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Performance

a corporate responsibility report from the UK cement industry

BCA
British Cement Association

Contents

This review

Welcome to the first issue of this new look UK Cement Industry 'Performance review'. It has been produced in response to an extensive stakeholder survey carried out last year, which made clear the need for the industry as a whole to report its progress.

An increasing number of companies are now following the government-led trend towards reporting on corporate responsibility. The four UK cement makers: Lafarge Cement UK, Castle Cement (a subsidiary of Heidelberg-Cement); Rugby Cement (a subsidiary of RMC Group) and Buxton Lime Industries (a subsidiary of Tarmac) all produce, or are part of group reports, along these lines.

Few complete industry sectors report like this, however, the four companies agreed to show how they are addressing corporate responsibilty criteria as a sector and publish this review through the BCA.

Global initiative
Through the World Business Council for Sustainable Development, ten industry leaders have developed the Cement Sustainability Initiative. With Lafarge, HeidelbergCement and RMC all involved and with Buxton Lime Industries agreeing to implement the action programme, the UK industry is fully committed to delivering its aims and objectives, and its work is reflected in this report.

National sector plan
We are also using this review as a preliminary baseline in satisfying the longer term need to measure and report performance against the indicators set out in the Environment Agency's sector plan for the industry which is due to be published in the coming months.

The draft sector plan sets eight key objectives that are detailed on page 10. Each objective will ultimately have measurable targets attached to it so that our stakeholders can judge how successful we have been. It will represent an important step in communicating industry performance and we welcome it.

Local company initiatives
Each company continues to work with the local communities and authorities to satisfy local issues. There is still more work to be done in order to achieve consistency in monitoring and reporting. This document is therefore only a first step towards more comprehensive reviews in the years ahead.

We hope you find our first steps interesting and we will welcome your comments and suggestions.

Mike Gilbert
BCA CHIEF EXECUTIVE

July 2004

Committed to performance

The new BCA offices at Camberley

Switching to alternative fuels is a key element of the sustainability strategy

Who we are

The UK cement manufacturing industry has four members – Buxton Lime Industries, Castle Cement, Lafarge Cement UK and Rugby Cement – who between them operate 15 manufacturing plants and produce over 90 per cent of the cement sold in the UK. They employ around 3,500 people directly and support a further 15,000 jobs indirectly, many of them in rural areas where employment is scarce.

The British Cement Association (BCA) is the trade and research organisation that represents the interests of the UK's cement industry at national and European levels.

In pursuit of its goal of encouraging the greater and better use of cement and concrete, the BCA has a team of technical and support staff, including specialists on materials, standards and engineering.

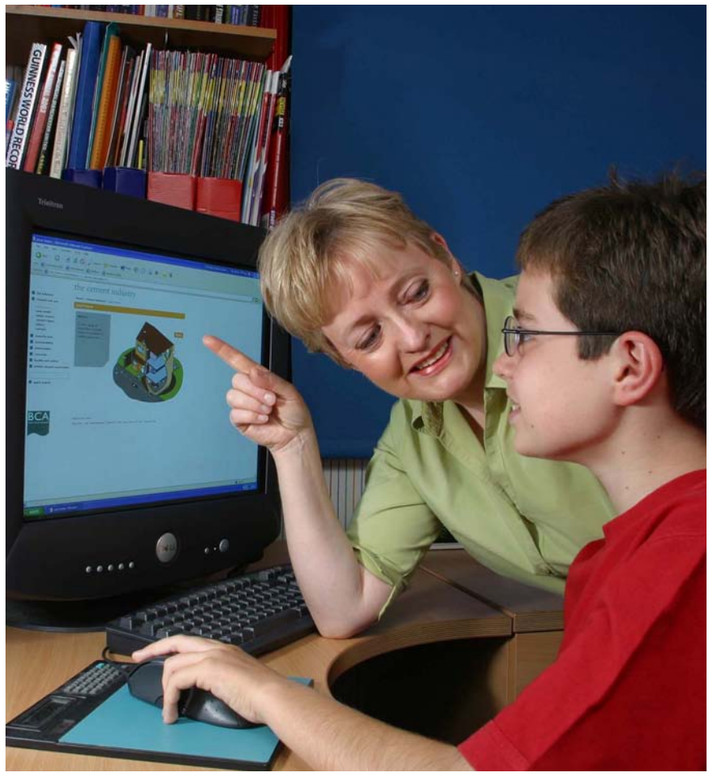
Our commitments

The key five commitments of the members of the BCA are:

1 *Health and safety*
The health and safety of its employees, customers and neighbours – as well as the public at large – is the industry's first priority. It works with the Health and Safety Commission to ensure that the highest possible standards are attained.

