Natural Stone: The Sustainable Solution




Federation Stone Great Britain

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CITB constructionskills

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Executive Summary 1

The last decade has seen a significant step change for the construction industry regarding the importance placed on sustainability. The emphasis placed on more sustainable and low carbon buildings has meant it is no longer sufficient for a building to just comply with Building Regulations, or for a product to meet the British or European standards for testing.

The industry is now required to provide a whole raft of information and documentation regarding the sustainability of products and their manufacturing processes. This change in emphasis towards sustainability has resulted in a new set of terminology, which can often be thought of as confusing, or a seemingly endless list of technical jargon.

This document is targeted at the **natural stone industry** and explains the relevant sustainability principles and drivers, with a focus on the Code for Sustainable Homes and BREEAM, the objective being to provide the industry with relevant and practical information required to address sustainability issues and requirements in the built environment.

It provides an overview of the following:

- Sustainability
- Environmental Assessment Methods
- Life Cycle Assessment (LCA), Environmental Product Declaration (EPD) and the Green Guide
- Responsible Sourcing

2 Defining Sustainability

Sustainability is widely recognised as a key issue for national leaders, public and private sector organisations and individuals alike. Today most organisations recognise the importance their clients, stakeholders and customers place on sustainable business practices.

Good sustainable practice can strengthen a company or a brand and provide business benefits whilst the opposite is equally true.

All organisations are exposed to economic, environmental and social risks. Sustainability is therefore a key element of risk management. It is advisable to be aware of a growing range of regulations and legislation that are finding their way onto the statute book, particularly in the environmental field, but also covering social factors. Fiscal measures are also being used to encourage sustainable behaviour.

Sustainability is used in a variety of contexts and is open to many interpretations. Commonly the terms include

- Society enduring in the long term
- Living within our limits
- Understanding and managing the interconnections between the economy, society and the environment
- The equitable distribution of resources and opportunities – the principles of 'justice' and 'freedom'
- Sustainability operating at different scales – 'local', 'regional', and 'global'.

There have been many attempts to define both "sustainability" and "sustainable development" and there are no universally accepted definitions of these terms. However, it can be helpful for an organisation to have a common understanding of what it means by sustainability. Without this it may be difficult to define common goals and measure progress and difficult to communicate the organisation's plans and achievements.

Remember, businesses are judged on what they do rather than on what they say.

2.1 Natural Stone: The Oldest Sustainable Material?

The oldest rocks on earth have been dated at some 4 billion years old and the mechanism of earth building is ultimately a continual process of erosion, deposition and formation. Natural stone used on construction projects provides a timeless aura of solidity, quality and prestige and mirrors the geological process whereby stone is worked for new build projects and subsequently re-used with time.

Natural stone is a "cradle to grave" material.

2.2 Stone Federation GB Sustainability Statement

Stone Federation GB recognises the impact that members' operations can have on the environment and therefore seeks to ensure that any potential harmful effects are minimised wherever practicable.

The Federation supports members in reducing or eliminating their environmental impact by engaging all its staff, partners, stakeholders, the supply chain and clients through encouraging them to follow the approach set out below.

- Identify and comply with all relevant legal requirements
- Strive to achieve a balance between economic, social and environmental responsibilities
- Investigate all aspects of energy consumption and establish a programme for reduction with measureable targets

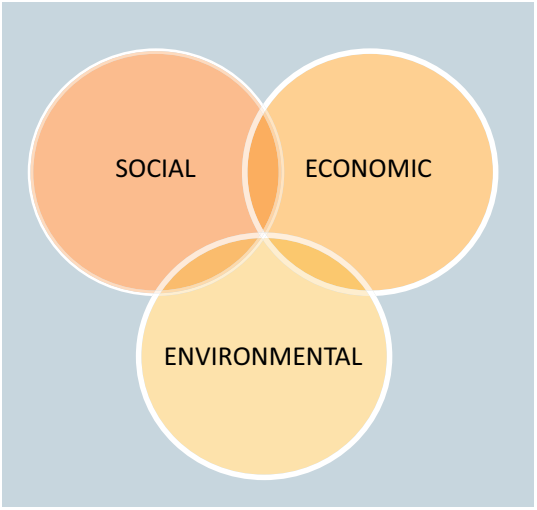
- Minimise waste through reducing, reusing and recycling and ensuring careful and responsible disposal in-line with legislation
- Sourcing materials from responsible, sustainable resources, taking steps to ensure that stone and other products are ethically sourced
- Ensuring full awareness among staff of environmental issues and delivering appropriate training
- Ensuring all activities are safe for employees and all others who may come into contact with work
- Monitoring purchasing practices and operations, including energy and transport, to minimise environmental impact
- Developing relationships with suppliers and clients to promote continuous improvements in environmental performance
- Incorporating environmental considerations into future decision making at all levels

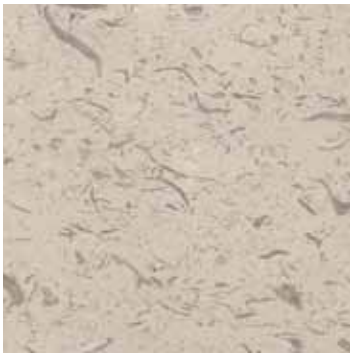
2.3 Key Legislation and Protocols

One of the most significant developments in sustainability came about in 1983 with the **UN World Commission on Environment and Development**. It was established to address the growing concern "about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development". In 1987 the Commission published its report "**Our Common Future**" which stated that: "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". It contains within it two key concepts:

- The concept of 'needs', in particular the essential needs of the world's poor, to which the overriding priority should be given
- The idea of limitations imposed by the state of technology and social organisation on the environment's ability to meet present and future needs

This report is commonly referred to as the **Brundtland Report** and it recognised that sustainability must be viewed as more than just an environmental issue. Societies' needs and Economic needs are also key considerations of sustainable development. This later gave rise to the "triple bottom line" with environmental, social and economic dimensions forming the three pillars of sustainability and also expressed in terms of 'people', 'planet' and 'profit' which can be more meaningful when considered in a business context.





Sustainable development means living on the earth's income rather than eroding its capital. It means keeping the consumption of renewable natural resources within the limits of their replenishment. It also means handing down to successive generations not only man-made wealth, but also natural wealth, such as clean and adequate water supplies, good arable land, a wealth of wildlife and ample forests.

2 Defining Sustainability

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change and it sets binding targets for 37 industrialised countries and the European Community for reducing greenhouse gas (GHG) emissions.

In November 2008 the UK Parliament passed the **Climate Change Act** which introduced the world's first long-term legally binding framework to tackle the dangers of climate change. CO_2 emissions must be reduced by at least 60% by 2050 (the target being 80%) and 26 - 32% by 2020 based on 1990 baseline figures.

From a construction perspective the **Energy Performance of Buildings Directive (EPBD)** has set in place a requirement for newly constructed buildings to have an **Energy Performance Certificate (EPC)**, and an EPC must be available for buildings when they are sold or rented. A **Display Energy Certificate (DEC)** must be displayed in a prominent position for all public buildings e.g. hospitals.

The EPBD has also set in place targets for reduced CO_2 emissions for new buildings, which is being achieved in the UK by regular revisions to **Part L of the Building Regulations**. These Regulations have defined targets towards zero carbon construction for dwellings by 2016 and a desired target for zero carbon non-domestic buildings by 2019. The targets for reduced CO_2 emissions are currently focussed on operational energy requirements.

2.4 Resources

A sustainable future is one in which mankind uses resources at no greater rate than they can be replenished naturally. To achieve this requires substantial improvements in resource efficiency, reuse of materials and a comprehensive programme of recycling.

From the perspective of natural stone this will have great impact on quarrying techniques, control of waste and accuracy of cutting stone sections and it is important to stress the longevity of material. Also to understand the impact that replacing a material during the life of a building as well as maintenance considerations may have.

Many of the concerns about sustainability have been connected to energy consumption. Greenhouse gas (GHG) emissions resulting from the burning of fossil fuels to provide heat and energy are a key factor in climate change. Security of fuel supply must also be considered.

2.5 Fossil Fuel Resources [1]

Coal, oil and natural gas currently provide about 80% of the world's energy consumption and contain a high proportion of carbon. When these fuels are burned this carbon is oxidised to carbon dioxide (CO_2) and released into the Earth's atmosphere. CO_2 is one of the green house gases that are causing concern regarding climate change.

Fossil fuel reserves (or natural stone) cannot be replenished over any timescale that will be meaningful to mankind. The rate of consumption

[1]Reference: 22nd edition of the World Energy Council's Survey of Energy Resources

suggests the following duration of supply (based on figures deemed correct in 2008):

- **Coal:** global proved recoverable reserves of coal were 860,938 million tonnes which is equivalent to 150 years at 2008 rates of consumption; however the rate of consumption of coal is expected to rise by over 60% by 2030 with developing countries accounting for the majority of this increase.
- **Crude oil:** global proved recoverable reserves of crude oil were 163,038 million tonnes or 1,238,834 million barrels in 2008. At 2008 levels of consumption this equates to roughly 41 years.
- **Natural gas:** global reserves of natural gas stood at 185.5 trillion cubic metres in 2008, this is equivalent to 54 years at 2008 levels of consumption.

