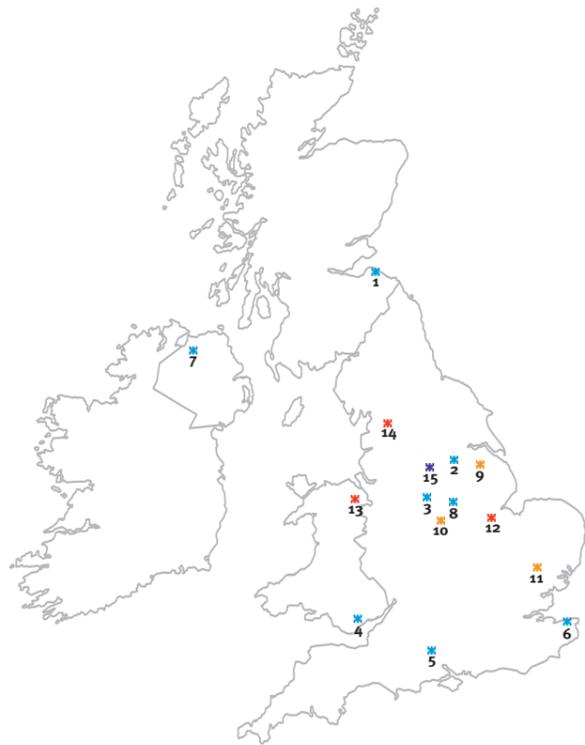


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- | | |
|---------------------|--------------------------|
| ■ Lafarge Cement UK | ■ CEMEX |
| 1 Dunbar | 9 S Ferriby |
| 2 Hope | 10 Rugby |
| 3 Cauldon | 11 Barrington |
| 4 Aberthaw | ■ Castle Cement |
| 5 Westbury | 12 Ketton |
| 6 Northfleet | 13 Padeswood |
| 7 Cookstown | 14 Ribblesdale |
| 8 Barnstone | ■ Buxton Lime Industries |
| | 15 Tunstead |

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£2300

million invested

21%

improvement in energy
efficiency

24

million tonnes of
cement supplied



Performance

a corporate responsibility report from the UK cement industry

- 3 This review
 - Welcome
- 4 Committed to performance
 - Who we are
 - Global initiative
 - Making cement
- 6 Economic
 - National economy
 - Local economies
 - Investment
- 8 Social
 - Health and Safety
 - Public consultation
 - Recruitment and training
- 10 Environment
 - Consumption of natural resources
 - Cement process waste
 - Pollution from cement manufacturing
 - Greenhouse gases
- 12 Productive use of wastes
 - Restoration and biodiversity
 - Stakeholder transparency
 - Management systems
- 14 Cement and our future
 - Concrete fire study
 - Chromium (VI)
 - Cleaning up land
 - Thermal mass



Front cover Buxton Lime Industries' new cement works, Buxton, Derbyshire This page The Spinnaker Tower, Portsmouth

This review



In this, our second edition of *Performance*, we review the social, economic and environmental performance of the UK cement industry in 2004.

It was a year of significant change, during which it continued to meet the needs of the construction industry for this essential building material, delivering 12 million tonnes of cement, 90 per cent of the UK's needs.

Changes include preparation and investment to meet the EU Emissions Trading Scheme, the Chromium (VI) reductions regulations, the Working Time Directive and the Climate Change Levy 2004 milestone.

The Environment Agency, the industry's regulator, undertook a public consultation on its plans to change the Substitute Fuels Protocol (SFP), an extra-statutory procedure with which it controls the introduction of alternative fuels to replace conventional fuel such as coal as an energy source in the cement and lime industries. Revisions to the SFP were challenged by elements of the high temperature incineration industry and some local groups. After due consideration by the Environment Agency board, the revised protocol came into force in February 2005. This now provides a more efficient procedure for the introduction of waste derived fuels, while retaining rigorous environmental control and extensive public consultation. Indeed, use of waste derived fuels has helped the industry achieve a 21 per cent energy efficiency improvement on the 1990 baseline.

Castle Cement and Buxton Lime Industries developed new, efficient and cleaner plants; Rugby (now Cemex) invested in the Rugby plant and Lafarge acquired new distribution network capabilities. The total value of investment was over £230m.