2 *Sustainability*
The cement industry understands the importance of ensuring a sustainable future for all and is therefore committed to its economic, environmental and social responsibilities. It means the industry is:

- fully engaged in the worldwide Cement Sustainability Initiative, run under the auspices of the World Business Council for Sustainable Development
- running at all UK cement works environmental management systems certified to ISO 14001, with a further eleven EMAS-registered
- switching from fossil fuels to alternative fuels that reduce carbon emissions and move materials up the waste hierarchy
- committed to an industry target of a 25.6 per cent reduction in specific energy consumption by 2010.



You can see an animated guide to where cement is used in your home at www.cementindustry.co.uk

www.cementindustry.co.uk

The industry invests heavily in its employees

3 *Performance*
Delivering ever-improving production, product and environmental performance by:

- increasing use of alternatives to fossil fuels
- running existing facilities more efficiently
- investing in new and upgraded plant

4 *Communication*
Open communication with stakeholders is central to the industry's operations and BCA provides the industry voice with:

- UK and EU policy makers; the government, civil service, and parliamentarians in both the UK and EU parliaments
- the industry's regulators, the Environment Agency, and the Health and Safety Executive (HSE)

Individual companies communicate with local stakeholders, Environment Agency and HSE staff

5 *Products*
BCA's team of technical experts supports the industry's work to develop standards relating to cement, concrete and engineering construction. It also collaborates on research on cement and concrete performance and durability, addressing specific issues relating to cement use. Results are fed into authoritative guidance both for BCA members and the construction industry as a whole.

What we do

BCA members manufacture around 12 million tonnes of cement each year and a further one million tonnes is imported to satisfy the nation's needs for a vital construction material.

Availability of suitable raw materials has usually been the determining factor in the location of cement works. Modern cement operations are large-scale and long-lived. The economies of scale needed to make them viable demand long reserves of raw materials and mean that a typical plant has a production capacity of one million tonnes per year.

In very simple terms, making cement involves taking a mixture of finely ground limestone or chalk, clay and sand and heating it almost to melting point in a large rotating kiln (the calcination process).

The cement clinker that emerges is then ground to a powder with about five per cent gypsum added to control the setting time of the end product.

The energy efficiency of the manufacturing process depends on the moisture content of the raw materials. Hard limestone processes are more energy efficient than those based on chalk, which has a higher moisture content.

Economic

As the supplier of a vital material, the cement industry, through its concrete industry partners, underpins the UK building and construction industries. In the often-rural communities in which cement works are based, the industry also has an important influence on the local economy.

National economy
The cement industry has an annual turnover of £750 million and is a major supplier to the construction industry. This in turn generates over £83 billion a year, delivers some ten per cent of the nation's gross domestic product and employs over 650,000 people.

Cement plays a fundamental role in daily life. As a key constituent of concrete, it puts the sustainable quality and strength into our homes, schools, hospitals and general infrastructure. In the UK, we consume around 13 million tonnes of cement a year – the equivalent of nearly a tonne per year for a family of four. In other parts of Europe, the same sized family on average calls for over twice as much.

To meet this need, the UK industry produces 12 million tonnes of cement annually – about seven per cent of the European total. The remaining shortfall against overall market demand is made up through imports.

Recent economic contributions: the Channel Tunnel Rail Link and Cribbs Causeway shopping centre, Bristol

Local economies
Most cement works are situated within rural areas. They are often the major employer locally, contributing significant sums into the community through sub-contracting or purchase of local services.

A typical cement works costs some £40 million a year to run, of which around £15 million reaches the local economy through salaries, business rates and local spending.