These figures demonstrate the limited nature of these resources and as they become ever scarcer, the cost of energy will increase.

Reducing energy use will not only have a benefit for the environment, but will also make good business sense. This is especially the case as energy costs continue to rise.

A sustainable future is one in which mankind uses resources at no greater rate than they can be replenished naturally.

3 Sustainability and the Construction Industry

Buildings are responsible for over half of the UK's CO_2 emissions.

The Government released the Code for Sustainable Homes in April 2008. The Code ranks sustainability credentials against six levels – level 6 being the most sustainable. While, since the abolition of the Home Improvement Packs (HIP) it is no longer mandatory for buildings to be built to the Code in England and Northern Ireland, in Wales the Welsh Assembly Government expects all new residential developments seeking planning permission to meet Code levels as set out in Section 4.11 of Planning Policy Wales.

Local Government also sets out local targets to different levels of the Code for Sustainable Homes.

The Code is aimed at providing inspiration to improve the environmental impact of buildings taking a holistic approach; from energy and water in use to the environmental impact of the materials; from waste generated during the construction process to the natural lighting potential.

Energy efficiency performances required for specific Code levels drive the changes of **Building Regulations Part L**.

As an illustration, current Part L requirements meet the energy requirements for Code Level 3. Part L is currently under revision for publication in 2013.

To date, the Government has focussed on measures to improve the operational carbon emissions[2] performance of buildings via revisions of Building Regulations, which is responsible for most of the environmental impact of the building. However, the impact of manufacturing, distributing, assembling on site and disposing construction materials is also quite significant and often quoted as representing about 20% of the environmental impact of buildings.

The aim of the UK Government is to build zero-carbon homes by 2016 and zero-carbon buildings by 2019 (although, this target is currently under consultation and timelines and the "zero-carbon" definition may be revised in the near future).

[2] *"Operational carbon emissions" – Emissions resulting from space and water heating, ventilation, lighting, appliances and cooking within a living space.*

3.1 Green Building Schemes

A number of whole building environmental assessments have been developed in the UK, Europe and the rest of the World. Examples of those are listed below:

- **The Code for Sustainable Homes** – developed and used in the UK. Applies to new domestic buildings only – managed by the Department for Communities and Local Government (DCLG)
- **BREEAM** (BRE Environmental Assessment Methodology) – developed in the UK, licensed in Spain, Netherlands, Norway and Sweden to specific organisations. BREEAM is mainly used in the UK however, the BREEAM international scheme is also used in many parts of the World. BREEAM is managed by BRE
- **LEED** – developed in North America and used in many parts of the World – managed by the US Green Building Council (USGBC)
- **Green Star** – developed and used in Australia – managed by the Green Building Council of Australia (GBCA)
- **HQE** (Haute Qualité Environmentale) – developed and mainly used in France – managed by Association Haute Qualité Environmentale

All the schemes above are fairly similar. However, it is important to understand the context in which a product may be sold as well as the client's requirements. As an example, the current version of LEED does not require the need to have an **Environmental Product Declaration (EPD)**, although this is likely to change very soon, but they may require the assessor to calculate the distance travelled by the materials and to understand their recycled content.

BREEAM, HQE and the Code for Sustainable Homes award credits for EPDs – albeit with specific requirements on the methodology used and in the UK, it is possible to use any of the schemes listed above.

However, while it is not currently **mandatory** for all new homes in England, Wales and Northern Ireland to comply with the Code for Sustainable Homes' requirements, Local Authorities still set out targets. Many Local Authorities may require that government and public buildings, such as offices, school and hospitals have to be built to meet some BREEAM (BRE Environmental Assessment Methodology) levels for new build and refurbishment projects.

The Code for Sustainable Homes and BREEAM are the most relevant building environmental assessment methodologies for the natural stone industry in the UK.

3 Sustainability and the Construction Industry

3.2 The Code for Sustainable Homes

Since 1 April 2008, all new homes built with public finance (e.g. social housing) are required to meet **Code Level 3** and this represents a target of 25% energy reduction against the 2006 Building Regulations Part L.

Building Regulations Part L was updated in October 2010 and the energy requirements were increased to reflect Code Level 3. Whilst there are currently no national requirements to meet the Code, there are many local requirements to encourage public new homes to meet Code Level 3 and even Code Level 4.[3] .

The Code for Sustainable Homes covers 9 categories of sustainable design[4] (percentage weighting):

1.	**Energy and CO_2 emissions**	**(Ene)**	**36.4%**
2.	**Pollution**	**(Pol)**	**2.8%**
3.	**Water**	**(Wat)**	**9.0%**
4.	**Health and wellbeing**	**(Hea)**	**14.0%**
5.	**Materials**	**(Mat)**	**7.2%**
6.	**Management**	**(Man)**	**10.0%**
7.	**Surface water run-off**	**(Sur)**	**2.2%**
8.	**Ecology**	**(Eco)**	**12.0%**
9.	**Waste**	**(Was)**	**6.4%**

Categories of particular relevance to the natural stone industry are **Materials**, followed by **Energy** and **Health** and each category includes a number of environmental issues for which a number of credits are available.

Each category is weighted to reflect the importance of some categories against others and the weighted credits result in a number of points for each category. The cumulative total of these points determine the final Code level achievement as per Table 1:

[3]NHBC (national house-building council) website: www.nhbc.co.uk
[4]http://www.communities.gov.uk/publications/planningandbuilding/codeguide

Number of points	Code levels
36 points	Level 1
48 points	Level 2
57 points	Level 3
68 points	Level 4
84 points	Level 5
90 points	Level 6

Table 1: Minimum number of points for each Code level

It is important to note that some of the categories have mandatory requirements

For example;

- Within Materials, Mat 1 requires that 3 out of the 5 elements assessed (e.g. roof, external walls, internal walls, upper and ground floors, windows) should have A+ to D ratings

Or minimum standard requirements;

- In order to have a Code Level 4 building, a **minimum of 8 credits** must be obtained in Energy or **Ene1**

The building is assessed at design (optional) and post-construction (mandatory) stages.

3.3 BREEAM (BRE Environmental Assessment Methodology)

There are different BREEAM[5] schemes depending on what building and what country it is applied to and whether the building is new or being refurbished:

- **BREEAM 2008**: a different manual applies to each BREEAM scheme (offices, school, hospitals, etc) in the UK. The manual applies to new construction, major refurbishment and fit out.

[5] BREEAM website: www.BREEAM.org.uk

- **BREEAM 2011**: one manual covers all building types in the UK. Only applies to new construction.
- **BREEAM international**: applies to all countries outside the UK where no specific BREEAM scheme has been developed, e.g. BREEAM Spain or BREEAM Netherlands.

BREEAM covers 10 categories of sustainability, which are the same in BREEAM 2008 and BREEAM 2011. However, there are differences in the details, so the right manual should be used for the appropriate application. BREEAM 2011 applies to most new non-domestic buildings located in the UK.

Each category is awarded a number of credits which may vary depending on the scheme. **Table 2** below is an illustration of the credits in BREEAM 2011:

Depending on the total number of credits achieved, a BREEAM rating is obtained as shown in **Table 3** below:

BREEAM Rating	% score
Unclassified	**<30**
Pass	**≥30**
Good	**≥45**
Very good	**≥55**
Excellent	**≥70**
Outstanding	**≥85**

Table 3: Minimum score required for each BREEAM level

Examples of calculations of the BREEAM ratings can be found at:
www.breeam.org/BREEAM2011SchemeDocument

BREEAM 2011 Section	Credits Available	Section Weighting	Category most relevant to natural stone
Management (Man)	22	12%	
Health & Wellbeing (Hea)	10	15%	Potential relevance
Energy (Ene)	30	19%	Potential relevance
Transport (Tra)	9	8%	
Water (Wat)	9	6%	
Materials (Mat)	12	12.5%	Relevance
Waste (Was)	7	7.5%	
Land Use & Ecology (LE)	10	10%	
Pollution (Pol)	13	10%	
Total		**100%**	
Innovation (Inn) - optional	10	10%	

Table 2: Credits available in each BREEAM category

3 Sustainability and the Construction Industry

It is important to note that as with the Code for Sustainable Homes, some of the categories have minimum standard requirements.

- E.g. in order to get BREEAM "excellent", a **minimum of 6 credits in Ene1** is required.

The building is assessed at design (optional) and post-construction (mandatory) stages.

Thus most of the credits available for the natural stone industry under BREEAM and the Code for Sustainable Homes are in the **Materials** categories and in particular in the categories relating to the environmental impact of materials. These refer to the **Life Cycle Assessment (LCA)** of materials.

