



# Concrete Industry Sustainability Performance Report

5th report: 2011 performance data



The responsible sourcing standard BES 6001 is based on the criteria set out for materials used at the Olympic park. Photo: ODA

# Chairman's Statement



**In 2008 the UK concrete industry committed to our Sustainable Construction Strategy. This initiative has been the catalyst for achieving a common framework of industry-wide reporting and delivering our ambition of continuous improvement. We now publish this, our fifth annual**

**performance report. This report provides industry data for a range of key indicators, set against a benchmark of previous performance and a 2012 target.**

Communicating and informing our colleagues and customers is also a key strategic objective for our strategy and the training, events and guidance available are an essential part of enabling the design of a more sustainable built environment using concrete.

As the UK construction industry's approach to sustainability develops it is essential that our Strategy keeps pace. As we publish this report we are looking forward to new strategic objectives and commitments (see 'Looking forward' overleaf).

The updated strategy represents progression, continuous improvement and an increase in scope. The strategy will include future targets for continuous improvement (see pages 14 and 15), target further engagement with the broader supply chain for concrete and enabling stakeholders to realise the potential and understand the sustainability credentials of concrete and its constituents.

Despite the economic recession and lack of growth within the construction sector, our commitment to delivering a sustainable built environment is undiminished and we believe that our industry is best placed to support government and client frameworks - helping to facilitate the sustainable design and construction of the built environment.

**Andy Spencer,**  
Chairman, Sustainable Concrete Forum

## Our fifth report

This report presents the concrete industry's sustainability performance in 2011. The data covers the manufacture of concrete and its constituent materials. The information is collected through survey responses from companies supplying an estimated 79% of concrete used in the UK. A table illustrating the sectors that contribute to this data collection is shown below.

The data for 2011 is presented as values for 'concrete' and 'concrete plus reinforcement'. When looking at the data sets it should be noted that the 2012 targets relate to 'concrete' as they were established prior to British Association of Reinforcement (BAR) members joining the strategy.

Concrete industry sectors contributing data	Data: Concrete	Data: Concrete Plus Reinforcement
Aggregate	✓	✓
Cement	✓	✓
GGBS	✓	✓
Fly ash	✓	✓
Admixtures	✓	✓
Ready-mixed concrete	✓	✓
Precast concrete	✓	✓
Steel Reinforcement		✓

### Concrete:

These figures include contributions for each indicator from the aggregate, cement, GGBS, fly ash and admixtures supply chain as well as the contributions from the ready-mixed and precast concrete manufacturing sites. This is a representation of the concrete industry's impacts based on unreinforced concrete.

### Concrete Plus Reinforcement:

This includes all of the sectors included in 'concrete' with the addition of data from the steel reinforcement sector.

- In 2011, the production of a **standardised tonne of concrete** produced 83.4kg CO<sub>2</sub>.
- 92% of concrete produced in 2011 was **responsibly sourced** with certification to BES 6001.
- As a **net consumer of waste** we use 63 tonnes of waste for every tonne of waste produced.
- **Environmental and quality management** systems are widespread, exceeding the 2012 target ahead of schedule.
- **Seven of the 12 targets** set for 2012 have been met or exceeded in 2011.
- **2020 performance targets** have been set as part of an update to our sustainable construction strategy.

## Introduction

Concrete is the most widely used construction material and is a fundamental part of our sustainable built environment; essential for the construction of our housing, schools, hospitals, transport networks, water and energy infrastructure.

Since 2008, when the majority of the UK concrete industry committed to the Concrete Industry Sustainable Construction Strategy, construction activity and the use of building materials has declined significantly due to the recession. Despite the economic downturn the scope of the sustainability initiative continues to grow, as demonstrated by the integration of BAR data from 2010 and the updated strategy launched in 2012.

The report presents a range of performance indicators that represent the most significant sustainability topics and support the Government Strategy for Sustainable Construction [1]. The concrete industry is largely covered by certified management systems such as ISO 9001, ISO 14001 and OHSAS 18001 systems which are also a key requirement within BES 6001. This approach provides a cohesive platform for continuous improvement and the delivery of sustainable construction products. This is evident from our progress over the last 5 years.

Additional information, previous industry reports and links to sector and company performance reports, is available at [www.sustainableconcrete.org.uk](http://www.sustainableconcrete.org.uk).

*19 performance indicators, 12 targets for improvement, 7 targets met or exceeded already. Go to the final pages of this report for a full summary.*

## Looking forward

The construction industry has committed to an update of the Concrete Industry Sustainable Construction Strategy. This provides the roadmap for our continual improvement and is indicative of our commitment to a sustainable built environment.

### Vision

The UK concrete industry will be recognised as a leader in sustainable construction by taking a dynamic role in delivering a sustainable, zero carbon built environment in a socially, environmentally and economically responsible manner.

### Strategic objectives

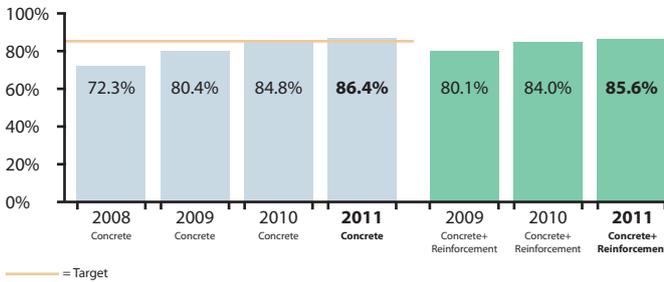
1. Commit to our role in achieving a sustainable built environment and contribute to construction industry and government initiatives
2. Engage with the broader supply chain to inform good practice and continue to explore new ways of improving our sustainable production performance
3. Communicate with clients to provide knowledge of concrete solutions to enable the design and construction of a sustainable built environment

### Commitments

1. Contribute to the delivery of a **zero carbon** built environment
2. Provide **Life Cycle Assessment** data compliant with codes and standards
3. Develop a **Material and Resource Efficiency Programme** to inform best practice across the life cycle of concrete in the built environment
4. Develop a **Low Carbon Freight Initiative** to support improvement in transport performance through the concrete supply chain to construction sites
5. Develop a **Water Strategy** to support the measurement and reporting of sustainability performance and target setting
6. Target continuous improvement of sustainable **production performance** and report performance annually

## Environmental Management

Percentage of production sites covered by a UKAS certified EMS



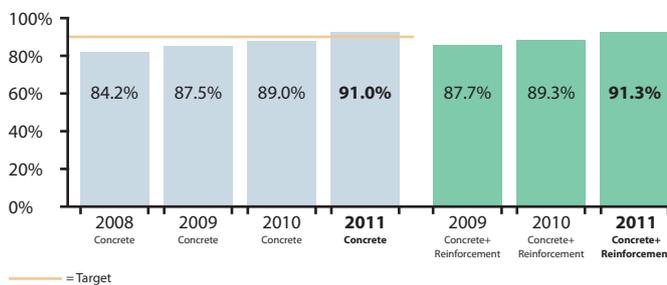
Environmental Management Systems (EMS) provide the framework for a sustainability strategy and are a key element in gaining certification to responsible sourcing schemes. Sites across the industry vary in their size and complexity from cement works to concrete batching plants. EMS drive performance improvements at each individual site and extending their coverage represents a challenging indicator for the industry.