The industry, working with BCA, established a sustainable development task force to set a new, more challenging agenda for the future. Its goal is to demonstrate continually improving performance to further its reputation as a sound, sustainable and transparent industry.

The industry has continued to work with the Environment Agency on the development of a sector plan containing performance indicators to allow improvement measurement for eight agreed key objectives. *Performance* was introduced last year to provide a preliminary baseline for future reporting against its draft requirements. The UK cement industry believes the sector plan has a major role to play in helping demonstrate transparency and achievements, as part of the industry's overall approach to openness and public consultation, as well as set out plans for delivering real environmental benefits.

This transparency was demonstrated when the industry was alerted to the fact that deliberate falsification of alkali test results had been discovered at one works. The industry has appointed BSI, an independent nationally recognised third party product certification body, to verify future cement alkali levels. BSI will monitor production data and test audit samples on a regular basis. This will ensure such an occurrence remains an isolated incident.

The year under review marked a watershed for the industry in developing its infrastructure and strategic plans for the future. Its goal is to work with all the stakeholders in the industry – employees, communities, suppliers, government and customers – to ensure that cement and concrete construction remains the material of choice for sustainable construction.

Mike Gilbert
BCA CHIEF EXECUTIVE

July 2005

Committed to performance



The cement industry meets 90 per cent of the country's needs from sustainable production

Who we are

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. It has four members – Buxton Lime Industries (a subsidiary of Tarmac), Castle Cement (a subsidiary of HeidelbergCement), Lafarge Cement UK and Cemex UK.

BCA members operate 15 manufacturing plants and produce over 90 per cent of the cement sold in the UK. They employ 3,500 people directly and support a further 15,000 jobs indirectly, many of them in rural areas where employment is scarce.

Global initiative

The UK cement industry members are fully committed to the global initiative originally developed by ten international cement companies under the auspices of the World Business Council for Sustainable Development.

National initiative

During 2004, members of BCA, working with Forum for the Future, created a task force to define and put in place a plan to improve the UK cement industry's role of delivering sustainable construction in a sustainable society.

The vision set was

'Through performance to reputation: the UK cement industry's performance on sustainable development is continually improved until it is recognised as leading the way by 2010.'

In setting this vision, the task force accepted the industry's responsibilities in working towards a sustainable future. Cement is the fundamental ingredient needed to produce concrete, which is essential to sustain our built environment. The benefits of concrete in construction include structures that are durable, inherently fire resistant and provide good acoustic separation. Its thermal mass properties have an important part to play in future climate change control by helping to provide good, naturally comfortable, living and working environments.

The industry also contributes to overcoming some of the country's waste management problems by putting waste materials to productive use as alternative raw materials and fuels. This in turn contributes to its ability to meet 90 per cent of the country's cement needs from sustainable production, minimising the need to import cement and avoiding exporting the environmental consequences of the manufacturing process.



Chipped tyres stockpile to provide for an alternative kiln fuel



Cement is essential for concrete used here at Canary Wharf station



Mortar – a basic building material needing cement

Sustainability objectives

The sustainability task force set objectives to ensure that its vision is met:

- to create a framework that will allow the industry to maximise its contribution to the well-being of its employees, to its neighbours and to wider society, making the UK cement industry an employer of choice
- to continually improve the sustainability performance of the cement industry by setting and reviewing targets on environmental, economic and social performance
- to maximise the contribution of cement to the delivery of a more sustainable built environment
- to extend its constructive, proactive and sustainable relations with stakeholders
- to optimise the role that the cement industry can play in assisting the UK with delivery of best practicable environmental options for waste recovery
- to integrate sustainable development into all UK cement industry strategies, activities and communications.

Sustainability projects

Major projects initiated by the task force include:

- the development of a long term carbon strategy, underlining the industry's commitment to reducing direct carbon dioxide emissions from cement kilns and transport, and indirectly from electricity use.
- a sustainable development business case in the UK cement industry to provide the industry with a reference tool to aid discussion with stakeholders, government departments and agencies.
- the UK cement industry plans to launch the results of its year long sustainability study later in 2005.