Sustainability jargon is quite recent and there is confusion in the difference between carbon footprint, life cycle assessment or EPDs. It is important not only to understand the difference between the types of analysis, but also the difference in the results obtained when using different methodologies.

The result of a certified LCA assessed to the BRE Environmental Profile Methodology is an Environmental Product Declaration (EPD). The results can be used to obtain a Green Guide rating, which in turn can be used to gain credits under BREEAM or the Code for Sustainable Homes.

Figure 1 below is an illustration of how these schemes fit together:

4.1 Life Cycle Assessment (LCA)

A Life Cycle Assessment (LCA) is a process that quantifies every environmental impact over the whole lifecycle of a product from the extraction of the raw materials to final disposal. All inputs (use of energy, water, raw materials) and outputs (e.g. emissions to air) of the system need to be recorded. LCAs are fundamental to the generation of **Environmental Product Declarations or EPDs** which, in turn, are required to substantiate any environmental claims.

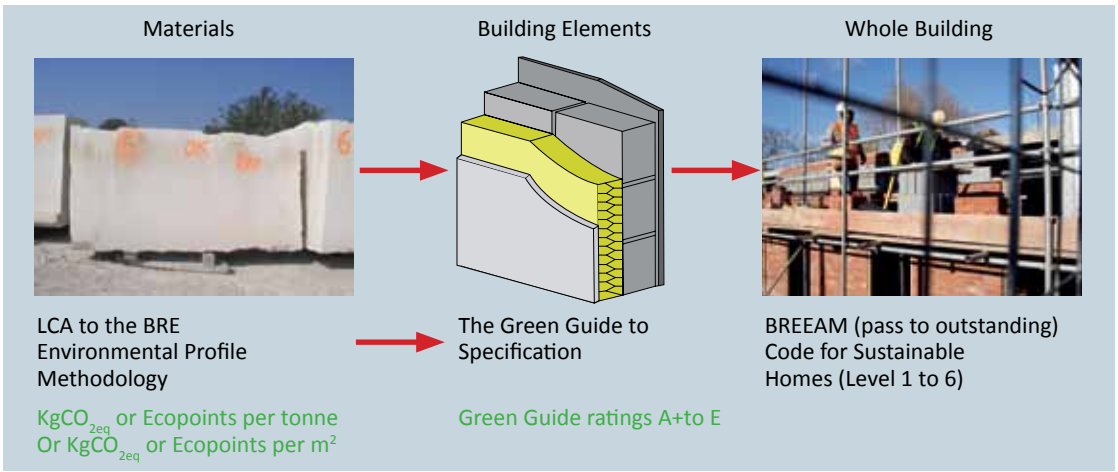


Figure 1: Illustration of the link between LCA, Green Guide and BREEAM/Code for Sustainable Homes

Environmental Assessment of Products 4

LCA measures environmental impact across a range of issues such as: impact on air quality, water usage, and water quality, ecosystem functioning, toxicity to life, global warming and resource depletion.

An illustration of a life cycle assessment is given in **Figure 2** below.

4.2 Carbon Footprinting

Carbon Footprinting is a simplified form of Life Cycle Assessment (LCA) focussing purely on the greenhouse gas emissions of each step of a product's lifetime, from the extraction of raw materials through to the disposal of the final product after use. It can also be used to measure the emissions arising from the activities of an organisation and is a key element of Corporate Social Responsibility reporting.

4.3 EPDs in the UK and EU

An **EPD** is a **third party verified** Environmental Product Declaration, which presents quantified environmental information on the life cycle of a product. EPDs provide environmental impact information from LCA studies in a common format to common rules and an EPD provides robust and consistent information.

Environmental Profiles produced using BRE's Environmental Profile Methodology are EPDs, the results of which are expressed in **Ecopoints**.

EPDs allow consumers to make informed comparisons between products. EPDs, also known as Type III environmental declarations, are currently voluntary. Having an EPD will therefore distinguish manufacturers from their competitors and can be used as follows:

1. For marketing purposes: to demonstrate the environmental credential of a product – according the CPR requirements. **From 2013: if a product wishes to demonstrate its environmental credentials, it has to be done using EPDs.**

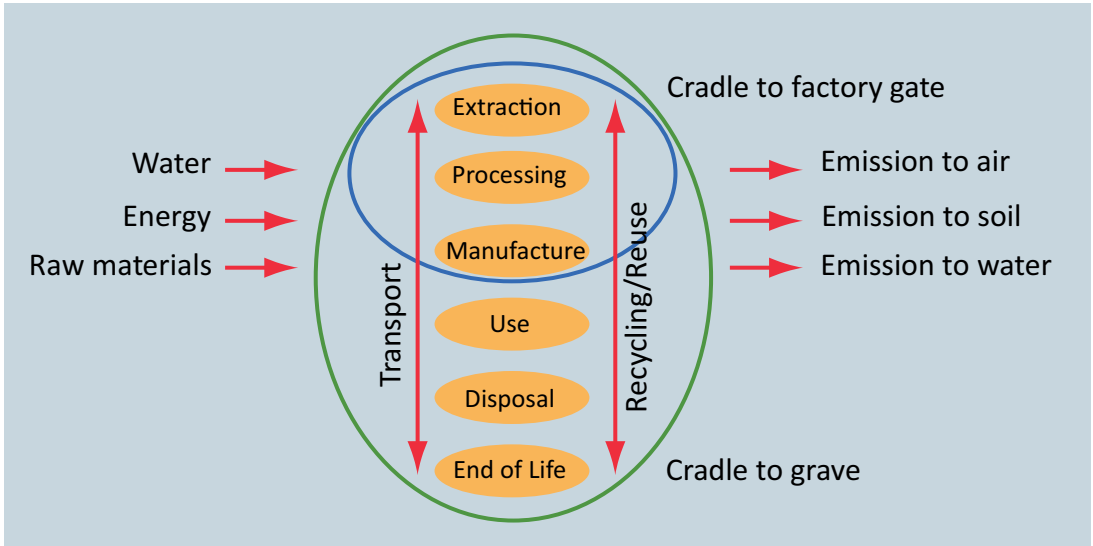


Figure 2: Life Cycle Assessment

4 Environmental Assessment of Products

2. To obtain a **Green Guide** rating: **if assessed using the BRE Environmental Profile Methodology – and therefore to gain credits under BREEAM and the Code for Sustainable Homes**
3. In building modelling information (BIM) systems , such as IMPACT [6]

4.4 Other Drivers from the European Union

As of 1st July 2013, it will be mandatory for all construction products to be **CE marked** under the **Construction Products Regulation (CPR) 2011**.

CE marking indicates that a product has successfully passed tests for fire performance and emission of dangerous substances, and therefore complies with the relevant safety requirements[7]. Such tests can be undertaken by the manufacturer or in the case of high risk products, by an independent organisation.

The CPR also stipulates that if, under Basic Work Requirements (BWR) 7 a product makes environmental claims, these claims must be demonstrated using Environmental Product Declarations (EPDs).

4.5 Implications of the Sustainability Agenda on the Natural Stone Industry

As the sustainability agenda grows in importance the natural stone industry is more and more likely to be asked how their products comply.

The sector also needs to understand how to answer questions related to their compliance with the BREEAM and Code for Sustainable Homes.

The most relevant credits to the natural stone industry relate to the environmental impact of materials and responsible sourcing. As measures are implemented to reduce the operational impact of buildings, the relative importance of the embodied carbon of buildings will increase in terms of the percentage contribution to the overall carbon emissions of the building[8].

Focus on the embodied[9] environmental impact of construction products is therefore likely to grow and the natural stone industry is therefore more and more likely to be asked about EPDs.

4.6 The use of EPDs in Green Building Assessments

Credits for materials are awarded following different criteria depending on the Green Building assessment schemes.

As explained above, BREEAM 2008 and the Code for Sustainable Homes award credits based on the Green Guide ratings. BREEAM 2011 awards credits based on the Green Guide to Specification and extra credits for manufacturers that have had a third party verified EPD (including, but not exclusively, BRE EPDs).

This next section provides guidance on how Green Guide ratings can be obtained.

[6] http://www.iesve.com/news/IES-helps-BRE-Global-make-IMPACT_1623_/corporate
[7] http://ec.europa.eu/enterprise/sectors/construction/legislation/index_en.htm and 'Regulation (EU) No. 305/2011 of the European Parliament and of the Council' p14, 32, Annex I.
[8] "Operational and embodied carbon in new build housing – a reappraisal" – NHBC Foundation publication 2011, Toby Balson, Flavie Lowres and Katie Johnson (BRE).
[9] Embodied environmental impact –the environmental embodied impact of a product includes the environmental impacts of extracting raw materials, manufacturing the product, transport to site.

The Green Guide to Specification 5

The BRE Green Guide to Building Specification is an environmental profiles database, a UK based document and is mainly for use in the UK. All the materials listed in the Green Guide are assessed using the same LCA methodology - the BRE Environmental Profile Methodology - and to obtain a Green Guide rating, the data must be modelled in that way.

