Sustainability Strategy
Progress Report 2012
Based on 10 years of data 2002-2011

BRICK Industry

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Welcome to the BDA sustainability strategy ten year progress report. The Brick Development Association represents the United Kingdom and Ireland’s clay brick and paver manufacturers. Our role is to ensure clay bricks and pavers are recognized as the materials of choice. We are responsible for promoting the contribution that brick makes to the places and spaces that people live and work in today.

In 2001 the UK brick industry published its Sustainability Strategy - Brick, Made for Generations - and at the same time established a suite of Key Performance Indicators to assess its progress in meeting the aspirations defined in its sustainability strategy [www.brick.org.uk/2011/03/a-sustainability-strategy-for-the-brick-industry]. Performance is monitored by returns submitted annually by members of the Brick Development Association. A list of current members is shown on the back cover.

The brick industry KPIs explored throughout this publication address the following broad principles of sustainability:

- Social Progress which recognises the needs of everyone
- Effective Protection of the Environment
- Prudent Use of Natural Resources
- Maintenance of High and Stable Levels of Economic Growth and Employment

The BDA is currently reviewing its sustainability programme with a view to establishing new KPIs and targets, building on the knowledge gained in the ten years covered by this report, as a basis for the strategy for the period to 2020.

Chairman of Sustainability Working Party: John Sandford

CEO of the Brick Development Association: Simon Hay
Sustainability Headlines:

The Brick Development Association’s over-riding ambition remains that the beauty and robust sustainability of brickwork, including all styles from english bond and gauged brickwork through to more contemporary stack bonding, continues to form an intrinsic aspect to Britain’s built environment.

Building on the strong foundation of the ten years of sustainability data summarised in this report the BDA will, in 2013, review all the existing KPI’s and update them as necessary in accordance with emerging UK Government Guidelines. Additionally, quantitative targets will be established to shape the future progress of the industry towards 2020.

10 Year Summary Headlines:
- Reportable accidents reduced by 73%.
- Working days lost due to accidents at work reduced by 76%.
- Proportion of production covered by ISO 14001 certification increased from 60% to 95%.
- Usage of water from non mains sources increased to 31% of total water used.
- Total waste sent to landfill reduced to below 4,000 tonnes per year for the whole industry.
- The amount of alternative or secondary raw materials diverted from landfill is more than 75 times the amount of waste sent to landfill.
- Overall energy consumption per tonne reduced by 6%.
- More than 90% of manufacturing capacity now certified to the BRE Environmental and Sustainability standard for the “Responsible Sourcing of Building Materials”, BES 6001.
- Investment in the period in excess of £300million - focussed on energy efficiency improvements.
Brick Types and Processes

There are literally thousands of different brick products, which can be broken down into a handful of basic types. The vast majority are made from clay and are kiln-fired, quality, durable bricks with an attractive appearance for external use above ground.

**Extruded/Wirecut** - The clay is continuously extruded to a required size and shape and then cut into individual bricks by means of a wire. There are multiple variations in colour and texture due to the manufacturing process being highly automated and the products can be either perforated or solid.

**Soft Mud/Stock** - The clay is wetted to a "soft mud" consistency and then moulded to shape, before being allowed to dry prior to firing in the kiln. Much of the process is automated and can produce slightly irregular shapes.

**Handmade** - Clay is thrown by hand into a mould, and allowed to dry much as described above for a stock brick. The clay isn’t compacted by machine, each brick has distinctive creasing known as a 'smile' (a visible trace of the hand thrown process).

**Fletton** - Also known as 'London Bricks'. A unique facing brick manufactured from the Lower Oxford clay found only in parts of England and currently only used in East Anglia. This clay contains organic material, which burn during firing, reducing the amount of fuel needed for the kiln, which produces some interesting aesthetic effects in the external appearance of the bricks. These products are made by semi dry pressing and fired in a Hoffman kiln.

The pie chart above displays the division of soft mud versus non-soft mud despatches amongst BDA members for 2011.
Social Progress

Improving occupational health and safety of the industry’s employees:

All members of the Brick Development Association are formally committed to the Ceramic Industry Health and Safety Pledge. This consists of a comprehensive programme of initiatives, agreed with the Trade Unions and the Health and Safety Executive (HSE), designed to reduce the incidence of work-related injury and ill health [www.hse.gov.uk].