Based on 2011 data the industry has already met its 2012 target of 85%. Industry coverage of UKAS certified systems has increased year on year against an overall trend in the reduction in the total number of sites. The 2011 data indicates a positive start in moving towards the 95% target set for 2020.

*1235 production sites have certified Environmental Management Systems, exceeding the performance target set for concrete in 2012.*

## Quality and Performance

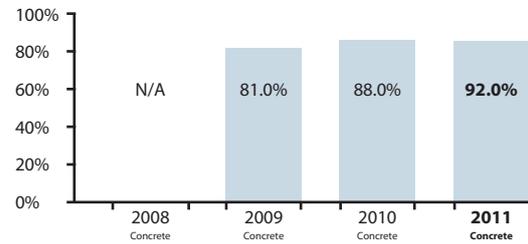
Percentage of production sites covered by a UKAS certified ISO 9001 QMS



Certified Quality Management Systems (QMS) are the basis for delivering product consistency and performance as well as providing supply chain engagement. Consistent with the coverage of EMS this indicator has also met the 2012 target of 90% coverage and made a positive start to the 95% target set for 2020. As with the EMS coverage this has been achieved against an overall trend in the reduction in the total number of sites since the baseline was established.

## Responsible Sourcing

Percentage of production certified to BES 6001 responsible sourcing standard



Over the last three years the concrete industry has taken significant steps to demonstrate its responsible sourcing credentials by gaining third party certification. In 2011, this has resulted in 92% of concrete production being certified to BES 6001.

Reinforcement supplied by BAR members is also certified to responsible sourcing standards. In 2011, 83% of the reinforcement from fabricators was certified to BES 6001, compared to 55% in 2010. This has been achieved through the Eco-Reinforcement sector scheme.

Concrete is a locally sourced material so its constituents are both traceable and subject to the comprehensive EU regulatory framework. The concrete industry is committed to continued investment to maintain its leadership in this area and a 2020 target of 95% has been established for this performance indicator.

The industry believes that the comprehensive requirements of BES 6001 can provide a common benchmark for all construction products in order to demonstrate their responsible sourcing credentials. The relative performance of this standard compared to other schemes is now recognised in BREEAM 2011 [2] and the BREEAM Domestic Refurbishment scheme [3]. Designers can now easily specify and source certified concrete products that also gain maximum credits in sustainability assessment tools such as BREEAM and CEEQUAL.

Ready-mixed concrete is the leading product sector within the concrete industry in delivering responsibly sourced products. In 2011 almost 96% of its products were certified to BES 6001. Significant progress has also been made by the precast sector in increasing the amount of BES 6001 certified products from 67% to just over 78% between 2010 and 2011.

### Case Study: Crossrail

*Through the development of BES 6001 certification and the Eco-Reinforcement equivalent standard the Concrete Industry and BAR members are able to deliver 100% responsibly sourced concrete and steel to Crossrail, a significant achievement and a marker to other construction products to make similar investments in managing the sustainability issues within their supply chains. [www.eco-reinforcement.org/crossrail/](http://www.eco-reinforcement.org/crossrail/)*

### New logo for BES 6001 certification



The increasing importance of BES 6001 in supporting sustainable construction has resulted in BRE launching a logo to easily identify products which meet the demanding requirements of the standard.

The full listing of products certified to BES 6001 is available online at [www.greenbooklive.com](http://www.greenbooklive.com) and this is also included in the logo.

### Major contractors recognise responsible sourcing

The importance of responsibly sourced projects is increasing and this is most evident in the policies of major contractors. In 2012 the UK Contractors Group (UKCG), which represents over 30 leading construction companies, issued the following policy to promote the sustainable procurement of materials. "UKCG members support and give preference to procuring products which are able to demonstrate compliance with a recognised responsible sourcing scheme, certified by a third party." Skanska, a member of UKCG, has stated their ambition is to responsibly source 100% of its concrete and 80% of its steel reinforcement.

Contractors and the concrete industry are just some of the supporters of the Action Programme on Responsible Sourcing (APRES) network based at Loughborough University. APRES provides a focus for knowledge-sharing and dissemination of good practice and support as well as generating new research ideas and relationships, visit [apres.lboro.ac.uk](http://apres.lboro.ac.uk).

*By specifying responsibly sourced concrete, reinforcement and aggregates many projects will automatically meet the government target for 25% of materials for construction projects to be responsibly sourced.*

### Case Study: Horizon House

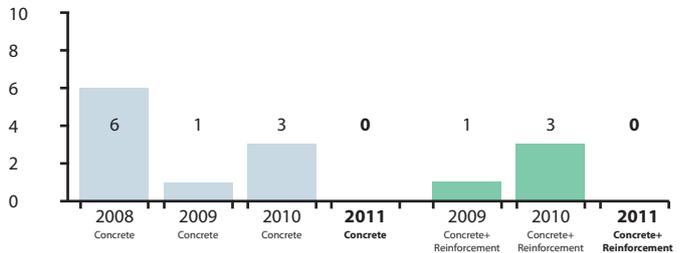


*Having a minimal impact on the environment was always going to be a high priority for the Environment Agency's HQ, Horizon House, in Bristol. The concrete for the post-tensioned frame was locally sourced and certified to the responsible sourcing standard BES 6001. With a BREEAM rating of 85%, the best for an office in the UK, this is a truly sustainable building.*

[www.thisisconcrete.co.uk](http://www.thisisconcrete.co.uk)

## Emissions (excluding CO<sub>2</sub>)

Number of convictions per annum for air and water emissions



Emissions vary significantly across the different sectors of the industry and are actively monitored by regulatory bodies. Due to the diversity of emissions the indicator selected for monitoring performance is the convictions for non-compliance that have occurred in each year.

Continuing investment across the industry has led to significant improvements in the overall levels of emissions. Each sector trade body is active in promoting best practice in order to achieve emission reductions.

The target for all the sectors of the concrete industry is to achieve an annual level of zero convictions and this target is unchanged in the updated strategy.