How to Obtain a Green Guide Rating?

In order to obtain a proprietary Green Guide rating, a manufacturer first needs to obtain an EPD. Only EPDs carried out to the BRE Environmental Profile methodology can be accepted to obtain a Green Guide rating. There are currently two organisations that can provide such EPDs: BRE Global and BBA.

A Green Guide rating is a relative measure of the environmental impact of a building element (as opposed to a single material) against other types of construction from cradle to grave over a 60 years study period.

Figures 3a and **3b** illustrate how the Ecopoints results of an EPD carried out to the BRE Environmental Profile methodology can be turned into the evaluation of the environmental impact of 1 m² of external wall, according to the Green Guide to Specification:

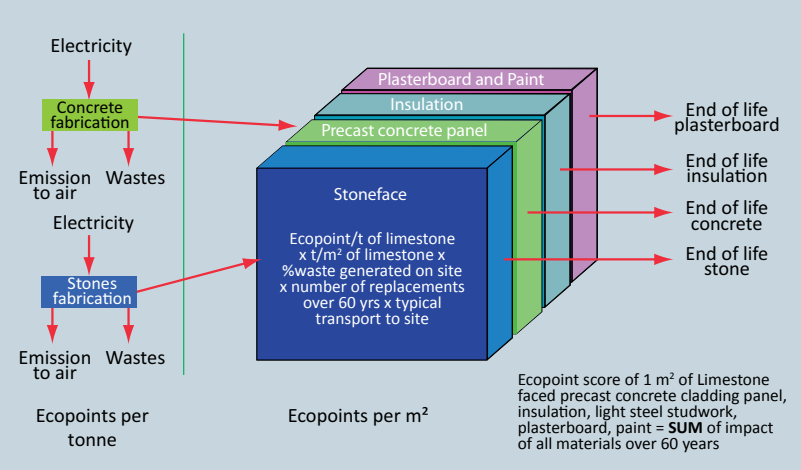


Figure 3b: Calculations of the environmental impact of 1 m² of limestone faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint. Results expressed in Ecopoints/m²

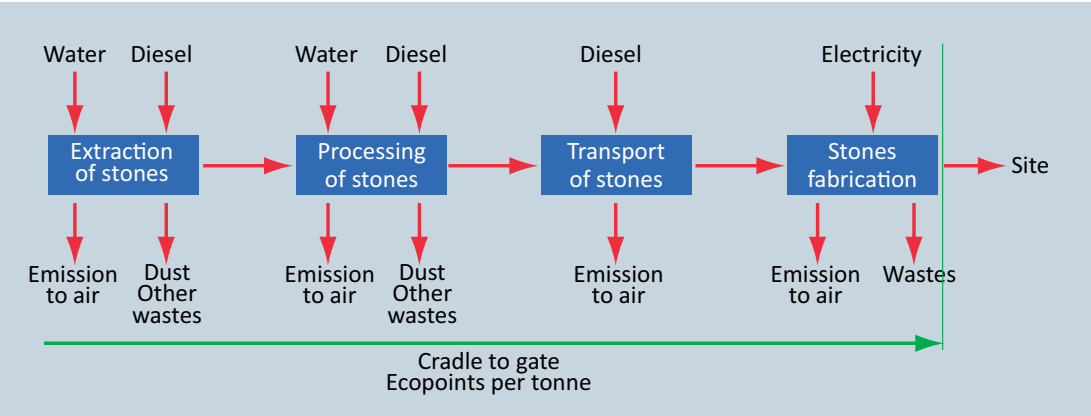


Figure 3a: Cradle to factory gate of a natural stone panel. Results expressed in Ecopoints/tonne

5 The Green Guide to Specification

The Ecopoints/m² result of the wall described in **Figure 3b** is then compared to the Ecopoints/m² of other types of external walls and a Green Guide rating is awarded (see **Figure 4** below). It is important to note that the scales of Ecopoints/m² are different for different building elements and that the higher the number of Ecopoints, the worse the environmental impact.

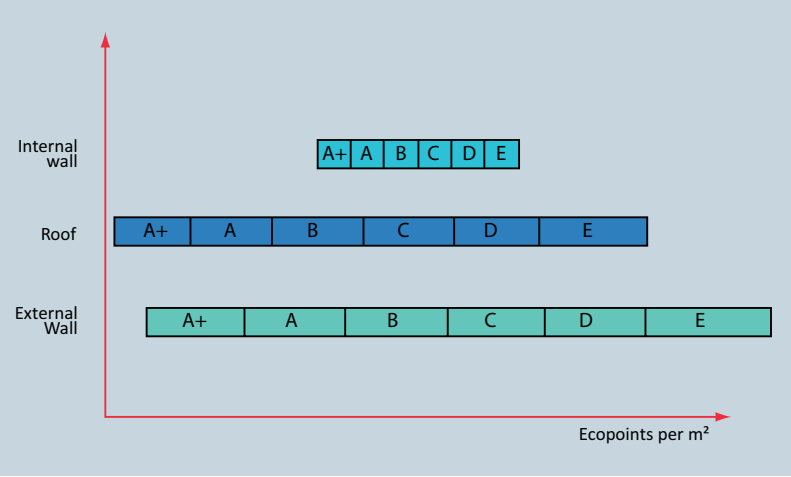


Figure 4: Translation of an Ecopoint/m² score for a building element into a Green Guide rating. Note: this diagram illustrates that the Ecopoint/m² scale is different for various building elements.

5.1 Responsible Sourcing

Responsible Sourcing of construction products provides a holistic approach to managing a product from the point at which a material is mined or harvested in its raw state through manufacture and processing, through use, onwards to re-use and recycling, until final disposal as waste with no further value.

It is demonstrated through an ethos of supply chain management and product stewardship and encompasses social, economic and environmental dimensions. It addresses aspects such as stakeholder engagement, labour practices and the management of supply chains serving materials sectors upstream of the manufacturer.

Various schemes exist for different types of materials.

BREEAM and the Code for Sustainable Homes rank those schemes according to their rigour and award credits accordingly. Examples of schemes are:

- FSC
- CSA
- Reused materials
- Schemes compliant with BES6001
- Certified environmental management system (EMS)

BRE launched BES6001[10] to provide a framework for the assessment of responsible sourcing and to give a route to certification of construction products. The key objectives of this standard are:

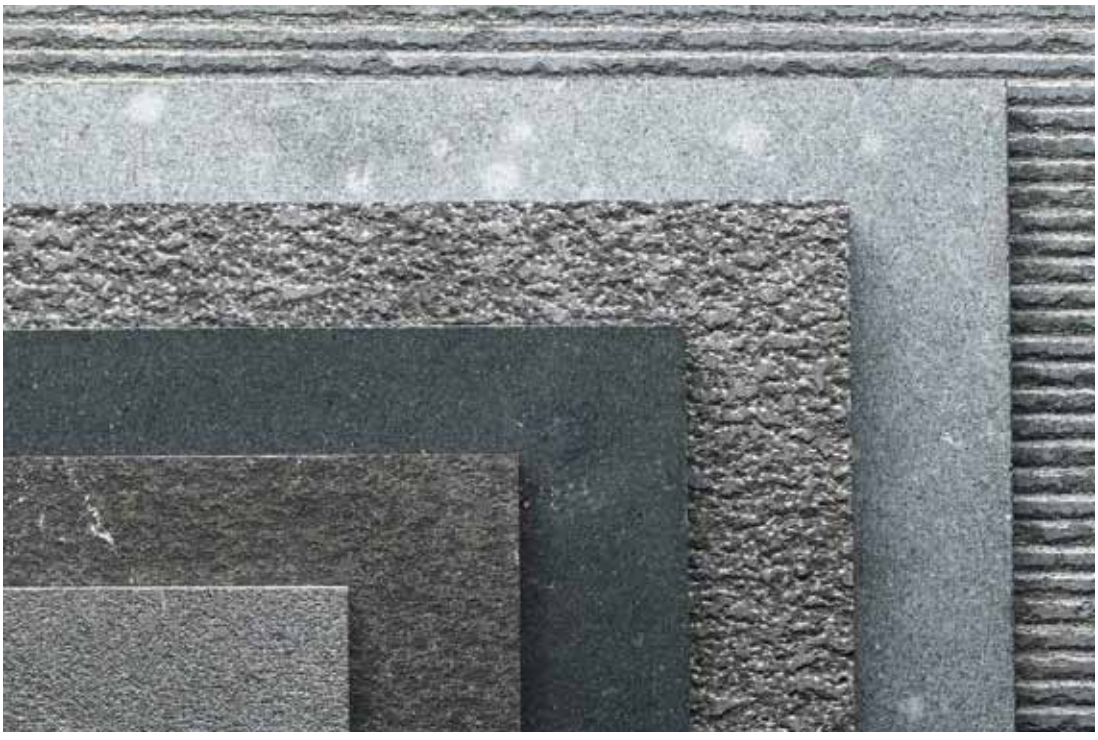
- To promote responsible sourcing of construction products through the provision of a set of requirements.
- To give clear guidance on the sustainability aspects that should be addressed.
- To provide confidence that materials and products are being responsibly sourced; and to provide a route to obtaining credits within the Materials sections of the Code for Sustainable Homes and the BREEAM family of certification schemes.