Manufacturers also contribute to the community through direct charitable donations or by providing staff help or materials for local fundraising projects.

Case study: investing in Derbyshire
Buxton Lime Industries (BLI), has invested £110 million in a pre-calciner dry-process cement plant with an annual capacity of 800,000 tonnes at Tunstead, near Buxton. The new cement plant is part of a highly integrated quarrying, lime and cement production unit.

The investment delivers a range of environmental benefits. Energy consumption per tonne of product has reduced by 30 per cent, while total emissions of particulates have been reduced by 70 per cent. Rail-linked cement distribution depots at Leeds, Birmingham and London will minimise the impact of traffic movements on local roads.

Investment
current programmes total £400 million

A typical cement works spends around £15 million annually in the local economy

Installation of a new kiln at Padeswood, Flintshire

Investment
International companies now own all four of the UK-based cement manufacturers, providing significant financial backing for UK operations.

Over the next few years a total of some £400 million will have been spent on major projects designed to improve operational efficiency, higher standards of environmental performance and stringent safety standards.

Construction of a £56 million dry-process kiln, operating to the highest levels of environmental control, is well underway at Castle Cement's Padeswood works in north Wales. Alternative fuels will be used extensively at the new works and the manufacturing process itself will be more energy-efficient.

Lafarge Cement UK has permission for a new, state-of-the-art cement works in the Medway Valley, Kent. Enabling works for the project are being completed so that it can be constructed and commissioned swiftly. This project is supported by further investment at its other UK works and in its distribution network.

Already on line is Rugby Cement's new works in its namesake town in Warwickshire. Approximately £200 million has been spent on the kiln, which produces over 4,000 tonnes of cement a day. An underground pipeline has been renewed that brings 80 per cent of the raw materials needed for cement manufacturing from a chalk quarry 56 miles away.

In the spring of 2004, Buxton Lime Industries commissioned its new Tunstead cement works in Derbyshire, at a cost of £110 million. It replaces an old plant on the site and is described more fully in the accompanying case study.

Key facts

- the industry has sales of £750 million
- it is a vital supplier to the wider construction sector – sales £83 billion
- it operates 15 manufacturing plants
- a typical cement works contributes £15 million annually to its local economy
- the industry is currently investing £400 million in major plant improvements

Social

The UK cement industry takes its social responsibilities seriously. By producing an essential material and contributing to the economy it benefits the UK's wider society. It also strives to have a positive impact on local communities and consults with them on its activities. For individuals in the industry great emphasis is placed on developing career potential and, beyond all else, ensuring safety at work.

Safety is top priority

The industry welcomes school visits

Health and safety

For the UK cement industry, health and safety is the number one priority. Its vision is to create an environment where accidents do not occur.

In order to achieve this, a steering group of representatives from the industry, trade unions and the Health and Safety Commision meet regularly to discuss matters of health and safety in the industry.

The industry has achieved a reduction in accident rates of two-thirds over the past ten years. Despite this, it has committed itself to further hard targets for the future. All four British cement manufacturers have signed up to the initiative, *Cementing good practice*. They aim to achieve a 30 per cent reduction in injury rates every year until 2010 compared to a baseline of 2003. This will add up to an overall reduction of 92 per cent.

Areas identified for immediate action include:

- accidents caused by falls from heights, transport, slips and trips
- management of the industry's process operations, general maintenance and contractors working on-site
- occupational health, including product safety

Lost time accidents

	actual		*target*	
	2002	2003	2005	2010
employees	60	47	23	4
contractors	–	54	22	4

Communication

Development of good relationships between a cement works and its neighbours is of great importance. Understanding and mutual respect between the industry, the Environment Agency and the general public can lead to the faster achievement of environmental benefits, especially in terms of the introduction of the use of waste resources as fuels and raw materials.

Member companies generally coordinate community relations through:

- open days
- schools programmes
- charity work
- literature – eg newsletters
- local liaison groups
- provision of recreational facilities
- media relations

The overall aim is to build better public understanding of the industry's activities and maintain channels to ensure community views on the industry's activities can be effectively taken into account.

Target

reduce accident rates by 30% every year until 2010

Everyone is encouraged to develop their potential

Recruitment

The commitment and skills of its employees are fundamental to the industry's success. It therefore places great emphasis on recruitment and employee retention.