## Stakeholder Engagement

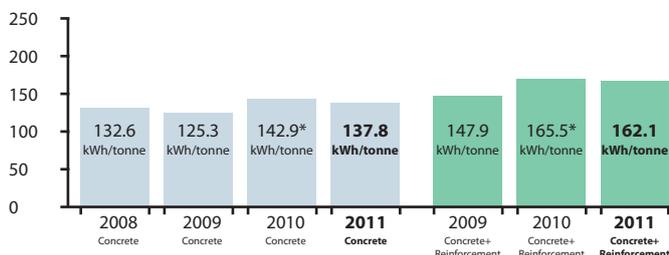
The type of 'stakeholder' varies within each of the production sectors that form the concrete industry supply chain. There is a wide range of activity by manufacturers and sector trade associations resulting in significant engagement with local, national and international stakeholders.

A stakeholder consultation process was undertaken by the concrete industry in 2011 to support the development of the updated strategy. An extensive programme of interviews was conducted using an independent consultancy. In total, the views of 41 major stakeholders were gathered from the construction marketplace, relevant UK government departments and the concrete industry. The output, together with proposed EU and UK policy and legislation, was used to identify how the existing strategy needed to be updated in order to show leadership in the period up to 2020 and beyond.

*Sustainable Concrete Forum is working with the UK Contractors Group to extend the use of performance metrics and deliver sustainability through the supply chain.*

## Energy Efficiency

### Energy used in production as a proportion of production output



\*Data published in the 4th report has been restated due to further improvements in data validation

Improving the energy efficiency of the manufacturing process helps drive a healthier and more competitive industry as well as reducing the embodied energy of concrete industry products. When products are used in the context of a building, the primary consideration is its life cycle energy demand. While concrete products contribute to the embodied energy of a building they can play a significant role in minimising operational energy efficiency during its lifetime.

2011 data shows that the total energy use for concrete production has fallen by around 11% compared to the 2008 baseline. However, as concrete production was less in 2011 this leads to a net increase in kWh/tonne.

The consumption of a largely fixed energy use against a lower output of product can cause fluctuations in this indicator for the concrete sector. The cement sector is a major component of the embodied energy in concrete, which has continued to achieve improvements in energy efficiency. Although other factors in the concrete market, such as a changing product mix, can sometimes counteract efficiency improvements and have contributed to the net kWh/t increase from the baseline year of 2008. It should also be noted that the 2010 value has been restated at a slightly higher level as a result of further improvements in data validation.

The different sectors of the concrete industry have different energy demands. The heaviest demand comes from the cement sector, which is responsible for around 75% of the energy used in concrete manufacture. Since 2005 the cement sector has reported against a voluntary agreement with the Environment Agency. With these targets now met, a new plan is in development that will set targets for 2020. New targets are also being developed for the next phase of Climate Change Agreements (CCA) due to start in April 2013. Between 1990 and 2011 the cement sector improved its CCA performance by 44.8%, which exceeds the agreed target of 30%.

The energy efficiency data for concrete plus reinforcement includes steel mills and fabricators. The integration of this data has increased the energy value per tonne by just under 18%.

### Operational energy

As well as minimising the embodied contribution of concrete products, it is their performance over the full life cycle of the building which will determine the sustainability of the built environment for future generations.

The use of passive design to maximise the inherent thermal mass properties of concrete can provide considerable energy savings in terms of reduced heating and cooling requirements over the lifetime of a building. Thermal mass relates to the ability of construction materials to absorb heat on hot days to help prevent overheating problems without recourse to energy dependent cooling. Night time ventilation removes the stored heat. During the winter, the absorbed heat provides a buffer within the building to help maintain a constant ambient temperature without using additional energy.

For more information visit [www.concretecentre.com](http://www.concretecentre.com).

### Case Study: Waste derived fuel use in the cement sector



The cement sector is increasing its use of various waste streams to improve the environmental sustainability of cement manufacture, including the reduction of CO<sub>2</sub> emissions.

The sector has set its own targets to reduce the use of fossil fuels and increase use of waste derived alternatives. This improves emissions and reduces dependency upon imported fuel supplies.

Throughout the development of waste-derived fuels and natural raw material replacement, the industry has applied a strict code of practice so that only wastes that are safe and provide an overall environmental benefit are selected for use.

### Case Study: Greening-the-Box



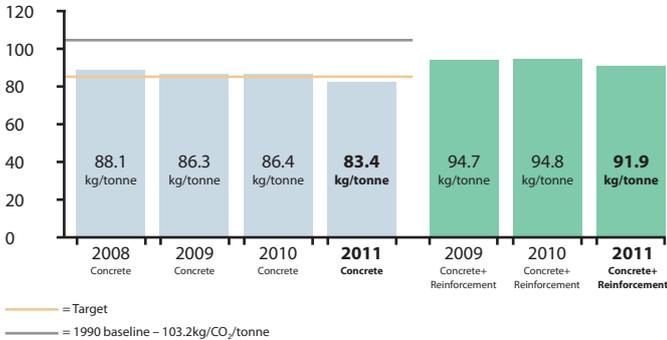
Greening-the-Box is a project that demonstrates how an existing dwelling can be adapted to improve performance standards including energy efficiency.

Modifications made to windows/shading, enveloping the external walls with insulation and increasing the buildings thermal capacity by retrofitting a concrete ground floor all contributed to a reduction in the energy required to run the home.

The measures implemented all work together to enable homeowners to minimise their dependence on fossil fuels, reducing the vulnerability of the householder to the effects of climate change and reducing greenhouse gas emissions.

## CO<sub>2</sub> Emissions - Production

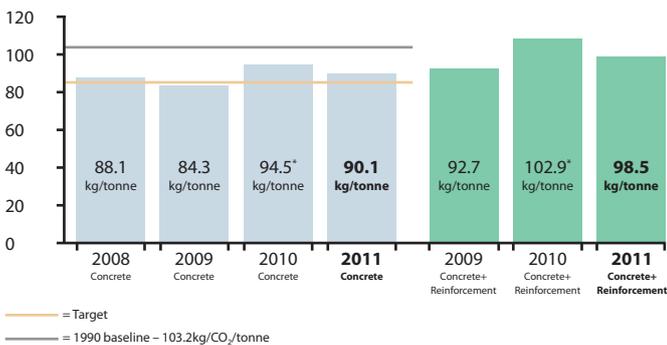
CO<sub>2</sub> emissions – Production (Standardised mix)



Using a standardised concrete mix, the CO<sub>2</sub> emissions have steadily reduced over the four years of data collection and the 2011 value has met the 2012 target showing a 19% reduction compared to the 1990 baseline. The 2011 data shows a 3.5% reduction compared to 2010. This performance indicator uses the 2008 standardised mix which reflects the improvements made in the production of concrete over this period and takes out any changes in the market mix of concrete products.