The industry is also working with the sustainable development charity, Forum for the Future, on identifying the stakeholder groups it needs to listen to in order to present its case and credentials. Such two-way communication is vital to achieve better understanding on all sides.

Making cement

Making cement involves quarrying limestone or chalk, grinding it very finely and mixing it with clay or sand, before heating it in a rotating kiln to 1,450°C. At that temperature, a chemical change takes place, where the raw materials turn into a volcanic rock-like material called clinker. When cooled, this is ground with about five per cent gypsum, added to control the setting time of the end product – cement.

The UK cement 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.

The UK cement industry produces a range of products to meet the requirements of the construction industry in terms of colour and strength. Ordinary Portland cement, now correctly designated as CEM I, is sold in the greatest quantities but the industry also has products for particular applications, for example, those with sulfate resistance or fast setting characteristics.



Buxton Lime Industries' new cement plant near Buxton, Derbyshire



Industry investment has included kiln refurbishment



Concrete has been extensively used in the construction of a new London stadium for Arsenal football club

National economy

UK cement manufacturers make up a viable and internationally competitive industry with an annual turnover of £750 million. The industry plays a vital role as a supplier of an essential, virtually irreplaceable, building material, crucial to the well-being of the construction industry, which generates over £83 billion a year and employs 650,000 people.

International competitiveness for the UK cement industry is essential for its survival. By remaining profitable, it protects its ability to invest for the future. It also ensures continuation of UK employment and prevents growth of imports. Its vitality also ensures that while it produces a product that is a worldwide commodity, the environmental consequences of cement manufacture are not exported to other parts of the world where controls may not be as high as in the UK.

Cement in use

Cement is a fundamental component of construction, from bags at builders' merchants for everyday use to many concrete products, either for direct use as a wet (insitu) concrete or in a moulded and cured form (precast). Figures 1 and 2 show where cement is playing a fundamental role in the development and maintenance of the built environment.

Figure 1 Market in Great Britain for cementitious product by type of delivery, 2004

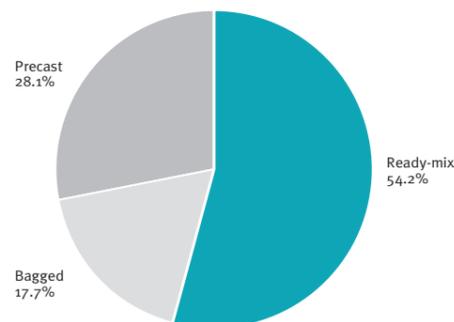
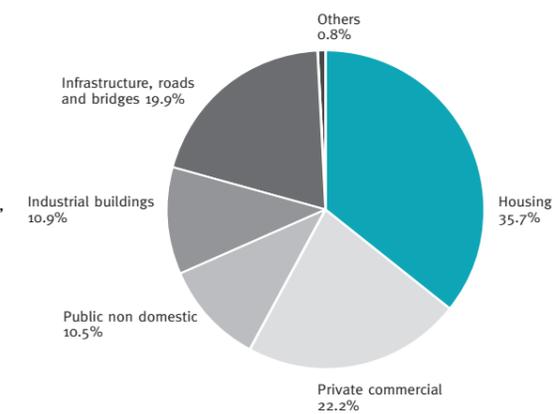


Figure 2 Market in Great Britain for cementitious product by building sectors/segment use, 2004



Lafarge opened a new depot in Theale, to the west of London in 2004



Local economies

Local economies benefit from having cement manufacture nearby. A works is often the major employer in mainly rural areas. Additionally, it calls upon other local businesses for products and services and it is estimated a typical cement works contributes about £15 million a year to the local economy through salaries, business rates and local spending.

Investment

Investment in new plant and machinery and upgrading of environmental control equipment continues. In 2004, an estimated £60 million was spent on capital projects as major investment over recent years in new kilns was completed.

Buxton Lime Industries officially opened a new cement plant in Derbyshire in 2004. It replaced an older plant on the Tunstead quarry site and represents an investment of £110 million by the company.

The new pre-calculator, dry-process plant has an annual capacity of 800,000 tonnes of cement and brings with it a range of improved environmental benefits. These include a reduction in energy consumption of 30 per cent per tonne of product and a 70 per cent drop in total emissions of particulates. Bulk distribution by rail is also a key factor, saving many vehicle movements on local roads.