[10] http://www.greenbooklive.com/filelibrary/responsible_sourcing/BES_6001_Issue2_Final.pdf

The standard sets out requirements under 3 main headings:

- Organisational management
- Supply chain management
- Environmental and social issues

The natural stone industry can gain credits under BREEAM and Code by gaining BES6001 accreditation.



6 Natural Stone, BREEAM and the Code for Sustainable Homes

This section provides details of the information the natural stone industry needs to meet the requirements set in BREEAM and the Code for Sustainable Homes' documents.

6.1 The Code for Sustainable Homes and the Natural Stone Industry

The most relevant issues to the stone sector are found in the materials category.

- **Mat 1 - Environmental impact of materials**
- **Mat 2 - Responsible sourcing of materials**

Mat 1 relates to the environmental impact of materials and refers to the Green Guide to Specification, which is based on the BRE Environmental Profile Methodology (BRE LCA methodology).

Other parameters to consider, depending on where the stones are used are:

- **ENE1 - Dwelling emission rate**, where natural stone may contribute to the reduction of operational CO_2 of the building.
- **HEA 2 – Sound insulation**, where the use of natural stone may impact on the likelihood of noise.

6.2 BREEAM 2011 and the Natural Stone Industry

The issues in BREEAM 2011 most relevant to the natural stone industry are also found in the materials category

- **Mat 1 – Life cycle impacts**
- **Mat 2 – Hard landscaping and boundary protection**
- **Mat 3 – Responsible sourcing of materials**

Credits for Mat 1 and Mat 2 are obtained by using the Green Guide to Specification, which is based on the BRE Environmental Profile Methodology (BRE LCA methodology).

Other parameters to consider, depending on where the stones are used are:

- **Mat 5 – Designing for robustness**
- **ENE1 – Reduction of CO_2 emissions**, where the stone may contribute to the reduction of operational CO_2 of the building.
- **HEA5 – Acoustic performance** where credits are awarded where an acoustician is appointed by the client to provide early design advice on several issues, including acoustic treatment of different zones and facades.

6.3 Environmental Impact of Materials

Requirements set out in BREEAM and the Code for Sustainable Homes with regards to the environmental impact of materials are provided below.

Credit references in the different schemes, relevant to the natural stone industry, are given in **Table 5**.

The assessor will use the materials calculator and Green Guide ratings based on generic information: www.thegreenguide.org.uk or proprietary ratings (or BRE EPDs) from: www.greenbooklive.com to gain credits under BREEAM and Code for Sustainable Homes' materials sections.

Credits are awarded as described in **Table 4** below:

Green Guide rating	BREEAM/ Code points/ credits
A+	3
A	2
B	1
C	0.5
D	0.25
E	0

Table 4: Number of credits available from the Green Guide to Specification

www.thegreenguide.org.uk

www.greenbooklive.com

6 Natural Stone, BREEAM and the Code for Sustainable Homes

Details on how credits are awarded in the various schemes are provided in Table 5 below:

Scheme	Credit number	Assessment criteria (relevant to the Stone industry)
The Code for Sustainable Homes	Mat 1: Environmental impact of materials	In order to achieve any Code level, it is important to comply with the mandatory requirement, for which no credits are available, to achieve a Green Guide rating of between A+ and D for at least three of the five following elements: • **Roof** • **External walls** • Internal walls • Upper and ground floors • Windows Once that mandatory requirement has been achieved, credits can be awarded based on the area of the elements and using table 4 shown on page 19.
BREEAM 2008 for office	Mat 1: Materials specification	The Green Guide ratings for the specifications for the following building elements must be determined as follow: • New build and major refurbishment o **External walls** o Windows o **Roof** o Upper floor slab • Fit out o Internal walls o **Floor finishes/coverings**
	Mat 2: Hard landscaping and boundary protection	Credits are awarded where at least 80% (by area) of all external hard landscaping and boundary protection achieve A or A+ ratings as per the Green Guide to Specification
	Mat 7: Designing for robustness	Credits are awarded where areas of the building where vehicular, trolley and pedestrian movement occur have been identified AND suitable durability and protection measures or design features have been specified to prevent damage to the vulnerable parts of these building areas.
BREEAM New construction – non-domestic buildings 2011	Mat 1: Life cycle impacts	Credits are awarded on the basis of the building's quantified environmental life cycle impact through assessment of the main building elements: • **External walls** • Windows • **Roof** • Upper floor slab • Internal walls • **Floor finishes/ coverings** Note that the elements to assess depend on the building types. For example floor coverings are not covered in the industrial scheme. Additional credits may be awarded where independently verified third-party EPDs are available for a material that forms part of the building element.
	Mat 2: Hard landscaping and boundary protection	Credits are awarded where at least 80% (by area) of all external hard landscaping and boundary protection achieve A or A+ ratings as per the Green Guide to Specification
	Mat 5: Designing for robustness	Credits are awarded where areas of the building where vehicular, trolley and pedestrian movement occur have been identified AND suitable durability and protection measures or design features have been specified to prevent damage to the vulnerable parts of these building areas.

Table 5: Details of how credits are awarded in BREEAM and the Code for Sustainable Homes with respect to environmental performances of materials

Most credits can be awarded for **Mat 1**, which refers to the Green Guide to Specification. Ratings provided in the Green Guide to Specification are based on an absolute Ecopoint/m2 for a building element relative to another type of construction.

It is important to note that the ratings are awarded for a type of construction and that even if this construction gets a poor rating of E, this rating relates to the combination of materials and not to a single product.

The Green Guide recognises that a material may be "green" in one application and not "green" in another and therefore assesses materials in the context of their use against a functional unit set for each section of the Guide. Some examples of external wall constructions which have A+, A or B ratings and which include a natural stone product are given in the **Table 6** overleaf.

A list of all the building elements where stones are mentioned is given in Table 10.

The Green Guide is not fully comprehensive and building elements can be added to it.

Questions to ask (as a natural stone supplier) regarding the rating awarded to a specification:

- Is this specification most representative of the use of my product? If not, then more relevant specifications can be added to the Green Guide – contact BRE or the Stone Federation GB for more details.
- What is the environmental importance of the generic environmental impact of my product in that specification, i.e. how much influence does it have on the rating?
- If the rating is not "good", the generic data representing my product has an influencing role on the specification and if I think my product should have a better rating, then I may want to certify my product to prove it. When going through environmental certification, a number of Green Guide ratings can be awarded as part of the process.

6 Natural Stone, BREEAM and the Code for Sustainable Homes

Table 6: Examples of Green Guide specifications containing natural stone and scoring A+, A or B.

Section	Element description	Element number	Housing	Health	Office	Education	Industrial shed	Retail
External wall construction	Limestone split faced outer leaf, insulation, dense solid blockwork inner leaf, cement mortar, plasterboard on battens and paint	806170022	A+	A+	A+	A+	A+	A+
External wall construction	Sandstone split faced outer leaf, insulation, dense solid blockwork inner leaf, cement mortar, plasterboard on battens, paint	806170039	A+	A+	A+	A+	A+	A+
External wall construction	UK produced natural slate tiles on timber battens, breather membrane, no sheathing, insulation, light steel frame, vapour control layer, plasterboard on battens, paint	806490586	A+	A+	A+	A+	A+	A+
External wall construction	UK produced natural slate tiles on timber battens, breather membrane, plywood sheathing, insulation, light steel frame, vapour control layer, plasterboard on battens, paint	806490583	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, breather membrane, cement-bonded particle board sheathing, insulation, light steel frame, vapour control layer, plasterboard on battens, paint	806490585	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, lightweight solid blockwork with cement mortar, insulation, plasterboard on battens, paint	806220628	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, medium dense solid blockwork with cement mortar, insulation, plasterboard on battens, paint	806220622	A	A	A	A	A	A
External wall construction	Limestone cladding and steel support, insulation, medium dense solid blockwork, plasterboard on battens, paint	806220678	A	A	A	A	A	A
External wall construction	Handset limestone cladding and support, insulation, lightweight solid blockwork, plasterboard and paint	806220034	A	A	A	A	A	A
External wall construction	Imported Chinese granite cladding and steel support, insulation, lightweight solid blockwork, plasterboard, paint	806220088	B	B	B	B	B	B
External wall construction	Imported Italian marble cladding, insulation and steel support, aircrete blockwork, plasterboard, paint	806220708	B	B	B	B	B	B
External wall construction	Imported Chinese granite cladding and steel support, insulation, medium dense solid blockwork, plasterboard, paint	806220677	B	B	B	B	B	B
External wall construction	Sandstone rainscreen cladding and steel support, insulation, lightweight solid blockwork, plasterboard and paint	806220083	B	B	B	B	B	B
External wall construction	Sandstone rainscreen cladding and steel support, insulation, medium dense solid blockwork inner leaf, plasterboard and paint	806220055	B	B	B	B	B	B
External wall construction	Imported Italian marble cladding, insulation and steel support, lightweight solid blockwork, plasterboard, paint	806220048	B	B	B	B	B	B
External wall construction	Imported Italian marble cladding, insulation and steel support, medium dense solid blockwork, plasterboard on battens, paint	806220072	B	B	B	B	B	B