In the UK, the cement industry employs around 3,500 people. A section of its recently launched website is dedicated to explaining the range of career paths available and outlines the schemes run by BCA member companies.

The industry offers apprenticeships for school-leavers, placement schemes for undergraduates and permanent positions for graduate trainees. As each company is part of an international group, it can offer employees the scope and resources of major companies, while retaining the benefits and atmosphere of local operations.

Training and development

The industry strives to support its employees and help them reach their full potential.

Employees are encouraged to achieve National Vocational Qualifications (NVQs) and Scottish National Vocational Qualifications (SNVQs), in such disciplines as engineering maintenance, combined working practices, mobile plant and quarry management.

In terms of health and safety, managers and supervisors pursue NEBOSH (the National Examination Board in Occupational Safety and Health) qualifications, which are recognised by employers in all sectors of the economy. The industry also sponsors employees to take accredited health and safety courses run by IOSH (Institution of Occupational Safety and Health), the leading body for individuals with a professional involvement in occupational safety and health.

Team leaders have received training in management skills through the Institute of Leadership and Management. Courses on supervisory management and coaching – to teach sharing skills and knowledge amongst colleagues – have provided industry employees with further qualifications.

Key facts

- cement is a key building ingredient in schools, hospitals, roads and every construction activity
- the industry employs 3,500 people
- creates employment for 15,000 indirectly
- over the six years to 2003, it recruited 137 apprentices and 65 graduates

Case study: on the job training

Leanne Donaldson joined the cement industry straight from leaving school. Six years on, she is already a mechanical engineer, with an impressive list of qualifications to her name. Having achieved an HNC, a BTec National Certificate and a Scottish Vocational Qualification, Leanne's latest project is an Open University degree in engineering.

But first step was a craft apprenticeship at Lafarge Cement's Dunbar works in Scotland: 'I didn't feel that I had missed out on taking A Levels,' Leanne explains. 'I could start my career, while learning about the subjects that interested me.

'The industry might seem like an odd choice for a woman, but I love working in an industrial environment and being responsible for hugely complex plant and machinery.'

Environment

The main environmental impacts of making cement are the use of natural resources, releases to air of exhaust gases from the manufacturing process and process waste. The cement industry has a major role to play in contributing to the Best Practicable Environmental Option for selected waste materials from other industries, through its use of both alternative raw materials and fuels.

Producing a tonne of cement needs 1.6 tonnes of raw material

The heart of the process – a cement Kiln

The UK industry is working with the Environment Agency in the development of a sector plan that, in its draft form, sets out eight initial principal objectives to improve overall environmental performance. The objectives shown in the draft are summarised in the next column.

Natural resources

The industry has made great strides forward in reducing the amounts of virgin raw materials and fossil fuels used in cement manufacture.

About 1.6 tonnes of raw material is needed to produce one tonne of cement but the industry has been successful in replacing freshly extracted material with waste products such as pulverised fuel ash from power stations and ground granulated blast furnace slag from the steel industry. Other examples of alternatives include cement kiln dust that previously may have been sent to landfill for disposal, bricks from kiln linings, selected construction waste, broken moulds from the ceramics industry, waste foundry sand and gypsum and mill scale.

Use of fossil fuels such as coal or petcoke has reduced as the industry has developed its use of alternative fuels derived from waste products. The most widely used alternatives are substitute liquid fuels from the residues of solvent recycling and waste tyres. Other fuels include paper and plastic packaging waste, waste oils, waste wood and sewage sludge. In 1994, there was only a 1.4 per cent replacement of fossil fuel in cement manufacture; by 2002, that percentage had risen to 9.35, amounting to the productive use of about 144,000 tonnes of waste material.