At Padeswood in north Wales, work nears completion on Castle Cement's new kiln. The company is spending £60 million that will not only bring significant environmental benefits locally, arising from the closure of three old kilns, but will also allow the shut down of two wet kilns at Ribblesdale in Lancashire. It is estimated that this will reduce the company's overall emissions of carbon dioxide by 17.5 per cent per tonne of cement produced, compared to 2004 performance.



A Lafarge Cement manager with two young visitors to an open day at the company's Aberthaw plant in South Wales

Health and safety

Cement Best Practice programme

The cement industry, together with representatives from member companies, trade unions and the Health and Safety Commission, continues to work towards its vision of an operating environment where accidents to employees and contractors do not occur. The number of lost time accidents (LTAs) decreased compared to the number experienced in 2003, as shown in figure 3 on this page. In 2004, the industry achieved a 17 per cent reduction. However this does not meet the 30 per cent year-on-year targeted decrease set in 2003 by the industry's steering group on health and safety. Reasons for the shortfall have been identified and further preventative action built into plans. Slips, trips and falls continue to be the biggest cause of accidents and an initiative has started to reduce further such occurrences, primarily through publication of guidance on prevention and best practice.

Figure 3 Lost time accidents

	actual		target	
	2003	2004	2005	2010
employees	47	40	23	4
contractors	54	45	22	4

Other initiatives have been aimed at production and customer site safety.

Hot meal burns

Working with very hot materials and plant is inherently risky, so guidance has been drafted to prevent burns to operatives working on unblocking, cleaning and maintenance activities in hot areas such as pre-heater towers and associated cooling systems.

Driver safety

The industry has developed plans for the introduction of a scheme designed to eliminate delivery accidents. A cement company representative, along with a customer representative, will jointly audit a site to identify opportunities to reduce the risk of injuries. Sites are designated green for safe to deliver; amber for safe to deliver with restrictions; red for unsafe to deliver.

Employee health

Safeguarding the health of employees and those living near cement factories is of paramount importance to the industry. It is supporting health studies under the worldwide Cement Sustainability Initiative mentioned elsewhere and has co-operated with the UK Health and Safety Executive, which was commissioned by the European cement industry to look at health matters. While in no way being complacent, the industry is heartened that in over 100 years of its existence, no history of ill health has been associated with its operations. This position is strengthened by the knowledge that emissions from works have reduced significantly over the last decade and regulations on the industry's operations have become evermore stringent.



Prize-winning apprentices from the Rugby works

Prevent slips, trips and falls, a BCA poster campaign



Figure 4 Industry consultations and communications with stakeholders in 2004

liaison committee meetings	35
newsletters	14
estimated total circulation	107,000
events	
open days	7
local exhibitions	6



Newsletters play a major role in local communication

Alternative fuels and public health

In October 2004, the government-established, independent, Health Protection Agency, published a position statement* relating to public health assessments on emissions from cement kilns. It said: 'Such assessments show a negligible impact, whether using conventional or substitute fuels, which could not be detectable through any currently available health surveillance method'.

Public consultation

Over the last ten years, the industry has stepped up its communication with the general public and its other principal stakeholders. In figure 4 is an indication of the volume of activity carried out by the industry.

Much management time is spent on direct discussion with those who come in contact with the industry, be they school groups, councillors, the media, neighbours, regulatory personnel or other opinion formers. Typical regular means of communication now employed across the UK include:

- open days
- schools activity
- sponsorship of local groups
- newsletters and booklets
- local liaison groups
- provision of recreational facilities
- media relations.

The cement industry continues to be involved with and make active contributions to their local communities. The overall aim is to achieve a better understanding of what the industry does and to ensure there are channels through which local people and single-issue groups can feed back their opinions and reactions. Stakeholder consultation also helps create a series of benchmarks against which future communications and opinion research may be measured.

Recruitment and training

The industry continues to be an important employer in mainly rural areas, with some 3,500 employees.

It offers excellent career opportunities and encourages its workforce to achieve nationally recognised qualifications in disciplines such as engineering maintenance, combined working practices, mobile plant and quarry management. Health and safety training is widely promoted with managers and supervisors pursuing NEBOSH (National Examination Board in Occupational Safety and Health) qualifications. Employees are also sponsored to take accredited health and safety courses run by the Institution of Occupational Safety and Health.