7.1: A New Home

The results are area weighted. This case study demonstrates where credits can be awarded for a new home:

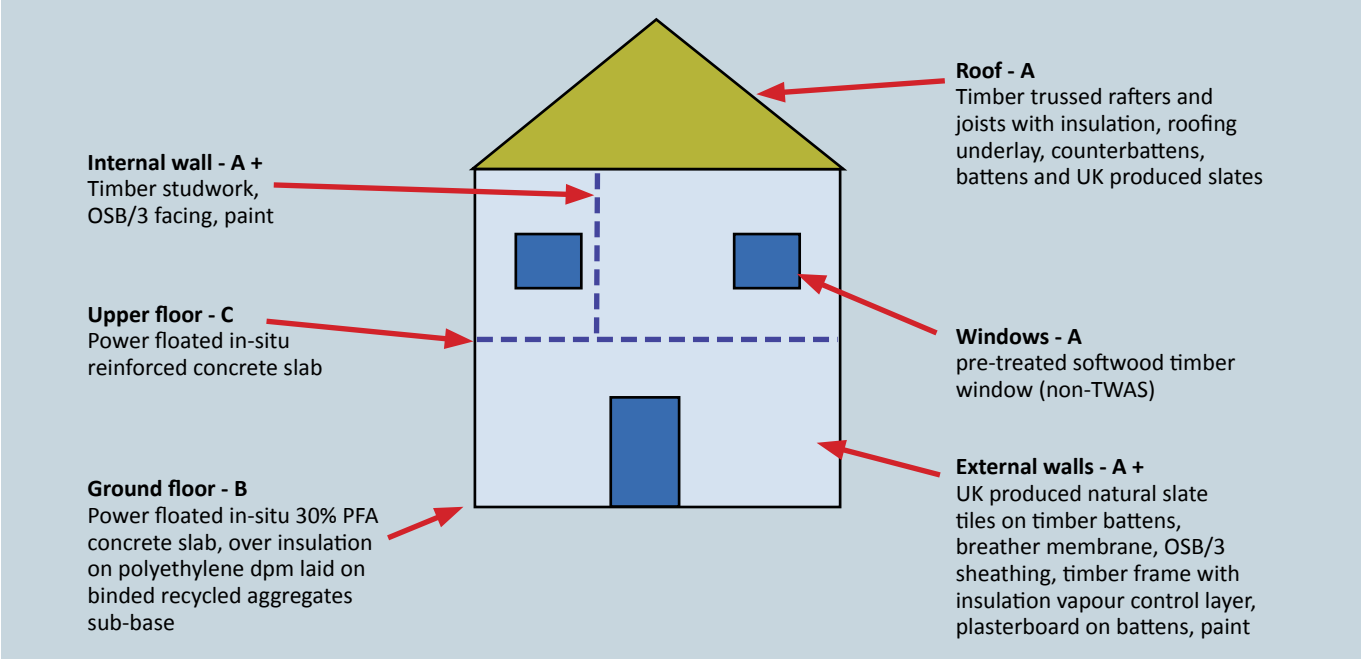


Figure 5: Illustration of credits for Code for Sustainable Homes Materials section

There is a maximum of 15 credits available in Mat 1 of the Code for Sustainable Homes. **Table 7** below demonstrates how credits are awarded in the Code for Sustainable Homes:

Element	Green Guide rating	% Area	Number of credits
Roof	A	100%	2
External walls	A+	100%	3
Internal walls	A+	100%	3
Upper and ground floor	C and B	50/50	0.75
Windows	A	100%	2
Total			**10.75 rounded down to 10**

Table 7: Credits calculations in Mat 1 of the Code for Sustainable Homes

7 Case Studies

The mandatory requirement of Mat 1 is achieved: no more than 2 elements have an E rating. There are 24 credits available in total in the materials section with a weighting factor of 7.2%. So, there are approximately 0.3 points available for each credit. A score of 10 credits in Mat 1 section would therefore contribute to 3 points towards a Code level.

7.2: A New Retail Unit:

The results are area weighted. The case study described below in **Figure 6** demonstrates where credits can be awarded for a retail unit in BREEAM 2011:

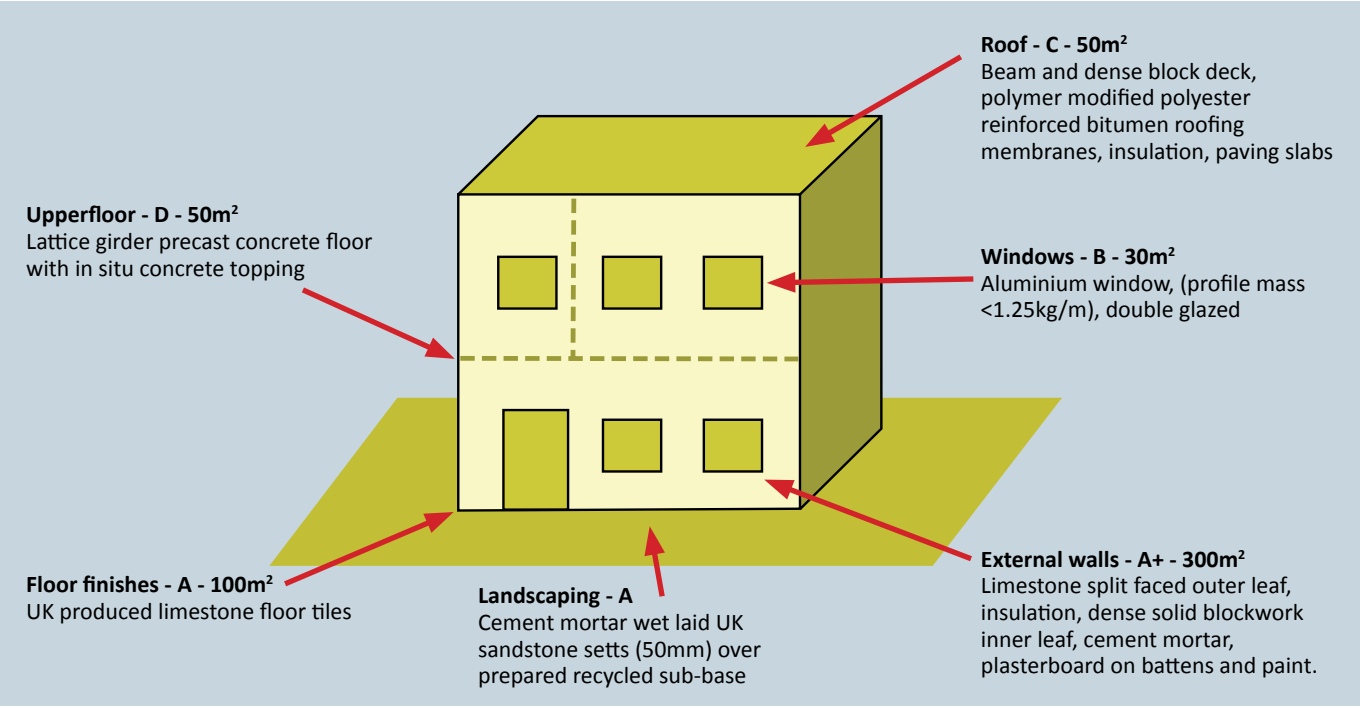


Figure 6: Illustration of credits for BREEAM 2011 for retail materials sections

There are three categories under which credits related to the environmental assessment of a building can be awarded. See Table 8 below for details of how the credits are awarded in BREEAM 2011:

Mat	Element	Green Guide rating	% area of element	Area weighted points	Area of building (%)	Points available	Number of credits
Mat 1	External wall	A+	100%	3	56.5%	8.95	5
	Windows	B	100%	1	6%	0.09	
	Roof	C	100%	0.5	9.5%	0.21	
	Upper floor slab	D	100%	0.25	9.5%	0.04	
	Floor finishes	A	100%	2	18.5%	2.73	
Total				**6.75 (max 15)**	**100%**	**12.01**	
Mat 2	Hard landscaping and boundary protection	A	100%				1
Total							**6**

Table 8: Credits calculations in Mat 1 and Mat 2 of BREEAM 2011

Notes:

- **Mat 1:** additional credits can be awarded if proprietary EPDs are produced. There is a maximum of 5 credits available for retail unit.
- **Mat 2:** maximum of 1 credit is awarded where at least 80% of all external hard landscaping and boundary protection (by area) achieves an A or A+ rating, as defined in the Green Guide to Specification.