Having achieved targets for the first two phases, phase 3 of the Pledge includes quantitative targets for improvement in health and safety performance to be achieved by the end of 2012. BDA Member Companies are on track to meet these targets with a further 30% improvement in performance from a 2006 baseline.

Important indicators are working days lost as a result of accidents and the number of Reportable accidents in a year.

The graph above indicates reducing trends in both the number of working days lost as a result of work related accidents (expressed as a percentage of total working days) and the number of reportable accidents (expressed per 100 employees per annum).
Improving employee development through relevant and useful vocational training:

The Industry recognises the importance of investing in the training and development of its employees. BDA Members are fully represented on the Training Committee of the International Clay Technology Association (ICTa) which forms part of the Institute of Materials Minerals and Mining (IOM³). This group is committed to raising the levels of Technical competence within the Industry.

The annual BDA Sustainability KPI survey records how much training was provided. We are pleased to report that in spite of the fact that there have been difficult trading conditions, the industry has broadly maintained its commitment to formal training, with levels remaining stable throughout the ten year period at around 1.1 training days provided per employee each year. This figure only captures formal direct training and reflects the positive situation that the brick industry benefits from a high proportion of long serving, experienced and highly competent employees.

A large amount of further formal training is not required due to the existing competency of employees, but it should be noted that companies provide considerable development of employees, particularly in the field of health and safety. The Pledge, which is reported on page 5, shows a dramatic decrease in working days lost and reportable accidents. This demonstrates the increasing competence of the workforce and has been supported by the use of specially developed toolbox talks and other training tools.

Informal training and development is also incorporated into operational activities and the majority of employees are covered by the training and competence requirements of certification to ISO 9001 (the international standard for Quality Management Systems) and other Management System standards. The sector has also engaged with a number of providers to develop levels 2 and 3 Technical Certificates, and this has been strongly supported by the industry.

The British Ceramic Confederation and the Health and Safety Executive are currently developing an evidence based competence profile for brick industry production operators. It is anticipated that the level of compliance with this protocol will be used in future years as a more effective measure of competence within the sector.
Protecting Our Environment

Extending the application of environmental management systems to the industry’s operations:

The brick industry recognises the impact that its manufacturing and extractive activities could have on the environment and works hard to minimise these effects.

The industry has responded to environmental concerns by the adoption of management systems such as ISO 14001 or BS 8555. The sector were early movers in the development of certified Environmental Management Systems with the first UK brick factories certified to ISO 14001 (then BS 7750) in 1996. By 2002 the coverage of such certified systems was 60%, and by 2011 nearly 95% of the industry’s production was covered by a certified Environmental Management System.

The next challenge for the industry is the development of Environmental Product Declarations following the requirements of EN 15804.

The chart above shows the percentage of production capacity covered by systems certified to ISO 14001.
When considered over the long service life of the product, the carbon footprint per square metre of clay brickwork is extremely low. The overall profile of CO₂ emissions over the 10 year period appears to be broadly constant but this represents a position where an underlying trend in reduction of CO₂ emissions has been masked by a number of conflicting factors as follows:

- A reduction in production output since 2008 which has resulted in some factories being operated at less than optimum efficiency. (For example large continuous kilns mainly consume a fixed amount of fuel and therefore operating at slower rates, results in less efficient operation).
- A decrease in the proportion of Fletton bricks and an increase in the share of soft mud moulded bricks. These brick types have different CO₂ profiles.

There has also been a general shift in the amount of different clay types used in manufacture which has increased the proportion of process emissions. In 2011 approximately one third of all CO₂ emissions came from the natural raw materials used and these emissions cannot be reduced using currently available technology.

Emissions of CO₂ are a key focus in the whole construction sector. Emissions from manufacturing need to be considered on the basis of whole life cycle of the product. The table below reflects the contribution of CO₂ emissions per square metre of standard brickwork attributable to the brick component. These emissions include both emissions from combustion of energy and “Process emissions” from the component raw materials as reported under the rules of the EU Emissions Trading Scheme.

