skim, paint</td> <td>806530294</td> <td>D</td> </tr> <tr> <td>Imported Chinese granite faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint</td> <td>806230688</td> <td>D</td> </tr> <tr> <td>Imported Chinese granite faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint</td> <td>806530022</td> <td>D</td> </tr> <tr> <td>Imported Chinese granite faced precast concrete sandwich panel, plaster skim, paint</td> <td>806530295</td> <td>E</td> </tr> <tr> <td>Limestone faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint</td> <td>806260690</td> <td>C</td> </tr> <tr> <td>Limestone faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint</td> <td>806530021</td> <td>D</td> </tr> <tr> <td>Limestone faced precast concrete sandwich panel, plaster skim, paint</td> <td>806530296</td> <td>D</td> </tr> <tr> <td>Reconstructed stone faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint</td> <td>806000023</td> <td>C</td> </tr> <tr> <td>Reconstructed stone faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint</td> <td>806260689</td> <td>B</td> </tr> <tr> <td>Reconstructed stone faced precast concrete sandwich panel, plaster skim, paint</td> <td>806530293</td> <td>C</td> </tr> </tbody> </table>		Element number	Summary rating	Brick faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint	806230679	C	Brick faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint	806230687	C	Brick faced precast concrete sandwich panel, plaster skim, paint	806530294	D	Imported Chinese granite faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint	806230688	D	Imported Chinese granite faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint	806530022	D	Imported Chinese granite faced precast concrete sandwich panel, plaster skim, paint	806530295	E	Limestone faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint	806260690	C	Limestone faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint	806530021	D	Limestone faced precast concrete sandwich panel, plaster skim, paint	806530296	D	Reconstructed stone faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint	806000023	C	Reconstructed stone faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint	806260689	B	Reconstructed stone faced precast concrete sandwich panel, plaster skim, paint	806530293	C
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Summary Issue Category Ratings



< Back to BRE	Green Guide 2008 ratings	
Home	Building type > <u>Domestic</u>	
Introduction to The Green Guide	Category > <u>External Wall Construction</u>	
Sponsors	Sub-category > <u>Loadbearing Precast Concrete</u>	
Publications and Tools	Element type > <u>Loadbearing Precast Concrete Systems</u>	
How the Green Guide was compiled	Element	Brick faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint
How to use the Green Guide to Specification	Element Number	806230687
Register	Summary Rating	C
Login	Climate Change	D
Green Guide 2008 Ratings	Water Extraction	B
	Mineral Resource Extraction	A
	Stratospheric Ozone Depletion	D
	Human Toxicity	A
	Ecotoxicity to Freshwater	A+
	Nuclear Waste (higher level)	A
	Ecotoxicity to Land	D
	Waste Disposal	D
	Fossil Fuel Depletion	D
	Eutrophication	D
	Photochemical Ozone Creation	B
	Acidification	C

The Use of the Green Guide to Specification



- Architects and building specifiers
- Part of BRE's Environmental Assessment Methods for buildings
 - BREEAM & EcoHomes (BRE)
 - Code for Sustainable Homes (BRE & DCLG)
 - Materials specification credits
 - www.breeam.org

breeam

Protecting People, Property and the Planet



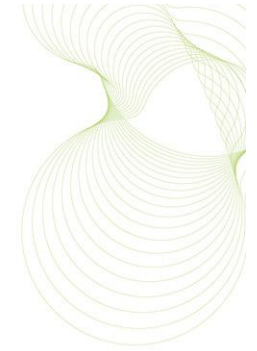
breglobal



What is BREEAM?

- BRE - Environmental Assessment Method
- Voluntary Certification scheme for Buildings (but often specified as part of planning)
- Provides an environmental label for buildings
 - Pass, Good, Very Good, Excellent, Outstanding
- Independent & credible
- Holistic and Issue based – broad range of environmental concerns
- Ensures best environmental practice above regulatory minimum
- Large scope – many different types of buildings assessed
- Used mainly in UK but also growing Internationally

breeam



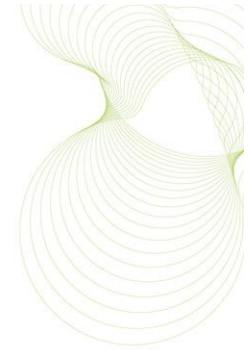
The Code for Sustainable Homes

- The Sustainable Buildings Task Group (SBTG)
- Set up by DEFRA, DTI, DCLG, EA, EP and others

- Launched April 2007, revised May 2008
- A single national standard for England
- Based on BREEAM - EcoHomes
 - (replaces EcoHomes in England)

- Mandatory rating for all new homes in England (May 08) and now for Wales too!