7 Case Studies

7.3 Responsible Sourcing of Materials

Requirements set out in BREEAM and the Code for Sustainable Homes with regards to the responsible sourcing of materials are provided in this section.

Credit references in the different schemes, relevant to the natural stone Industry, are given in **Table 9** below:

Scheme	Credit number	Assessment criteria (relevant to the Natural Stone industry)	Reference
The Code for Sustainable Homes	**Mat 2:** Responsible Sourcing on materials – basic building elements	Points are awarded where 80% of the assessed materials used in key building elements are responsibly sourced: • Frame • Ground floor • Upper floors • **Roof** • ***External walls*** • Internal walls • Foundations and substructure • Staircase Materials assessed include: dressed or building stone including slate. Credits are allocated depending on the rigour of the schemes or of the evidences provided. Schemes relevant to the Natural Stone industry, listed in order of importance are: • Reused materials or schemes compliant with BES6001 excellent or very good • schemes compliant with BES6001 good and pass • Certified EMS at for key process and extraction stage • EMS at key process stage only	Evidence of ISO14001 can be used to gain credits. Where manufacturers have certified their products with BES6001, certificates can be found on: www.greenbooklive.com.

Table 9: Details of how credits are awarded in BREEAM and the Code for Sustainable Homes with respect to responsible sourcing of materials

Conclusion 8

Sustainability is a broad subject, with many tiers and complexities. Its increasing level of importance within the construction industry requires it to be taken very seriously and therefore the ability to demonstrate a sustainable product and business is paramount.

This booklet provides the background information and detailed elements that must be understood in order to demonstrate the sustainable credentials of using natural stone and how to derive the data to support this.

It provides an overview of the drivers for sustainability and how the natural stone industry can respond to the sustainability agenda. The key points to remember are:

- In the UK, BREEAM and the Code for Sustainable Homes are the key environmental assessment methodologies.
- The natural stone industry can contribute to BREEAM and the Code for Sustainable Homes credits principally under the Materials sections.
- The Green Guide to Specification allows designers to understand the relative environmental performances of one type of construction versus another using a “cradle to grave” life cycle assessment of all the materials making up the specification.
- There are many specifications that include natural stone in The Green Guide to Specification. More are possible. Green Guide ratings can be used to gain credits under BREEAM and the Code for Sustainable Homes.
- There are also opportunities for the natural stone industry in the UK to gain credits in BREEAM and the Code for Sustainable Homes in the responsible sourcing section (via BES6001 or Environmental Management Systems (EMS)).

8 Conclusion

A full list of building elements where natural stone is mentioned is provided in Table 10. It is important to note that the ratings are awarded for a type of construction and that even if this construction gets a poor rating of E, this rating relates to the combination of materials and not to a single products.

The Green Guide recognises that a material may be “green” in one application and not “green” in another and therefore assesses materials in the context of their use against a functional unit set for each section of the Guide.

Table 10: List of all Green Guide ratings containing natural stone

Section	Element description	Element number	Housing	Health	Office	Education	Industrial shed	Retail
External wall construction	Limestone split faced outer leaf, insulation, dense solid blockwork inner leaf, cement mortar, plasterboard on battens and paint	806170022	A+	A+	A+	A+	A+	A+
External wall construction	Sandstone split faced outer leaf, insulation, dense solid blockwork inner leaf, cement mortar, plasterboard on battens, paint	806170039	A+	A+	A+	A+	A+	A+
External wall construction	UK produced natural slate tiles on timber battens, breather membrane, no sheathing, insulation, light steel frame, vapour control layer, plasterboard on battens, paint	806490586	A+	A+	A+	A+	A+	A+
External wall construction	UK produced natural slate tiles on timber battens, breather membrane, plywood sheathing, insulation, light steel frame, vapour control layer, plasterboard on battens, paint	806490583	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, breather membrane, cement-bonded particle board sheathing, insulation, light steel frame, vapour control layer, plasterboard on battens, paint	806490585	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, lightweight solid blockwork with cement mortar, insulation, plasterboard on battens, paint	806220628	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, medium dense solid blockwork with cement mortar, insulation, plasterboard on battens, paint	806220622	A	A	A	A	A	A

Section	Element description	Element number	Housing	Health	Office	Education	Industrial shed	Retail
External wall construction	Limestone cladding and steel support, insulation, medium dense solid blockwork, plasterboard on battens, paint	806220678	A	A	A	A	A	A
External wall construction	Handset limestone cladding and support, insulation, lightweight solid blockwork, plasterboard and paint	806220034	A	A	A	A	A	A
External wall construction	Imported Chinese granite cladding and steel support, insulation, lightweight solid blockwork, plasterboard, paint	806220088	B	B	B	B	B	B
External wall construction	Imported Italian marble cladding, insulation and steel support, aircrete blockwork, plasterboard, paint	806220708	B	B	B	B	B	B
External wall construction	Imported Chinese granite cladding and steel support, insulation, medium dense solid blockwork, plasterboard, paint	806220677	B	B	B	B	B	B
External wall construction	Sandstone rainscreen cladding and steel support, insulation, lightweight solid blockwork, plasterboard and paint	806220083	B	B	B	B	B	B
External wall construction	Sandstone rainscreen cladding and steel support, insulation, medium dense solid blockwork inner leaf, plasterboard and paint	806220055	B	B	B	B	B	B
External wall construction	Imported Italian marble cladding, insulation and steel support, lightweight solid blockwork, plasterboard, paint	806220048	B	B	B	B	B	B
External wall construction	Imported Italian marble cladding, insulation and steel support, medium dense solid blockwork, plasterboard on battens, paint	806220072	B	B	B	B	B	B
External wall construction	UK Slate rainscreen cladding and steel support, insulation, medium dense solid blockwork inner leaf, plasterboard and paint	806220002	E	E	E	E	E	E
External wall construction	UK produced natural slate tiles on timber battens, breather membrane, OSB/3 sheathing, timber frame with insulation, vapour control layer, plasterboard on battens, paint	806210566	A+	A+	A+	A+	A+	A+
External wall construction	UK produced natural slate tiles on timber battens, breather membrane, plywood (temperate EN 636-2) sheathing, timber frame with insulation, vapour control layer, plasterboard on battens, paint	806210564	A	A	A	A	A	A
External wall construction	Sandstone faced non-loadbearing precast concrete sandwich panel, concrete frame, light steel studwork, plasterboard, paint	806390024	E	E	E	E	E	E
External wall construction	Sandstone faced non-loadbearing precast concrete sandwich panel, structural steel frame, light steel studwork, plasterboard, paint	806360030	E	E	E	E	E	E

Table 10: Continued

Section	Element description	Element number	Housing	Health	Office	Education	Industrial shed	Retail
External wall construction	Limestone faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint	806260690	C	C	C	C	C	C
External wall construction	Limestone faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint	806530021	D	D	D	D	D	D
External wall construction	Sandstone faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint	806530031	D	D	D	D	D	D
External wall construction	Imported Chinese granite faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint	806230688	D	D	D	D	D	D
External wall construction	Imported Chinese granite faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint	806530022	D	D	D	D	D	D
External wall construction	Sandstone faced precast concrete cladding panel, insulation, medium dense solid blockwork, plasterboard, paint	806530020	D	D	D	D	D	D
External wall construction	Limestone faced precast concrete sandwich panel, plaster skim, paint	806530296	D	D	D	D	D	D
External wall construction	Imported Chinese granite faced precast concrete sandwich panel, plaster skim, paint	806530295	E	E	E	E	E	E
External wall construction	Sandstone faced precast concrete sandwich panel, plaster skim, paint	806530297	E	E	E	E	E	E
External wall construction	UK limestone cladding panel and support system, breather membrane, insulation, structural concrete frame, lightweight solid blockwork with cement mortar, plasterboard on battens, paint	806260458	A	A	A	A	A	A
External wall construction	UK limestone cladding panel and support system, breather membrane, insulation, structural concrete frame, medium dense solid blockwork with cement mortar, plasterboard on battens, paint	806260459	A	A	A	A	A	A
External wall construction	Imported Italian marble rainscreen cladding on stainless steel supports, breather membrane, insulation, structural concrete frame, cement-bonded particle board, light steel frame, polyethylene sheet VCL, plasterboard on battens, paint	806280299	B	B	B	B	B	B
External wall construction	UK produced natural slate tiles on timber battens, lightweight solid block outer, light steel frame (with insulation), polyethylene sheet, plasterboard on battens, paint	806320671	A	A	A	A	A	A