*Investment in plant, process and people is reducing the CO<sub>2</sub> emissions associated with the production of concrete.*

CO<sub>2</sub> emissions – Production (Rolling mix)



\*Data published in the 4th report has been restated due to further improvements in data validation

Based on the rolling concrete mix, there has been a reduction of 4.6% for 2011, compared to 2010 and a reduction of 12.7% compared to the 1990 baseline. 2010 values for concrete and concrete plus reinforcement have been updated based on improvements in the validation of data.

The rolling concrete mix reflects any changes in the mix of concrete products used by the market during the calendar year. The variations identified using this indicator suggest the market demand for higher strength concrete has resulted in a higher average cement content of the rolling concrete mix.

### Future targets for the reduction of embodied energy

The concrete industry 2020 target of a 30% reduction compared to the 1990 baseline is fully in line with the government's targets established as part of the Climate Change Act.

Approximately half of the carbon emissions in the UK's Carbon Budget are covered by the European Union Emission Trading System (EU ETS). In the case of concrete, the majority of greenhouse gas emissions are from cement, which is covered by the EU ETS and is actively managed in order to meet the EU carbon reduction targets.

The inclusion of the UK average reinforcement content to the concrete has increased the CO<sub>2</sub> emissions indicators by between 9% and 10%. BAR members have committed to the 2020 targets and have established a 1990 baseline to support this indicator.

All of the steel produced by BAR members is produced using Electric Arc Furnace which uses scrap metal as its main raw material. As a consequence steel reinforcement bar has approximately a third of the embodied energy and a fifth of the carbon impact of primary steel production.

The CO<sub>2</sub> emission indicators are intended to reflect the overall performance of the concrete industry. Extensive work has been carried out to update the product embodied CO<sub>2</sub> data, in anticipation of the launch of BS EN 15804 in 2012. To monitor developments on the latest data for carbon calculators, visit [www.sustainableconcrete.org.uk](http://www.sustainableconcrete.org.uk)

*Low carbon concrete can be specified to further reduce the embodied CO<sub>2</sub> of concrete.*



### Specifying Sustainable Concrete

Concrete's flexibility offers many opportunities for designers to influence the environmental, economic and social credentials such as fire, durability, acoustics and adaptability. This publication is intended to assist designers in optimising the sustainable credentials of concrete through specification.

Download free from [www.concretecentre.com/publications](http://www.concretecentre.com/publications)

## CO<sub>2</sub> Transport

### CO<sub>2</sub> emissions of total delivery transport through the industry supply chain

	Kg CO <sub>2</sub> /tonne
2009 Concrete	7.2
2010 Concrete	8.2*
2011 Concrete	7.7

\*Data published in the 4th report has been restated due to further improvements in data validation

The performance for this indicator in 2011 is similar to that for 2010 at around 8 kg CO<sub>2</sub>/tonne, which reflects the local nature of concrete production. The figure for 2010 has been slightly updated based on improved data validation. There has been some rationalisation in the number of production sites within the concrete supply chain and the industry has achieved a small reduction in the average delivery distance for raw materials from 53km in 2010 to 51 km in 2011. This is consistent with the slight reduction in the overall transport performance indicator.

The predominantly local supply network for concrete products means that delivery distances are short and therefore the energy used during haulage is relatively small. The average delivery distance of ready-mixed concrete to the construction site in 2011 is 10 km, and 96 km for precast concrete products. The average delivery distance for all concrete is 35km.

*In 2011, over 15 million tonnes of aggregates and over 2 million tonnes of cement were transported by rail, highlighting the increasing significance of rail freight to the concrete supply chain.*

The average transport load for precast concrete is 21.2 tonnes compared to 14.8 tonnes for ready-mixed concrete. The transport within the concrete supply chain in 2011 has the following modal distribution: 90% road; 9% rail; 1% water. This continues to show the increasing role of rail transport over the last 3 years.

The concrete industry and supply chain have been proactive in looking for ways to improve efficiency and reduce the carbon dioxide emissions associated with delivery transport.

These actions have now been captured within the updated strategy, as a commitment to develop a Low Carbon Freight Initiative, which will include the establishment of challenging targets. The industry is already actively involved with the work of the Strategic Forum for Construction in trying to develop programmes for the construction industry through its members and the Freight Transport Association's Logistic Carbon Reduction Scheme.

### Case Study: Delivering efficiency



*The majority of concrete and constituent materials are transported by road. In addition to increasing rail transport, when it is a viable alternative, the industry continues to invest in improving the efficiency and functionality of road haulage. Truck mixers are becoming increasingly sophisticated in order to deliver the optimum product while minimising transport loads and improving fuel efficiency.*

*Some examples of the investment in innovation and efficiency:*

- *Truck mixers that can accurately measure and control concrete slump to provide a consistent and quality product.*
- *Transport strategies to maximise national coordination and improve efficiency in loaded miles and fuel economy.*
- *Driver training and the use of telematics data ensures fuel efficiency and best practice in efficient driver behaviour.*

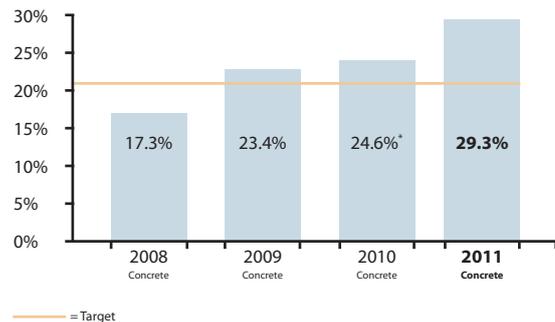
*Transport is an area where the industry is working hard to improve delivery logistics in order to improve environmental performance.*

## Materials Efficiency

The concrete industry, as well as recycling its own process waste, is very active in the use of by-products, secondary materials and material diverted from the waste stream to reduce its demands on primary raw materials.

### Replacement of fossil fuels

**Material diverted from the waste-stream for use as a fuel source, as a percentage of total energy use**



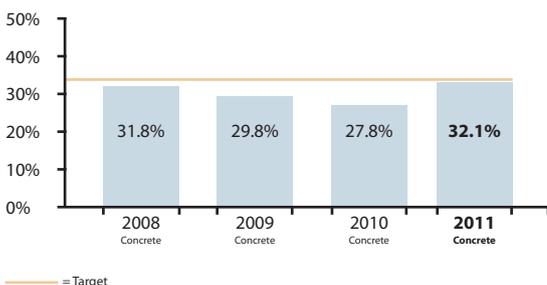
The high temperature achieved in cement kilns enables the safe use of combustible waste materials which can replace non-renewable fossil fuels. The use of biomass materials provides a carbon neutral fuel under the EU ETS, which helps reduce the embodied CO<sub>2</sub> content of concrete.