During 2004, BCA member companies employed 42 apprentices and 13 graduate trainees.

*Health Protection Agency, position statement 'Substitute fuels in cement kilns', 13 October 2004

The industry has been working with the Environment Agency in the development of a sector plan. While this has not yet been published, *Performance* sets out to report progress made in the last year against eight draft key objectives.



Emissions from cement plants are continuously monitored both at the plant in the chimney and in the surrounding area



Unloading a secondary liquid fuel which helps reduce greenhouse gas emissions

Objective 1 *Reduce consumption of natural resources per tonne of cement manufactured*

The cement industry, with its network of UK plants, has made great progress in recovering wastes produced by other industries for use as fuel and raw materials.

In 2004, 11.5 per cent of fossil fuel and 4.8 per cent of virgin raw materials were replaced by waste materials, adding up to over one million tonnes of waste being recovered in the year.

In terms of raw material replacement, alternative materials include pulverised fuel ash (PFA) and ground granulated blast furnace slag from the power or steel industries. Both may be added in the cement manufacturing process or as a cement supplement in final concrete production. Suitable waste products being utilised in manufacturing are:

- selected construction waste
- broken moulds from the ceramics industry
- waste foundry sand and gypsum
- mill scale
- cement kiln dust
- refractory bricks from kiln linings
- road sweepings
- waste water.

As with fuels covered under *Objective five* below, the industry will continue to seek alternative materials as long as their use has no adverse impact on the health of its employees, the general public, its environmental performance or product quality.

Objective 2 *Reduce cement process waste residues disposed of per tonne of cement manufactured*

The cement industry has continued to reduce the overall amount of waste produced in the cement making process. The greatest proportion of process waste generated is cement kiln dust (CKD), which is removed from the manufacturing process for quality control purposes. Most CKD is now returned to cement making as a raw material, although some is used in land reclamation where its high alkaline properties are welcomed to help neutralise acidic soils.

The industry reported 110,000 tonnes of CKD going to landfill sites in 2002. In 2004, that figure had dropped to 63,500 tonnes.

Figure 5 Sulfur dioxide and nitrogen oxides emissions to air from cement processes

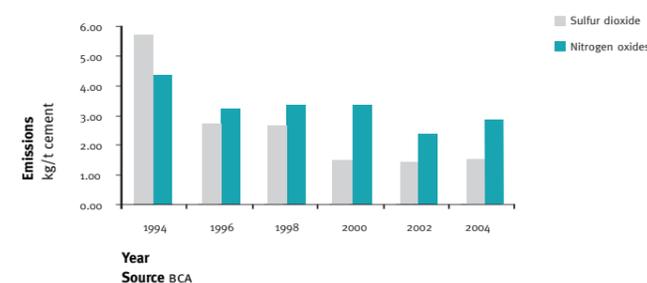


Figure 6 Dust emissions to air from cement processes

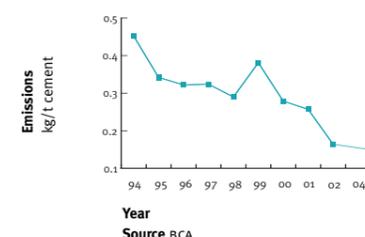
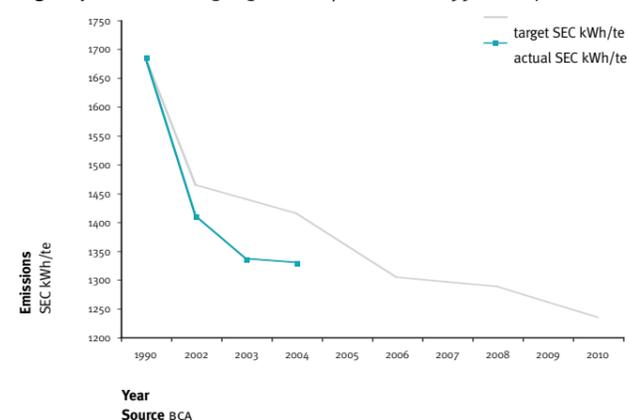


Figure 7 Climate change agreement performance 1990–2004



Objective 3 *Reduce pollution from cement manufacturing*
The most significant sources of pollution from production are carbon dioxide (CO₂), oxides of nitrogen (NO_x), sulfur dioxide (SO₂) and dust.