Cement industry sector plan

The Environment Agency's Cement Industry Sector Plan will provide the basis against which further environmental improvement can be measured. Still in its draft form, it sets eight key objectives:

1 reduce consumption of natural resources per tonne of cement manufactured
2 reduce cement process waste residues disposed of per tonne of cement manufactured
3 reduce pollution from cement manufacturing
4 reduce emissions of greenhouse gases per tonne of cement manufactured
5 optimise the appropriate use of wastes from other industries or sources
6 develop site restoration plans and biodiversity action plans
7 improve transparency, understanding and engagement between the Environment Agency, industry and other stakeholders
8 work to risk-based regulatory and environmental management systems

Achievement

cement kiln dust reduced by 198,000 tonnes in seven years

Process waste reduction

Reduction of process waste is a priority in the cement industry. Cement kiln dust (CKD), generated during production and removed for quality control reasons, constitutes a high proportion of the total waste produced. Disposal of CKD fell from 308,000 tonnes in 1995 to 110,000 tonnes in 2002. Today, most CKD is returned to the manufacturing process as a raw material replacement. It can also be put to positive use in other ways. CKD from Castle Cement's Ribblesdale works, Lancashire, was used to stabilise and create fertile soil on spoil heaps at Silverwood Colliery in Yorkshire. The CKD is alkaline and the spoil acidic, so the kiln dust was mixed with sewage sludge to neutralise the acidity and add nutrients.

Releases to air

The manufacturing process is the main source of releases to air with carbon dioxide (CO_2), oxides of nitrogen (NO_X), sulphur dioxide (SO_2) and dust being the most significant.

The industry has achieved major improvements over time in NO_X, SO_2 and dust, as the accompanying graphs illustrate. These have been achieved principally through the development of new kiln technologies and better abatement techniques.

Emissions principally reflect the nature of the raw materials used, so the industry keeps a close watch on material variability. It takes measures such as using waste products like pulverised fuel ash to modify its cement-making recipe to control further the release of pollutants.

Figure 1 sulphur dioxide and nitrogen oxides emissions to air from cement processes in England and Wales

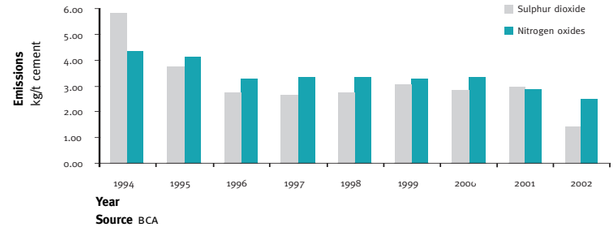
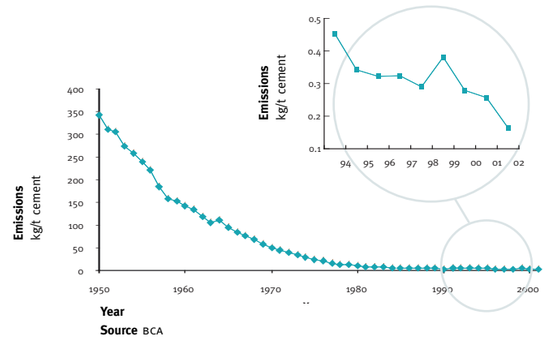


Figure 2 Dust emissions to air from cement processes in England and Wales



Case study: controlling emissions

A recent example of emissions control by design is RMC's new kiln at Rugby. By designing in a system of flue gas de-sulphurisation, the company has reduced sulphur dioxide emissions by about 95 per cent compared to those arising from the old cement-making operations on site. Two main raw material streams are added at different points in the process so that one, chalk, absorbs the sulphur from the rest of the feed, virtually eliminating sulphur dioxide emissions.

RMC was chosen as the 'British Green Champion', the overall winner in the Green Apple Environment Awards 2003 for its reduction of sulphur dioxide emissions at the plant. The group also won the category for science and technology.

Target
energy efficiency improvement of 25.6% by 2010 compared with 1990

Figure 3 Use of alternative fuels in Europe, 2002 **Source** CEMBUREAU, 2003

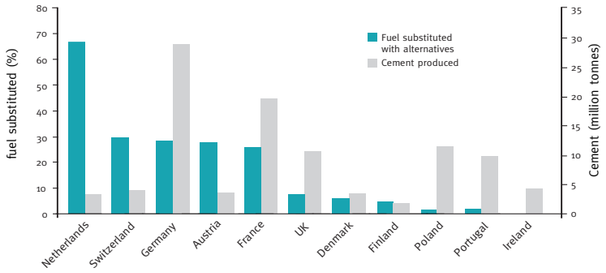
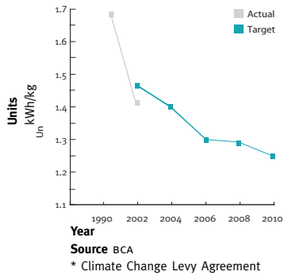