The continued investment by the cement sector in the replacement of fossil fuels is evident from the steady increase in the use of waste-derived fuels. The 2012 target was achieved in 2010 when a quarter of the energy used in the concrete industry came from material derived from the waste stream. The value for 2010 has also been slightly increased due to the improvements in data validation.

This indicator can now be assessed against the challenging target of 50% set for 2020 which recognises that there is likely to be increasing competition for these alternative fuel sources. In addition, this activity also reduces the potential energy demands associated with the conventional methods of disposal for these wastes.

### Additional cementitious materials

**The amount of additional cementitious materials as a proportion of total cementitious materials**



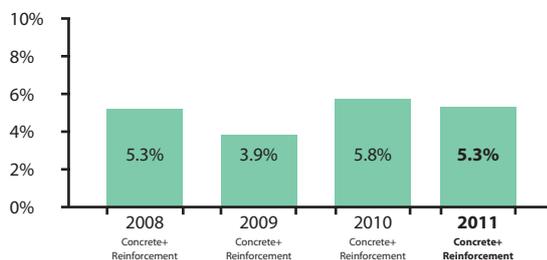
Concrete manufacture uses by-products from other industries, such as fly ash from power stations and ground granulated blast-furnace slag (GGBS) from the steel industry. These materials are

used extensively in concrete as an additional cementitious material to lower the embodied CO<sub>2</sub> and reduce demand for primary materials [4].

In 2011 the use of additional cementitious materials increased compared to 2010. This indicator is on track to meet the target for 2012. Awareness of the benefits associated with additional cementitious materials is increasing amongst specifiers.

### Recycled/secondary aggregates

**The use of recycled/secondary aggregates as a proportion of total aggregates used**



In 2011, the use of recycled and secondary aggregates accounted for 5.3% of the aggregates used in concrete. The trend observed for this indicator is likely to depend on the market demands for a specific product mix rather than any specific programme to increase the recycled content. The manufacture of precast concrete provides greater opportunities for the use of recycled aggregates and in this sector the figure is over 20%.

The sustainable outcome of including larger volumes of recycled and secondary materials into concrete manufacture is unclear. Account needs to be taken of both transport and production impacts compared to using locally available virgin material. In simple terms it depends upon the circumstances of individual projects and the potential supply. An excellent example of what can be achieved in aggregate recycling was demonstrated on the Olympic Park [5]. In general, when transported by road, the use of recycled aggregates is only a lower carbon option than virgin aggregates when used within 10 miles (or 15km) of their source.

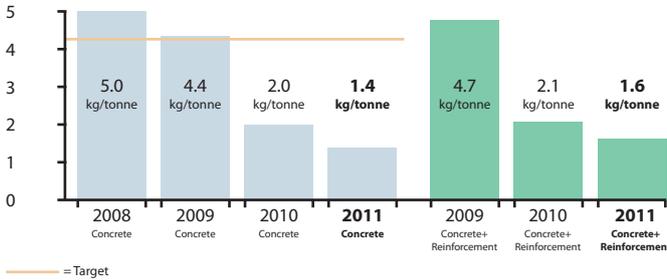
In total, recycled and secondary materials accounts for 28% of the GB aggregates market. This is the highest market share in Europe and is over three times the European average [6]. Most 'hard' construction and demolition waste currently generated is reprocessed for use in the aggregates markets and the future supply of these materials will be dependant on the availability of suitable demolition material. Guidance for the use of these recycled and secondary materials is provided for in material codes and is influenced by performance, quality and consistency [7].

### Recycled steel reinforcement

Reinforcing steel from BAR members contains a recycled content of 94% as a proportion of the total constituent raw material used.

## Waste Minimisation

Waste to landfill as a proportion of production output



The target for 2012 of a 15% reduction, compared to the 2008 baseline, was exceeded in 2010 with a 60% reduction. This improvement has continued into 2011 with a 72% reduction now achieved.

All of the different sectors in the concrete industry have shown excellent progress in improving performance since the baseline was set in 2008. This level of reduction is well on the way to the new target of a 90% reduction by 2020.

In 2011, the inclusion of the waste data from the reinforcement sector resulted in a 14% increase in the total amount of waste. In 2011, over 94% of the waste generated at the mills and fabricators was re-used as a raw material.

*Since 2008 the concrete industry has reduced the total tonnage of waste it sends to landfill by 76%.*

Net waste consumption ratio

Year	Waste and by-products used divided by waste generated during production
2008	19
2009	18
2010	44
2011	63

Again the concrete industry has increased the net waste ratio. For a number of years the concrete industry has demonstrated that it is a net user of waste and continues to improve this ratio by reducing the waste it produces and increasing the waste from other industries that it uses. The concrete industry now uses 63 times the amount of waste it produces.

*The concrete industry is a net user of waste, using 63 times more waste than it sends to landfill.*

To put it into context, the amount of waste used by the concrete industry is equivalent to over 40% of the construction, demolition and excavation (CD&E) waste sent to landfill in England based on 2008 data [8].

Waste comparison	Tonnes
2008 concrete industry waste to landfill	275,085
2008 material used in the concrete industry diverted from external waste streams	5,089,426
2010 data for CD&E waste to landfill in England <sup>7</sup>	12,270,000

### Improving material and resource efficiency

The flagship EU initiative for a resource-efficient Europe (under the Europe 2020 strategy) identifies a greater focus on a resource-efficient, low-carbon economy that supports sustainable growth. The UK WRAP programme provides a model for the practical implementation of this initiative. These initiatives have a wider scope than the individual performance indicators in the Concrete Industry Sustainable Construction Strategy but overall the objectives and targets are inclusive. The current documented performance indicates industry leadership in achieving government targets for resource efficiency. The updated strategy recognises the need to ensure the communication is consistent and this is addressed under the commitment to develop a Material and Resource Efficiency Programme.