Figures 5 and 6 record emissions of SO₂, NO_x and dust over the previous ten years. Overall, improvement has been made through the introduction of new kiln technologies, better abatement techniques and the modification of raw materials – emissions principally reflect the nature of the raw materials used. Use of alternative raw materials and fuels has also assisted in the improvement of overall environmental performance.

Objective 4 *Reduce emissions of greenhouse gases per tonne of cement manufactured*

The cement industry produces carbon dioxide, directly from burning fossil fuels, the calcination process, transport operations and indirectly, by using electricity.

Energy represents around 35 per cent of the industry's variable costs so it is vital to use it efficiently. BCA member companies signed up to the UK Climate Change Agreement in 2001 and had, by the end of 2004, all achieved their milestone targets – as had the cement sector as a whole. This meant the sector had achieved an improvement in specific energy consumption of 21.2 per cent against an agreed baseline and is well on track to meet its target of a 26.8 per cent reduction by 2010. Figure 7 charts progress.

The industry continues to seek even further energy improvements with associated reductions in emissions of carbon dioxide. Investment in more modern manufacturing plant is key, as is the use of alternative fuels and reducing the amounts of fossil fuels being burned. The industry also encourages the use of cement replacements such as pulverised fuel ash in concrete mixes where it is safe and permissible to do so.

UK cement industry supports the use of market mechanisms rather than direct taxation to stimulate improvements in energy efficiency and to reduce CO₂ emissions. It therefore supports the EU Emissions Trading Scheme (EU ETS) that came into force in January 2005. It is however concerned about the way allocations for the scheme have been approached. Direct CO₂ emissions from cement manufacture have been reduced by around 24 per cent between 1990 and 2004, but this success has not been fully recognised in the European scheme.



A nature reserve near Tring in Hertfordshire, developed in a former cement works quarry

The industry has already taken steps to ensure it is able to meet the monitoring and reporting requirements of this further climate change control legislation. It remains committed to the principle of emissions trading and will be working with government to ensure that phase two of the scheme, due to start in 2008, can be more productive in terms of delivering a sustainable future.

Objective 5 *Optimise the appropriate use of wastes from other industries or sources*

Although the recovery of energy from wastes in the UK is growing, alternative fuel use in the UK is now far behind that in other parts of Europe, where cement manufacturers are recognised as being an integral part of the waste management infrastructure. In some parts of Europe, up to 70 per cent replacement of fossil fuel has been reached.

Alternative fuels have now been safely used in the UK for over a decade. The industry only selects wastes that are safe and compatible with the cement manufacturing process and hence having no adverse effect on product quality. Fuels presently being used or trialled include:

- substitute liquid fuels from the residues of solvent recycling
- scrap tyres not usable in other ways
- paper and plastic wastes, not able to be recycled viably
- waste oils
- waste wood
- sewage sludge
- meat and bone meal
- paper ash.

The industry welcomed the recent changes made by the Environment Agency to its Substitute Fuels Protocol and hopes to see the authorisation process speeded up. The amendments will ensure tight controls remain on the introduction of new fuel sources so there can be no danger to the environment. Full public consultation remains part of the application process. The changes recognise the role the cement industry has in UK waste management and how its network of manufacturing plants can help overcome the shortfall in waste handling capacity. At the same time, the energy recovery from waste in cement plants lifts unwanted materials up the waste hierarchy.

Nevertheless, it still means that the UK industry works in a more rigid framework than its counterparts in Europe. As each of the BCA member companies are owned by international groups, this can inhibit the ability of UK plant to compete for investment resources.

Perhaps the biggest potential loser is the environment: the longer it takes to gain permits to use new fuels or to invest in capital improvements, the longer it takes for environmental benefits to be achieved.

In preparation for the implementation of the Waste Incineration Directive at the end of 2005, the industry has been investing in upgrading plant to meet new emission levels.