<table>
<thead>
<tr>
<th>Year</th>
<th>kg CO₂ e/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>27.90</td>
</tr>
<tr>
<td>2003</td>
<td>27.90</td>
</tr>
<tr>
<td>2004</td>
<td>27.75</td>
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<tr>
<td>2005</td>
<td>27.90</td>
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<td>2006</td>
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<td>2009</td>
<td>29.25</td>
</tr>
<tr>
<td>2010</td>
<td>27.90</td>
</tr>
<tr>
<td>2011</td>
<td>27.60</td>
</tr>
</tbody>
</table>

When considered over an average expected service life of 150 years the CO₂ emissions are typically 0.184 kg CO₂ e / m² / annum.

Reducing the impact of atmospheric emissions from the production process:

All brick factories are subject to statutory control of emissions to air. As a result of significant and ongoing investment in pollution control equipment the industry is able to maintain full compliance with emission limits.

In January 2013 the industry will enter Phase III of the EU Emissions Trading Scheme which includes further demanding targets for CO₂ reduction in the period to 2020.
Minimising waste disposal to landfill:

The industry produces very little waste. Most clay waste materials are recycled within the process. Almost all fired brick waste is beneficially used as secondary aggregate or for the surfacing of quarry roads. The majority of waste produced by the industry and sent to landfill has now reduced to less than 4,000 tonnes per annum. The chart below shows waste disposal to landfill expressed as a percentage of total brick production by weight.

The quantity of materials used in brick manufacture that might otherwise have become waste and been disposed of to landfill was more than 75 times the amount of waste the industry actually sent to landfill.
Prudent Use of Natural Resources

Reducing energy consumed through improved energy efficiency:
There is full commitment to improving energy efficiency and major investment is ongoing in new kiln technology. The industry has participated in a sector Climate Change Agreement with UK Government since 2001 and is subject to the EU Emissions Trading Scheme.

The chart below displays the Specific Energy Consumption (SEC) measured as kWh per fired tonne as reported to UK Government under the terms of the sector’s Climate Change Agreement. This includes consumption of all primary fuels including gas and electricity.

![](chart.png)

The SEC has shown a significant overall reduction in the period covered by the initial phase of Climate Change Agreements up to 2011. Improvement in recent years has been tempered by market conditions which have meant that some factories have not always been able to run at optimum energy efficiency due to intermittent operation. The sector is currently in discussion with UK Government concerning targets to be established for the second phase of Climate Change Agreements which will run from 2013 to 2023. It is anticipated that a further significant reduction will be required over this period in total energy consumption per tonne of product.
Since the BDA Sustainability Strategy was first launched in 2001 there have been significant developments in all aspects of Sustainable Construction. The establishment in December 2006 of the “Code for Sustainable Homes” introduced requirements for building materials producers to prove the responsible sourcing of their products and also to characterise their environmental performance as determined by Building Research Establishment (BRE) Environmental Profiles and subsequent assessment of different walling systems in the BRE Green Guide. The development of these standards has been embraced by the BDA and its member companies through the BDA Sustainability Working Party.

Since April 2007 all BDA member’s brick products have been covered by an Environmental Profile assessed by BRE using the current methodology. This replaced the earlier 1998 version of the clay brick profile. This profile has been used in the BRE Green Guide to classify the environmental impact of all forms of typical external wall construction containing clay bricks. All such forms of wall construction have been classified as A+ in the Green Guide.

In combination, the establishment of BES 6001 certification for Responsible Sourcing and the A+ rating in the Green Guide mean that the majority of UK manufactured clay bricks can obtain the maximum credits available in the “Materials” category of the Code for Sustainable Homes. When used as part of a walling system designed to achieve the required standards of thermal insulation and air tightness, bricks will continue to have an important role to play in the construction of dwellings meeting the highest levels of the Code.

In the same way bricks also have a key part to play in the achievement of Fabric Energy Efficiency Standards (FEES) with respect to the continuing refinement of Building Regulations for all UK buildings and the concept of “Fabric First”.

RESPONSIBLE SOURCING
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RESOURCES SOURCING
In 2011 the Sustainability KPI’s for the first time monitored the proportion of production capacity certified to BES 6001 – the BRE Environmental and Sustainability Standard for the Responsible Sourcing of Construction Products. The company returns showed that 90.4% of the sector’s production was independently certified to BES 6001.

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A+ BRE certified
Reducing the volume of mains water used in the production process:

Water usage is an important characteristic in clay brick manufacture and every opportunity is taken to reduce overall water use and to use non mains water in the brickmaking process rather than using drinking quality water. This trend will continue as parts of the UK come under greater water stress.