Section	Element description	Element number	Housing	Health	Office	Education	Industrial shed	Retail
External wall construction	UK produced natural slate tiles on timber battens, medium dense solid block outer, light steel frame (with insulation), polyethylene sheet, plasterboard on battens, paint	806320672	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, lightweight solid block outer, timber stud with insulation, polyethylene sheet, plasterboard on battens, paint	806310665	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, medium dense solid block outer, timber stud with insulation, polyethylene sheet, plasterboard on battens, paint	806310666	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, lightweight solid block outer, insulation, aircrete block inner, plasterboard on battens, paint	806290610	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, medium dense solid block outer, insulation, aircrete block inner, plasterboard on battens, paint	806290608	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, lightweight solid blockwork cavity, insulation, plasterboard on battens, paint	806290609	A	A	A	A	A	A
External wall construction	UK produced natural slate tiles on timber battens, medium dense solid block outer, insulation, lightweight solid block inner, plasterboard on battens, paint	806290607	A	A	A	A	A	A
External wall construction	UK limestone cladding panel and support system, structural steel frame, breather membrane, insulation, lightweight solid blockwork with cement mortar, plasterboard on battens, paint	806230424	A	A	A	A	A	A
External wall construction	UK limestone cladding panel and support system, breather membrane, insulation, structural steel frame, medium dense solid blockwork with cement mortar, plasterboard on battens, paint	806230423	A	A	A	A	A	A
External wall construction	Precast concrete panel (non-load bearing) with limestone facing panels, support system, breather membrane, insulation, structural steel frame, medium dense solid blockwork with cement mortar, plasterboard on battens, paint	806230427	D	D	D	D	D	D
External wall construction	Precast concrete panel (non-load bearing) with imported Chinese granite facing panels and support system, breather membrane, insulation, structural steel frame, medium dense solid blockwork with cement mortar, plasterboard on battens, paint	806230425	D	D	D	D	D	D

Table 10: Continued

Section	Element description	Element number	Housing	Health	Office	Education	Industrial shed	Retail
External wall construction	Precast concrete panel with sandstone finish and support system, structural steel frame, breather membrane, insulation, medium dense solid blockwork with cement mortar, plasterboard on battens, paint	806230683	D	D	D	D	D	D
External wall construction	Precast concrete panel (non-load bearing) with 50mm limestone facing panels, support system, breather membrane, insulation, structural steel frame, light steel frame with plasterboard on battens, paint	806230428	D	D	D	D	D	D
External wall construction	Precast concrete panel (non-load bearing) with imported Chinese granite facing panels and support system, breather membrane, insulation, structural steel frame, light steel frame with plasterboard on battens, paint	806230426	D	D	D	D	D	D
External wall construction	Precast concrete panel with sandstone finish and support system, breather membrane, insulation, structural steel frame, steel stud infil with plasterboard on battens, paint	806230684	D	D	D	D	D	D
Landscaping: Boundary Protection	Site sourced dry stone wall	827020007	A+	A+	A+	A+	A+	A+
Landscaping: Boundary Protection	Reclaimed split stone wall with lime mortar	827020027	A	A	A	A	A	A
Landscaping: Boundary Protection	Reclaimed split stone wall with cement mortar	827020032	A	A	A	A	A	A
Landscaping: Boundary Protection	Reclaimed stone wall with lime mortar	827020028	B	B	B	B	B	B
Landscaping: Boundary Protection	Reclaimed stone wall with cement mortar	827020025	B	B	B	B	B	B
Landscaping: Boundary Protection	Split stone wall with lime mortar	827020031	C	C	C	C	C	C
Landscaping: Boundary Protection	Split stone wall with cement mortar	827020026	C	C	C	C	C	C
Landscaping: Boundary Protection	Stone wall with lime mortar	827020019	E	E	E	E	E	E
Landscaping: Boundary Protection	Stone wall with cement mortar	827020015	E	E	E	E	E	E
Landscaping: Boundary Protection	Cement mortar wet laid UK sandstone setts (100mm) over prepared recycled sub-base	822120042	C	C	C	C	C	C

Section	Element description	Element number	Housing	Health	Office	Education	Industrial shed	Retail
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid reclaimed stone setts (100mm) over prepared sub-base	822120013	C	C	C	C	C	C
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid imported Chinese granite setts (100mm) over prepared recycled sub-base	822120039	C	C	C	C	C	C
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid imported Indian sandstone riven setts (100mm) over prepared recycled sub-base	822120055	D	D	D	D	D	D
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid UK sandstone setts (100mm) over prepared sub-base	822120019	D	D	D	D	D	D
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid imported Chinese granite setts (100mm) over prepared sub-base	822120008	E	E	E	E	E	E
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid imported Indian sandstone riven setts (100mm) over prepared sub-base	822120054	E	E	E	E	E	E
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid UK sandstone setts (50mm) over prepared sub-base	830120019	B	B	B	B	B	B
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid imported Indian sandstone riven setts (50mm) over prepared recycled sub-base	830120052	B	B	B	B	B	B
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid reclaimed stone setts (100mm) over prepared recycled sub-base	830120029	B	B	B	B	B	B
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid imported Indian sandstone riven setts (50mm) over prepared sub-base	830120051	B	B	B	B	B	B
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid reclaimed stone setts (100mm) over prepared sub-base	830120013	C	C	C	C	C	C
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid imported Chinese granite setts (100mm) over prepared recycled sub-base	830120027	E	E	E	E	E	E
Landscaping: surfacing for heavily trafficked areas	Cement mortar wet laid imported Chinese granite setts (100mm) over prepared sub-base	830120008	E	E	E	E	E	E

Table 10: Continued

Section	Element description	Element number	Housing	Health	Office	Education	Industrial shed	Retail
Landscaping: surfacing for pedestrian areas	Cement mortar wet laid UK sandstone paving flags (29mm) with no sub-base	824130012	A	A	A	A	A	A
Landscaping: surfacing for pedestrian areas	Cement mortar wet laid imported Chinese granite setts (100mm) with no sub-base	824130023	E	E	E	E	E	E
Roofing	Timber trussed rafters and joists with insulation, roofing underlay, counterbattens, battens and UK produced slates	812410026	A	A				A
Roofing	Timber trussed rafters and joists with insulation, roofing underlay, counterbattens, battens and reclaimed slates	812410012	A+	A+				A+
Roofing	Structurally insulated timber panel system with OSB/3 each side, roofing underlay, counterbattens, battens and reclaimed slates	812410067	A+	A+				A+
Roofing	Structurally insulated timber panel system with OSB/3 each side, roofing underlay, counterbattens, battens and UK produced slate	812410021	A	A				A
Roofing	Plasterboard, timber trussed rafters with insulation, roofing underlay, counterbattens, battens and imported Spanish slates	812410027	A					
Roofing	Structurally insulated timber panel system with plywood (temperate EN 636-2) each side, roofing underlay, counterbattens, battens and UK produced slate	812410057	A	A				A
Roofing	Structurally insulated timber panel system with plywood (temperate EN 636-2) each side, roofing underlay, counterbattens, battens and reclaimed slates	812410055	A+	A+				A+
Roofing	Timber trussed rafters and joists with insulation, roofing underlay, counterbattens, battens and UK produced slates	812410026	A	A				A
Roofing	Structurally insulated timber panel system with plywood (temperate EN 636-2) each side, roofing underlay, counterbattens, battens and UK produced slate	812410057	A	A				A
Roofing	Galvanised steel rafters and joists with insulation, roofing underlay, counterbattens, battens and reclaimed slates	812150011	A+	A+				A+
Roofing	Galvanised steel rafters and joists with insulation, roofing underlay, counterbattens, battens and UK produced slate	812150008	A	A				A

Section	Element description	Element number	Housing	Health	Office	Education	Industrial shed	Retail
Roofing	Timber trussed rafters and joists with insulation, roofing underlay, counterbattens, battens and reclaimed slates	812410012	A+	A+				A+
Roofing	Structurally insulated timber panel system with OSB/3 each side, roofing underlay, counterbattens, battens and reclaimed slates	812410067	A+	A+				A+
Roofing	Structurally insulated timber panel system with plywood (temperate EN 636-2) each side, roofing underlay, counterbattens, battens and reclaimed slates	812410055	A+	A+				A+
Roofing	Timber trussed rafters and joists with insulation, roofing underlay, counterbattens, battens and UK produced slates	812410026	A	A				A
Roofing	Structurally insulated timber panel system with plywood (temperate EN 636-2) each side, roofing underlay, counterbattens, battens and UK produced slate	812410057	A	A				A
Internal wall	2 x 15mm OSB with 112mm rigid urethane insulation, to give 142mm overall thickness SIP system, breather membrane, counter battens, battens, and UK produced slates	1112690002	A	A+	A+	A+	A+	A+
flooring	Quarry tiles.	821580005	A		B		B	A
flooring	UK produced limestone floor tiles.	821580009	A		A		A	B
flooring	Imported Chinese granite floor tiles.	821580015	A		B		B	B
flooring	Imported Italian Marble tiles.	821580004	C		D		D	C
flooring	UK produced Slate floor tiles.	821580010	E		E		E	E

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