Figure 5 specific energy (CCA*) targets



Source BCA
* Climate Change Levy Agreement

Tyres – an alternative fuel

Greenhouse gas emissions

The cement industry emits carbon dioxide (CO_2) directly from burning fossil fuels, the calcination process and from its transport operations. It also indirectly generates greenhouse gases by using electricity.

The industry reduced CO_2 emissions by nearly ten per cent between 1994 and 2002. It remains an important focus for the future, assisted by increased use of alternative fuels.

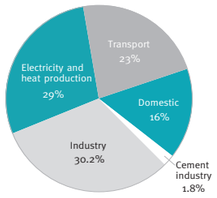
Despite the large tonnages of limestone burnt by the UK cement industry, it contributes only about two per cent of the UK's total carbon dioxide production.

Investment in new plant is playing a major part in reducing energy consumption as is its use of alternative energy sources. These not only replace fossil fuels but also cut the overall total amount of carbon dioxide that would have been produced if both the fossil fuels and the waste alternatives had been burned separately.

The industry has signed-up to the UK government Climate Change Levy Agreement. This will deliver an energy efficiency improvement across its sector of 25.6 per cent by 2010 against a base year of 1990. By 2002, the UK cement industry had achieved a 13.2 per cent improvement – with related improvements in CO_2 emissions – and is on target.

In terms of transport, the industry increasingly moves cement in bulk by rail wherever possible and specifies lowest emission engines for all new road vehicles.

Figure 4 principle UK sources of carbon dioxide emissions



Source National Air Emissions Inventory, 2001

Using wastes

The cement industry has a significant role to play in helping overcome many of the UK's hazardous and other waste management problems. It has been exploring the use of waste materials as a substitute for traditional materials and fuels for over a decade.

In 2002, the cement sector burned 144,000 tonnes of waste as fuel in its kilns and estimates it could potentially be using 1.5 million tonnes within the next five years. The Environment Agency is actively promoting the use of cement kilns as a safe recovery route for scrap tyres and the industry continues to seek further alternatives.

Sewage sludge pellets have been successfully trialled at Lafarge's Couldon Works, Staffordshire, while Castle Cement has applied for approval to use agricultural waste derived fuel – meat and bone meal – at its Ribblesdale works, Lancashire.

Currently the industry burns about 50 per cent of used solvent waste; 10 per cent of packaging waste and has the capacity to handle about 50 per cent of the total volume of waste tyres. Not only does this mean energy recovery from waste products but can also lead to other environmental benefits in terms of reduced emissions.

Figure three on this page shows the much wider use of alternative fuels across Europe. For example, in Belgium one plant uses alternative fuel mixes replacing 60% of its fossil fuels with waste.

Figure 6 CO_2 emissions to air from cement processes in England and Wales

Source BCA

More than 75,000 trees have been planted in a long-term restoration scheme at Lafarge's Hope works in Derbyshire

Restoration and biodiversity

Good planning, progressive quarry restoration and consultation with local stakeholders on the after-use of cement production sites are the ways the cement industry works to minimise the impact of its operations on the rural landscape.

Under the World Business Council for Sustainable Development's Cement Sustainability Initiative, the industry is committed to drawing up, by 2006, restoration plans for existing operating quarries, with similar plans for cement plant sites when appropriate. The UK industry is also preparing action plans for each of its works to identify and protect the biodiversity of species. An ecological consultant visiting a cement works recently said that wildlife found in the quarry there was even more diverse than that to be found at some nature reserves.

Environmental management systems

Cement operations in the UK are regulated under the Integrated Pollution Prevention and Control Regulations by the Environment Agency in England and Wales, SEPA in Scotland and the Industrial Pollution and Radiochemical Inspectorate in Northern Ireland.