Objective 6 *Develop the site restoration plans and biodiversity action plans*

The industry continues to work on progressive restoration and landscaping of its operations.

Each quarry has formal restoration plans associated with planning applications agreed with local authorities. Under the new Environment Agency Pollution Prevention Control permits, final end-use of sites is covered. However, cement factories by their capital intensive nature need to have very long lives, so definitive after-use plans are not practical.



Shredded waste paper and plastic provide a valuable kiln fuel

Many examples of progressive restoration exist, perhaps none with such longevity as that of Lafarge Cement's Hope works in Derbyshire, where plans were laid down by pioneering landscape architect, Sir Geoffrey Jellicoe in 1943. Benefits from previous investment manifest themselves today. Old Hope quarry, not used since the 1950s, has proven to be a haven for flora and fauna and the Derbyshire Wildlife Trust has been working with the company to identify the many species now colonising the area, including invertebrates such as newts, slender grasshoppers and damselflies and plants including marsh orchids.

Investment in the new cement manufacturing facility at Buxton has also allowed more sensitive siting of the plant. The previous works sat on the rim of Tunstead quarry whereas the new factory has been built on the quarry floor, greatly reducing the visual impact of the operation.

Objective 7 *Improve transparency, understanding and engagement between the Environment Agency, industry and other stakeholders*

Across the country, the industry continues to operate local liaison committees made up of representatives of local communities, the Environment Agency and the companies themselves. These allow open discussion about future plans and activities and provide local people with a forum to put forward their views to both the cement makers and the regulator.

Additionally, as reported on page nine, the industry uses a wide range of communications methods to keep local communities aware of its activities.

In terms of broader dialogue with stakeholders, the industry has been looking closely at how this may be achieved. Work has included an in-depth, two-day discussion with environmentalist Jonathon Porritt, Chairman of the UK Sustainable Development Commission, the government's own advisory body. This was designed to explore how best the industry may work to ensure it is transparent and shares its views and aims with the widest possible, relevant audiences.

Formal meetings are also regularly held with the Environment Agency at national, regional and local works levels to discuss policy, issues and performance.

Objective 8 *Work to risk-based regulatory and environmental management systems*

The new Pollution Prevention and Control regulations now cover all BCA member plants. These go beyond the traditional impacts associated with cement manufacture relating to emissions to air, land and water and now call for checks on energy efficiency, noise and vibration. Regulations are enforced by the Environment Agency in England and Wales, SEPA in Scotland and the Industrial Pollution and Radiochemical Inspectorate in Northern Ireland.

During 2004 there were no prosecutions of cement companies by the Environment Agency but two enforcement notices were issued. One related to a limestone slurry spillage, the other to a breach of emission levels. Suitable measures were agreed with the Agency in both instances to prevent reoccurrence.

All 15 works operate environmental management systems to ISO 14001 and additionally ten of these are registered under the EU's eco-management and audit scheme, EMAS. All BCA members have either ISO 9000/9001 or their own internal systems and comply with EC certification or Kite marking as appropriate. Castle Cement has ISO 9001 for both its production division and head office functions and BSI certification for its integrated management system.

Each cement company, or its parent, produces a sustainability or environmental report.

Industry awards

In June 2004, Rugby Cement won the Process award for sustainable development 2004, organised by the European Commission, for significantly reducing sulfur dioxide (SO₂) from its new kiln at Rugby works. Gas desulfurisation was built into the kiln, reducing SO₂ emissions to less than five per cent of those from a traditional operation.

Lafarge Cement UK was named in April 2004 as construction and building materials sector leader in Business in the Community's (BITC) annual environmental index, for the second year in a row. BITC assesses companies' performance against a range of measures, including corporate strategy and integration, together with management practice for the community, environment, marketplace and workplace.

Cement and our future



Concrete was the material of choice for this section of the new Channel Tunnel rail link

Energy performance, built-in fire safety, acoustic performance and robust construction of concrete ensure a flexible, long life. Its use of natural, plentiful resources, local distribution and wastes as material's and fuels make cement and concrete the material of choice for sustainable construction.