### Case Study: Specifying responsibly sourced materials



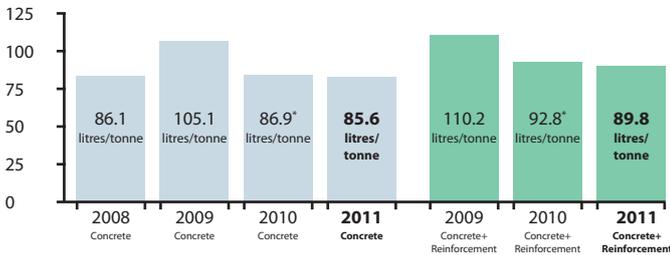
The concrete industry has worked hard to make it easy to specify products certified to BES 6001 "Framework standard for the responsible sourcing of construction products". As well as gaining credits in environmental assessments certification, BES 6001 provides:

- confidence that an holistic sustainable assessment has been taken to reduce risks in the supply chain.
- a comprehensive scope covering all elements of materials sourcing, transportation, product manufacture and delivery.
- rewards for the implementation of certified management systems such as ISO 9001, ISO 14001 and OHSAS 18001.
- risk assessments that cover any ethical trading issues or employment rights.

By increasing the coverage of products certified to BES 6001, the industry has committed to a transparent, responsible and ethical supply chain.

## Water

### Mains water consumption as a proportion of production output



\*Data published in the 4th report has been restated due to further improvements in data validation

A slight reduction in the use of mains water for 2011 has been observed compared to 2010. The value for 2010 has been updated to reflect improvements in data validation. Overall the mains water use has remained similar to the baseline figure for 2008.

The importance of water as a resource is climbing the agenda of governments and standards bodies. The concrete industry already employs extensive rainwater harvesting and water recycling schemes. Water is an ingredient of concrete and a tonne of concrete contains 60 to 80 litres of water. Around 90% of ready-mixed concrete contains water reducing admixtures which can result in the saving of up to 13 litres per tonne.

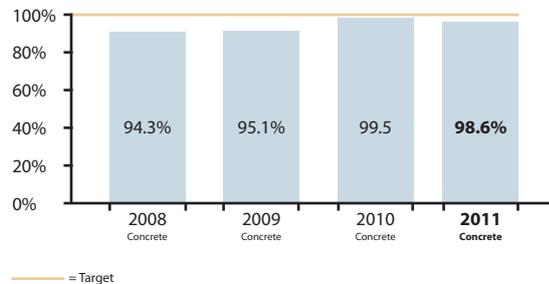
Progress continues to be made in improving the measurement of water use by the concrete industry to provide sustainable development targets. The investment in improved metering is part of an overall water strategy that is currently being developed. The completion of this work will allow the establishment of meaningful targets by 2015.



The Rugely quarry, Staffordshire. 2011 winner of the Natural England Biodiversity Award for creating and restoring 80 hectares of wildlife to lowland dry heathland. Photo: Neil Lambert RSBP

## Site Stewardship and Biodiversity

### Percentage of relevant production sites that have site specific action plans



The data for 2011 indicates that the progress has slowed compared to the trend seen over the previous 3 years. The industry has invested a lot of resources in establishing these plans and this figure is likely to be the result of the change in the number of operational sites.

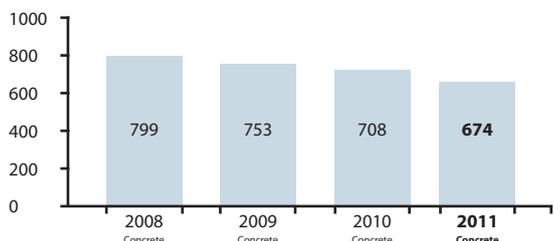
MPA launched its Biodiversity Strategy in 2011 at a Parliamentary Reception addressed by Defra Minister Richard Benyon MP. As part of this strategy two Biodiversity Exchanges have already been held, bringing together industry representatives, conservation groups, NGOs, public agencies and academics to identify lessons from past restoration and consider future opportunities. MPA has also introduced a Biodiversity Award scheme in partnership with Natural England and continues to support the Nature after Minerals initiative.

This renewed focus on biodiversity comes at a time when the government's Natural Environment White Paper and Biodiversity 2020 Strategy have emphasised its importance. Keeping track of performance and the contribution mineral products industries are making to biodiversity is crucial. Using biodiversity indicators we will measure the industry's contribution to UK Biodiversity Action Plan (BAP) targets for priority species and habitats. The industry is now assessing a new set of indicators to provide improved information on biodiversity. In addition, the industry is also assessing the relationship between mineral extraction and restoration, and the evolving issue of understanding and valuing ecosystem's services.

[www.mineralproducts.org/sustainability/pdfs/MPA\\_Biodiversity\\_Strategy.pdf](http://www.mineralproducts.org/sustainability/pdfs/MPA_Biodiversity_Strategy.pdf)

## Health and Safety

Reportable injuries per 100,000 direct employees per annum



Health and Safety is our industry’s top priority. In 2008 the industry strategy committed to a reportable injuries indicator. This indicator, which does not include BAR data, shows a continued improvement with a total reduction of 15% compared to the 2008 baseline.

In 2009 the industry committed to also reporting a more sensitive measure, Lost Time Injuries (LTI). This is in line with the Mineral Products Association (MPA) health and safety programme and is part of the concrete industry journey to the ultimate objective of ‘Zero Harm’. It should be noted that the move to reporting LTI’s precedes the changes in the Health and Safety Executive (HSE) criteria for reportable injuries which will impact the 2012 data.

Lost Time Injuries (LTI) for direct employee per 1,000,000 hours worked

	2009	2010	2011
Concrete	3.2	6.5*	6.3
Concrete plus reinforcement	3.8	6.5*	7.0
Concrete as 2009 baseline	3.2	2.4	1.6

\*Data published in the 4th report has been restated due to further improvements in data validation

Since 2009 the number of companies collecting data for the LTI indicator has increased and this reflects the strong commitment at sector level to health and safety. For example the precast sector, through its “Raising the Bar” and “Concrete Targets 2015” programmes has continued to widen the scope of its data collection with the increasing participation of smaller manufacturers. To aid comparison, concrete data based on a like for like basis is shown in the table above.

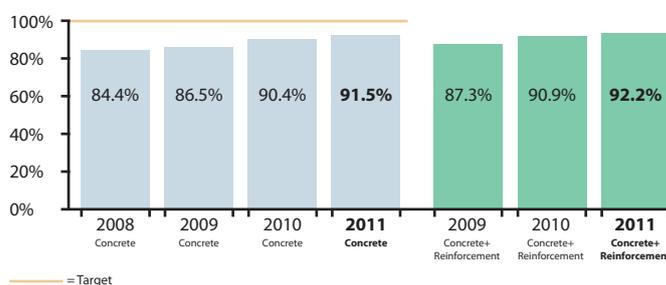
Through increased inclusion and the sharing of best practice, the concrete industry aims to halve the Lost Time Injury (LTI) frequency rate over the period from 2009 to 2014.

*Sector schemes have increased the scope of data collection, increasing the opportunity to share best practice throughout the industry.*

The MPA “Safer by ...” family of initiatives are central to delivering this commitment. The most recent addition to the family is ‘Safer by Partnership’. This is an initiative to encourage members and their contractors to work more closely together to reduce contractor injuries and the incidence of ill health; and ultimately achieve the target of Zero Harm.