On average the total water added in clay brick manufacture is typically 0.18 m$^3$ per tonne of finished product.

The amount of water used in the process varies significantly depending on whether the products are dry pressed, extruded or soft mud moulded. Therefore the variability in the water use data reflects the differing proportions of the three production methods used over the period. There has been a general trend towards the manufacture of more soft mud moulded products which generally require a higher water usage.

The following graph shows that the industry consistently uses between 25% and 35% of water from non mains sources such as quarry lagoons or rainwater harvesting etc.

![Graph showing water usage from non mains sources](image)

Due to the impermeable nature of clay, most water in quarries is rainwater runoff and consequently its process use does not affect adjoining land. This may provide future opportunities to further reduce mains water usage.

Future targets will include better quality reporting of water usage and a drive towards a more efficient use of water and reduced demand on mains water supplies.
Minimising virgin raw material (clay) consumption:

Since 2005 an annual survey undertaken by Ceram has monitored the usage of materials from alternative, recycled and secondary sources (MARSS) at the majority of the industry’s production sites. The 2011 survey covered manufacturing sites representing over 90% of UK production. The overall usage of MARSS [www.ceram.com/marss] materials is shown in the graph below as a proportion of the total raw material usage. The trend is generally stable although the individual materials used have changed quite significantly over the period. The variation in MARSS content between individual product types is also very large. Individual products which contain more than 10% MARSS are considered to represent Good Practice as determined by WRAP (Waste and Resources Action Programme) and Best Practice is to contain more than 30% MARSS content.

REDUCE REUSE RECYCLE

The BDA is working with WRAP to produce a Resource Efficiency Action Plan for the Brick Industry. The resource efficiency of a product will most obviously be determined through the design and manufacturing process. However, product distribution through the supply chain (including transport, storage, packaging) and the way the product is used on site and its end of life, will also contribute to overall resource efficiency.
The brick industry is a large investor proportionate to its turnover. The industry being a high energy user has endeavoured to use technology to reduce its operating costs. Particularly efficient factories which have received substantial investment would be Kingsbury, Measham and Throckley factories, which aim to become the most efficient plants in the world. There has also been a large investment into innovative products and this will continue as the industry faces the challenges and opportunities of the developing Sustainable Construction agenda.

Maintenance of High and Stable Levels of Economic Growth and Employment

Maintaining and improving profitability in order to provide continuing investment and employment:

Despite ongoing difficult trading conditions over the last ten years, the industry has continued to invest heavily in plant and machinery as shown in the graph below.

Over the period of this report the accumulated turnover of brick sales in the UK amounts to £4.6 billion. Since 2008 brick sales have been adversely impacted by the major downturn in UK construction activity.

Hanson's Measham plant can make 30,000 bricks an hour - enough for four detached houses.
With over 84% of UK houses built using brick the continuing success of the industry is vital to the overall UK economy. Every £1 invested in construction generates £2.84 in economic activity with 92p of every £1 retained in the UK [L.E.K. Consulting, October 2009. www.lek.com].

The industry has a clear responsibility to adhere to its sustainability strategy in order to meet the needs of future generations.

Unlike most other building materials brick lasts for centuries. Ceramic bricks were used as early as 4500 BC in Indus Valley cities. Bricks play a large role in Britain’s design heritage, serving as a structural, practical, thermally efficient, aesthetically pleasing and affordable material. Brick requires minimal maintenance and is suited to the UK’s demanding climate.

This durability and longevity allows its embodied energy to be distributed over at least 150 years leading to a low life cycle carbon footprint. As well as being effective for its acoustic performance, fire resistance qualities and thermal mass, brick also provides a thermal shield against high temperatures, which the UK may experience in the future.

A recent survey showed that 93% of people wanted to live in a brick and block constructed house [CBA/MMA 2010 survey]. Made from an abundant natural material, which is often manufactured and used locally – on average a brick travels within an 80 mile radius from factory to destination. Employment provided by the industry, particularly in rural areas, contributes significantly to the local economy.

The brick industry plays an important part in habitat creation and management through the restoration of its quarries.

The sustainability brochure published by the Brick Development Association in 2011 was shortlisted for the Sustain Awards, Business and Society Sector for Governance.