Regulators enforce conditions that the industry must meet if it is to be allowed to continue operating. In 2002, there were no prosecutions of cement companies but the Environment Agency issued four enforcement notices and four cautions over matters associated with emissions to air.

All 15 UK cement works operate environmental management systems certificated to ISO 14001. Eleven works are registered under EMAS, the EU's eco-management and audit scheme. Companies additionally carry out their own internal environmental audits and all parent companies of cement manufacturers in the UK produce sustainability or environmental reports.

Case study: long-term restoration

The College Lake Wildlife Centre is a 200-acre reserve created from one of three quarries that supplied Castle Cement's former Pitstone cement works in Buckinghamshire. The reserve dates from 1985 when the company and the Berks, Bucks and Oxon Wildlife Trust launched a joint initiative that transformed an initial area into a mosaic of contrasting habitats. A further large area was handed over for BBOWT management in 2000. Styled as a reserve that people as well as wildlife can enjoy, College Lake attracts some 7,000 visitors every year while supporting a wealth of wildlife, including many rare species. Its success is due in no small part to the dedication of its warden, Graham Atkins. A former Castle lorry driver, he designed the reserve and was subsequently awarded the MBE for services to nature conservation.

Cement and our future

The cement industry has been successful in making great advances in improving its environmental performance and is carrying out research which underlines its pursuit of a sustainable future. Research projects undertaken by the BCA over recent years include those detailed here.

Fire testing

Recycling aggregates

Alternative cements

For particular applications, the high strength performance of pure Portland cement is not required. Instead, materials such as limestone filler, pulverised fuel ash or ground granulated blast-furnace slag can be incorporated – with environmental benefits arising from lower tonnages of pure Portland cement needing to be produced. Research is also looking at whether reactive magnesia has similar advantages. Naturally, the BCA research is taking care to ensure that use of such materials does not have any detrimental affect on the performance of subsequent concrete products.

Recycled aggregates

The BCA is working in collaboration with other organisations. With the Building Research Establishment and the universities of Sheffield and Dundee, the association is assessing the use of recycled aggregates and the minimum use of natural stone in concrete.

Recycled aggregates can lead to reduced use of raw materials in concrete. These include demolition waste and container glass.

Case study: energy-saving concrete

Buildings don't come any more energy efficient than the new £78 million government offices complex in Nottingham – and much of the credit must go to concrete.

As a building likely to overheat due to electronic equipment and solar gain, the key to a comfortable working environment lay in clever use of pre-cast concrete to attenuate and delay peak internal temperatures. So energy efficient is the building, that the Building Research Establishment has awarded it its maximum 'green' points.

The BCA, in collaboration with the Concrete Centre and CEMBUREAU, the European cement association, is formulating guidance to help take full advantage of concrete in the design of energy efficient buildings.

Fact

designing with energy efficiency in mind can reduce in-use energy costs by up to 75 per cent

Land remediation for an out-of-town shopping centre Ramsgate

Eurocodes

Eurocodes are a new suite of design standards that will eventually replace the current British Standards for concrete. BCA and its sister organisation, the Concrete Centre, lead the work in the UK on Eurocodes for the design of concrete structures and are preparing guidance documents to assist designers during the transition period.

Fire design for safety

When appropriately specified, concrete is inherently 'fireproof' because of its non-flammability and thermal insulation properties. BCA is leading a programme of development work on the fire design of concrete structures. The aim is to achieve more economical concrete frame construction, while maintaining the current high levels of safety.

Fire-engineering methods are also being developed from the study of whole concrete structures. While current methods are based on individual structural components, new methods will consider the whole structure, taking into account the inherent fire resistance and robustness of concrete construction.

Brownfield remediation

Cement and lime can be used to immobilise contaminants in brownfield sites and allow them to be used safely for further development. Due to the variable nature of such sites and the need to satisfy a range of legislative requirements, great care is required to ensure successful remediation. The industry is playing a crucial role in producing practical guidance.

Key objectives

- develop and maintain a robust understanding of the performance of cement and concrete throughout their life cycle
- develop standards, codes and best practice guidance for the use of cement and concrete
- work with partner organisations to maximise the potential of cement and concrete in sustainable design, construction and re-use