## Employment Skills

Percentage of employees covered by UKAS certified training and evaluation processes



Steady improvement continues to be made, although it seems unlikely that the target of 100% will be achieved by 2012. This target is maintained for 2020, however it is recognised that current market conditions and the rationalization within the industry will have an impact on performance.

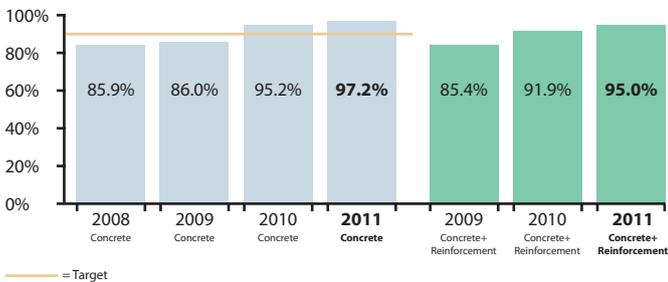
Employment in the mineral products industry is geographically spread through every part of the UK, and is particularly important to rural communities. The geographical spread is a key factor in the concrete industry’s contribution to the UK and local economies. In spite of difficult market conditions, the industry continues to promote the range of career opportunities available to young people through local and national programmes such as [www.careersinquarrying.co.uk](http://www.careersinquarrying.co.uk).

The concrete industry is committed to the development of a fully competent workforce, although it still remains a challenge to quantify competence. Through MPA a reporting procedure has been developed which helps identify skills development in terms of safety, health and environment at NVQ level qualifications. Skills’ training throughout the sector is delivered by the Mineral Products Qualifications Council which has been awarding qualifications since 2009 to new employees and those wishing to demonstrate continuing professional development. It also provides verification services and awards certificate to demonstrate occupational competence.

There are also schemes such as the Driver Skills programme awards cards for completing courses on safe driving behaviour. These cards are now a requirement for all hauliers carrying aggregates, asphalt, ready-mixed concrete and mortar. An additional benefit is that, by driving more smoothly, the drivers also reduce their fuel consumption.

## Local Community

### Percentage of relevant sites that have community liaison activities



There has been a gradual increase in the percentage of relevant sites within the mineral extraction sectors which are active in local communities. The current target was exceeded in 2010 and the performance continues to increase in 2011. The updated strategy has set an increased target of 100% for this indicator in 2020.

As part of continuing programmes, the cement and aggregates sectors welcomed over 38,000 visitors to its sites in 2011. The industry will continue to promote best practice and explore additional indicators to reflect the level of local community engagement.

These activities maintain positive relations, through formal liaison groups and community initiatives. Of the total number of sites within the concrete industry the majority are situated on industrial parks or are physically separate from local communities. Even where this is the case; the industry still recognises the importance of mitigating any potentially adverse effects from, for example, transport movements and noise. The industry sectors regularly engage with local schools in order to encourage engagement with nature conservation, safety and the interaction local industries and their products can play.

*414 relevant sites are active in community liaison, exceeding the performance target set for 2012.*



School Biodiversity Challenge is just one of the many local community activities run by concrete manufacturers. The year 7 children were tasked with producing Biodiversity Action Plans for their school grounds. The winning school was presented their award by Dr David Bellamy at Alnwick Castle.

## References

- 1) **Strategy for Sustainable Construction, BIS, 2008.**  
Download from [www.bis.gov.uk/files/file46535.pdf](http://www.bis.gov.uk/files/file46535.pdf)
- 2) **BREEAM New Construction - non-domestic buildings, Building Research Establishment, July 2011.**  
Download from [www.breeam.org](http://www.breeam.org)
- 3) **BREEAM Domestic Refurbishment, Building Research Establishment, June 2012.**  
Download from [www.breeam.org](http://www.breeam.org)
- 4) **Specifying Sustainable Concrete, MPA The Concrete Centre, 2011.**  
Download from [www.concretecentre.com/publications](http://www.concretecentre.com/publications)
- 5) **Demolition Waste Management on the Olympic Park, Jo Carris.**  
Download from [www.learninglegacy.london2012.com](http://www.learninglegacy.london2012.com)
- 6) **Recycling Concrete, The Cement Sustainability Initiative (WBCSD).**  
Download from [www.wbcds.org](http://www.wbcds.org)
- 7) **Mineral Products Association.**  
Download from [www.mineralproducts.org](http://www.mineralproducts.org)
- 8) **CD&E waste: Halving Construction, Demolition and Excavation Waste to Landfill by 2012 compared to 2008, July 2012.**  
Download from [www.strategicforum.org.uk](http://www.strategicforum.org.uk)

## Sector reports

- **Aggregate** [www.mineralproducts.org/sustainability/](http://www.mineralproducts.org/sustainability/)
- **Cement** <http://cement.mineralproducts.org/>
- **GGBS** [www.ukcsma.co.uk/sustainability.html](http://www.ukcsma.co.uk/sustainability.html)
- **Fly Ash** [www.ukqaa.org.uk](http://www.ukqaa.org.uk)
- **Admixtures** [www.admixtures.org.uk](http://www.admixtures.org.uk)
- **Ready-mixed concrete** [www.brmca.org.uk](http://www.brmca.org.uk)
- **Precast concrete** [www.britishprecast.org/](http://www.britishprecast.org/)
- **Steel reinforcement** [www.uk-bar.org/](http://www.uk-bar.org/)

## Concrete Industry Sustainable Construction Targets

### Sustainable Consumption and Production

Sustainability Principle	Performance Indicator	Baseline	Performance							Targets	
		1990	Concrete				Concrete plus reinforcement			2012	2020
			2008	2009	2010	2011	2009	2010	2011		
Environmental Management	% of production sites covered by a 'UKAS' Environmental Management System (EMS)		72.3%	80.4%	84.8%	86.4% <b>TARGET MET</b>	80.1%	84.0%	85.60%	85%	95%
Quality and Performance	% of production sites covered by a 'UKAS' certified ISO 9001 quality management system		84.2%	87.5%	89.0%	91.0% <b>TARGET MET</b>	87.7%	89.3%	91.3%	90%	95%
Responsible Sourcing	% of production certified to BES 6001		N/A	81.0%	88.0%	92.0%	N/A	N/A	N/A		95%
Emissions (excluding CO <sub>2</sub> )	Number of convictions per annum for air and water emissions		6	1	3	0 <b>TARGET MET</b>	1	3	0	Zero per annum	Zero per annum
Stakeholder Engagement	The industry sectors have successful and wide ranging schemes in place. The justification for an industry wide measure continues to be evaluated for future reporting.										