Materials Specification

- One of the many issues assessed in BREEAM and The Code
- Credits available - variable
- Whole life environmental impact
- Key building elements assessed
- Green Guide to Specification
 - Ratings A+ to E
 - www.thegreenguide.org.uk

The screenshot shows the Breglobal website interface for the Green Guide 2008 ratings. The header includes the Breglobal logo and the text 'THE GREEN GUIDE TO SPECIFICATION'. A navigation menu on the left lists various sections like 'Home', 'Introduction to The Green Guide', 'Sponsors', 'Publications and Tools', 'How the Green Guide was compiled', 'How to use the Green Guide to Specification', 'Register', and 'Login'. The main content area is titled 'Green Guide 2008 ratings' and features a 'Building type > Commercial' dropdown menu. Below this, a section titled 'Please select an element' contains several buttons for different building components: 'Upper Floor Construction', 'Internal Wall', 'External Wall Construction', 'Insulation', 'Commercial Windows', 'Roof Construction', and 'Landscaping'. A 'CONTACT' box in the top right corner provides contact information for the Green Guide Helpdesk.

- Higher scores for better rated elements
- Code – Minimum D rated specifications
- Based on LCA and Environmental Profiles Methodology
- Bespoke ratings – Certified Environmental Profiles

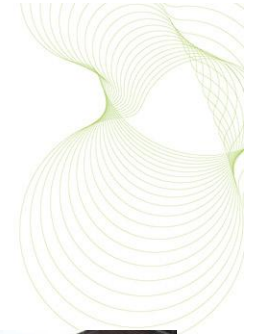
How are Cladding & Facades assessed within BREEAM and The Code?



- Points available within the materials specification credit
 - **External walls**

Elements assessed	Non Domestic schemes												Domestic	
	BREEAM													Code For Sustainable Homes
	Bespoke	Offices (design)	Offices (fit out)	Retail (design)	Retail (fit out)	NEAT (NHS)	Healthcare	Prisons	Schools	Courts	Industrial	Further Education	EcoHomes (2006)	
Upper Floors	Y	Y		Y		Y	Y	Y	Y	Y		Y	Y	Y
Ground Floors													Y	Y
External walls	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y
Roofs	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y
Floor Finishes	Y		Y		Y	Y	Y		Y	Y		Y		Y
Windows	Y	Y		Y		Y	Y		Y	Y		Y	Y	Y
Internal walls/partitions	Y		Y		Y	Y	Y		Y	Y		Y	Y	Y
Hard landscaping	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y	
Boundary protection	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y	

Green Guide performance for external cladding finishes



- Cladding on framed construction
 - **Steel or timber framed performs well (A and A+)**
 - **Claddings include**
 - ***Copper***
 - ***Canadian cedar***
 - ***Clay tiles***
 - ***Concrete tiles***
 - ***Polymeric render***
 - ***Pre-treated softwood***
 - ***PVC weatherboarding***
 - ***UK Natural slate***
 - ***Glass reinforced Plastic (GRP)***
 - **Sheathing material is important**
 - ***Plywood sheathing has a higher impact than OSB***

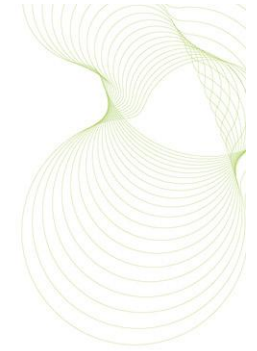


Green Guide performance for external cladding finishes

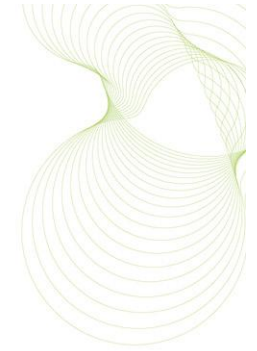


- Cladding on loadbearing masonry
 - ***Autoclaved fibre cement, Fibre cement sheet, Concrete tiles, Cement rendered blockwork***
 - ***Canadian Western Red cedar, treated softwood***
 - ***Clay tiles, Terracotta***
 - ***Coated steel composite profiled panels / single sheet, copper sheet***
 - ***Imported granite / marble, limestone, sandstone, natural UK slate***
 - ***PVC weatherboarding***
- Timber and PVC weatherboarding specifications perform well (A+)
- Coated steel composite panels perform well (A)
- Imported stones and sandstone specifications perform less well (B)
- Slate rainscreen cladding performs poorly (E)
 - ***High mineral resource extraction & ozone depletion***

Green Guide performance for external cladding finishes



- Rainscreen claddings
 - On various different frames & infills
 - ***Precast concrete panels with stone facing specifications performs poorly***
 - High climate change impacts
 - ***Autoclaved fibre cement sheet and coated aluminium / steel profiled sheet perform well***
 - Low climate change & mineral resource extraction
 - ***Treated softwood performs very well***
 - Low climate change & water extraction
 - ***Coated steel / aluminium composite profiled insulated panels mostly all get A's***
- Curtain walling systems (aluminium, timber or precast concrete)
 - **Poor ratings with range from B - E**



Conclusions

- Sustainability becoming increasingly important for the construction industry
- LCA and Environmental Profiles are tools for assessing environmental performance
- The Green Guide to Specification is a useful tool for architects and specifiers
- Green Guide increasingly being used in the UK due to BREEAM and The Code for Sustainable Homes



Any Questions?

Thank you

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