The principal benefit of cement manufacture is its use in concrete, allowing designers to take advantage of the material's intrinsic benefits in construction, particularly in terms of strength, thermal, acoustic and fire resistance performance. The industry works with many other bodies on a wide range of research projects and the agreement of European standards and guidance for the use of cement and concrete. Over the last year, much work has been done on the further development of Eurocodes on the design of concrete structures and the continuing progress of a range of standards relating to cement products and their testing. Outlined below are examples to demonstrate the breadth of technical subjects receiving the attention of the UK cement industry.

Concrete fire study

The excellent fire resistance of concrete structures has been confirmed by a report produced by BRE and funded by The Concrete Centre. *Fire safety of concrete structures: Background to BS 8110 Fire design (1)*, investigates the background to methods for establishing fire resistance, examining and revisiting original research and test results that underpin tabulated data used.

Not only does the BRE report demonstrate that the approach taken has been effective, it also indicates that the conservatism of the existing data means that further research would potentially result in even greater construction and cost economies for concrete structures. Evidence from real fires, for example at the Windsor Torre building in Madrid, does demonstrate the excellent performance of concrete in a fire.

Chromium (VI)

During 2004, the UK cement industry prepared for the implementation in January 2005 of the EU Chromium (VI) Directive. This tightened regulations on cement to minimise even further the chance of some people developing allergic contact dermatitis when in skin contact with wet cement. BCA member companies have been voluntarily adding warnings to their delivery tickets and cement bags for many years stating that cement contains chromium (VI). There is no risk from the trace element when handling or touching hardened concrete.

To meet the directive, BCA members are adding where necessary chemical reducing agents to their cement. Initially, ferrous sulfate and stannous (tin) sulfate are being used. This has an insignificant effect on the overall quality or performance of cements but the reducing agents become less effective over time. A dispatch/packing date and the product's shelf life is therefore being added to delivery documents and bags as required by legislation.

The industry continues to stress that users must still wear appropriate personal protective equipment when handling cement to avoid all kinds of dermatitis and cement burns.



Even after the Chromium (VI) directive, appropriate personal protective equipment must be worn when handling wet cement



Brighton's Jubilee Library may prove to be one of the most energy efficient buildings in Britain, with the mass of the central concrete structure designed to soak up heat during the day and radiate it back into the surrounding space at night

Cleaning up land

The BCA, in conjunction with the British Lime Association and the Concrete Centre, published in autumn 2004, *The Essential Guide to Stabilisation/Solidification for the remediation of brownfield land using cement and lime*. The publication explains how a cement-based technique called stabilisation/solidification (or s/s) can quickly bring land affected by contamination back into use. The technique mixes these soils with cementitious materials to improve engineering properties and immobilise contaminants.

Stabilisation/solidification provides three main environmental benefits:

- brownfield land can quickly be redeveloped, protecting greenfield sites
- it reduces dramatically lorry movements to and from landfill sites as well as reducing the need for imported fill
- contaminated soils will no longer need to be dug and dumped in landfill sites, a major advantage in terms of the EU Landfill Directive 1999 that calls for the pre-treatment of wastes prior to disposal and which has substantially reduced the number of available landfill sites.

Thermal mass

Climate change and global warming have increased demands for improved energy performance of buildings. This has increased the potential of concrete's high thermal mass to provide key answers.

The combination of high thermal mass and night cooling has great attraction in sustainable building design. Concrete used in construction can provide a thermal sponge, absorbing heat on hot summer days and then releasing it at night as the outside temperature drops. BCA and The Concrete Centre are working on guidelines for designers, demonstrating how concrete will play an increasingly important role as climate change continues to drive up temperatures.

The thermal mass principle does not, however, only relate to large buildings. Research by consultants Arup, using predictions from the UK Climate Impacts Programme, shows that by 2020 many houses built to current building standards will become increasingly warm and uncomfortable to live in during the summer. In the near future, such houses may require air conditioning to keep them cool. This will have a significant negative effect in terms of climate change targets, using more energy and releasing more carbon dioxide. The research includes a comparison between a lightweight, framed house and an equivalent heavyweight brick and block dwelling with cast concrete floors/ceilings and internal block partitions. It is projected that the heavyweight home will be able to maintain relatively comfortable internal conditions up to the 2080s, while the frequency of overheating in the lightweight house becomes excessive by 2050 even with the application of appropriate adaptive measures, such as shading.