### Climate Change and Energy

Energy Efficiency	Kilowatt hours of energy used in production as a proportion of production output		132.6 kWh/tonne	125.3 kWh/tonne	142.9* kWh/tonne	137.8 kWh/tonne	147.9 kWh/tonne	165.5* kWh/tonne	162.1 kWh/tonne	Deliver the industry CO <sub>2</sub> target and achieve sector climate change agreement targets	
CO <sub>2</sub> Emissions – Production	CO <sub>2</sub> emissions as a proportion of production output. Standardised Mix	103.2	88.1 kgCO <sub>2</sub> /tonne	86.3 kgCO <sub>2</sub> /tonne	86.4 kgCO <sub>2</sub> /tonne	83.4 kgCO <sub>2</sub> /tonne <b>TARGET MET</b>	94.7 kgCO <sub>2</sub> /tonne	94.8 kgCO <sub>2</sub> /tonne	91.9 kgCO <sub>2</sub> /tonne	Reduce by 17% from 1990 baseline (85.4)	Reduce by 30% from 1990 baseline (69.6)
	CO <sub>2</sub> emissions as a proportion of production output. Rolling Mix	103.2	88.1 kgCO <sub>2</sub> /tonne	84.3 kgCO <sub>2</sub> /tonne	94.5* kgCO <sub>2</sub> /tonne	90.1 kgCO <sub>2</sub> /tonne	92.7 kgCO <sub>2</sub> /tonne	102.9 kgCO <sub>2</sub> /tonne	98.5 kgCO <sub>2</sub> /tonne		
CO <sub>2</sub> Emissions – Transport	CO <sub>2</sub> emissions from delivery transport through the industry supply chain as a proportion of production output			7.2 kgCO <sub>2</sub> /tonne	8.2* kgCO <sub>2</sub> /tonne	7.7 kgCO <sub>2</sub> /tonne				Additional indicators and targets to be developed by 2015	

## Natural Resource Protection and Enhancing the Environment

Sustainability Principle	Performance Indicator	Baseline	Performance							Targets	
		1990	Concrete				Concrete plus reinforcement			2012	2020
			2008	2009	2010	2011	2009	2010	2011		
Materials Efficiency	Materials diverted from the waste stream for use as a fuel source, as a % of total energy use		17.3%	23.4% <b>TARGET MET</b>	24.6%* <b>TARGET MET</b>	29.3% <b>TARGET MET</b>	N/A	N/A	N/A	21%	50%
	% of additional cementitious materials (GGBS, fly ash, etc) as a proportion of total cementitious materials used		31.8%	29.8%	27.8%	32.1%	N/A	N/A	N/A	33%	35%
	Recycled/secondary aggregates as a proportion of total concrete aggregates		5.3%	3.9%	5.8%	5.3%	N/A	N/A	N/A	No targets have been set as increasing recycled content is not always indicative of sustainable performance	
	% of recycled scrap as a proportion of total constituent raw materials used		N/A	N/A	N/A	N/A	97.0%	97.2%	94.0%		
Waste Minimisation	Waste to landfill as a proportion of production output		5 kg/tonne	4.4 kg/tonne	2 kg/tonne <b>TARGET MET</b>	1.4 kg/tonne <b>TARGET MET</b>	4.7 kg/tonne	2.1 kg/tonne	1.6 kg/tonne	4.3 (15% reduction)	0.5 (90% reduction)
Water	Mains water consumption as a proportion of production output		86.1 litres/tonnes	105.1 litres/tonnes	86.9* litres/tonnes	85.6 litres/tonnes	110.2 litres/tonnes	92.8* litres/tonnes	89.8 litres/tonnes	The current Water strategy programme will result in targets being in place by 2015	
Site Stewardship & Biodiversity	% of relevant production sites that have specific action plans		94.3%	95.1%	99.5%	98.6%				100%	100%

## Creating Sustainable Communities

Health & Safety	Reportable injuries per 100,000 direct employees per annum		799	753	708	674					
	Lost Time Injuries (LTI) for direct employee per 1,000,000 hours worked			3.2	6.5*	6.3	3.8	6.5*	7	From 2009-2014, reduce lost time incidents by 50% with an aim of zero harm	
Employment & Skills	% of employees covered by 'UKAS' certified training and evaluation process		84.4%	86.5%	90.4%	91.5%	87.3%	90.9%	92.2%	100%	100%
Local Community	% of relevant sites that have community liaison activities		85.9%	86.0%	95.2% <b>TARGET MET</b>	97.2% <b>TARGET MET</b>	85.4%	91.9%	95.0%	90%	100%

\*Data published in the 4th report has been restated due to further improvements in data validation

*To ensure the successful implementation of the Concrete Industry Sustainable Construction Strategy the industry established the Sustainable Concrete Forum and associated Task Groups*

The Sustainable Concrete Forum and its member Associations maintain records of which member companies have supplied data. In order that the process is transparent, records are kept of which members companies have supplied data for each performance indicator.

**[www.sustainableconcrete.org.uk](http://www.sustainableconcrete.org.uk)**

**Founder members of the Forum:**

- Aggregate Industries [www.aggregate.com](http://www.aggregate.com)
- Brett Group [www.brett.co.uk](http://www.brett.co.uk)
- British Precast [www.britishprecast.org](http://www.britishprecast.org)
- British Ready-Mixed Concrete Association [www.brmca.org.uk](http://www.brmca.org.uk)
- Cement Admixtures Association [www.admixtures.org.uk](http://www.admixtures.org.uk)
- Cementitious Slag Makers Association [www.ukcsma.co.uk](http://www.ukcsma.co.uk)
- CEMEX [www.cemex.co.uk](http://www.cemex.co.uk)
- Hanson UK [www.heidelbergcement.com](http://www.heidelbergcement.com)
- Lafarge Aggregates [www.lafarge.co.uk](http://www.lafarge.co.uk)
- Lafarge Cement [www.lafarge.co.uk](http://www.lafarge.co.uk)
- Marshalls plc [www.marshalls.co.uk](http://www.marshalls.co.uk)
- Mineral Products Association [www.mineralproducts.org](http://www.mineralproducts.org)
- MPA - Cement [http://cement.mineralproducts.org](http://http://cement.mineralproducts.org)
- Tarmac [www.tarmac.co.uk](http://www.tarmac.co.uk)
- UK Quality Ash Association [www.ukqaa.org.uk](http://www.ukqaa.org.uk)

**Associations that have joined the Forum:**

- British Association of Reinforcement (BAR) [www.uk-bar.org](http://www.uk-bar.org)

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