



## Sustainability Initiatives That Can be Taken Up by Cement Companies

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### ABSTRACT

Regulatory pressures and stakeholders' expectations are increasing regarding health, safety and environmental performance. There are signs that cement products may evolve from commodities to a greater variety of differentiated products serving changing customer needs. Thus, maintaining the 'license to operate' as an industry depends on being able to earn and keep the support and trust of local people by treating their environment and communities with respect. Recent developments in sustainability relate to indicators of sustainable development and data for energy use, resource use, emissions and waste. These are key factors for understanding and controlling impacts such as consumption of scarce resources, polluting emissions, climate change and waste. The major role that construction can play in increasing sustainability is highlighted in the present study with a perspective on the impacts associated with cement. The study also includes an initial framework for assessing and improving the sustainability of cement industries as well as long-term roles that cement and concrete can play in improving the same at local, national and world levels. Better quality of life can be supported by creating global visibility.

### INTRODUCTION

Cement industry produces 1.6 billion tons of cement annually - a 'glue' which holds together much of our modern global infrastructure; from roads to houses, from dams to water treatment systems, from schools to hospitals. It is hard to envision a society without cement. Cement-making is an energy and capital-intensive process. Once built, cement plants may be in operation for 50 years or more. The cement industry is a large source of greenhouse gases, accounting for about 5% of the global man-made carbon dioxide emissions annually (Taylor 2006). The industry is growing most rapidly in developing markets where demand for infrastructure and housing is rising quickly. In the present paper an attempt has been made to highlight sustainability initiatives that can be taken up by cement companies, which will also reduce pollution and check global warming.

### CEMENT INDUSTRY AND POLLUTION

After water, concrete is the most used material of the planet and about three tonnes of it is used for every one of the six billion people on earth (Taylor 2006).

Cement is made from an intermediate product called clinker. Clinker itself is a complex mixture formed during high temperature reactions of limestone, clay, sand and iron. It contains calcium oxide (CaO), aluminium oxide ( $Al_2O_3$ ), silica dioxide ( $SiO_2$ ) and small amounts of iron oxide ( $Fe_2O_3$ ).

In many countries, the cement industry is powered by state-of-the-art production plants, which require highly sophisticated continuous processes, advanced control technology and energy manage-

ment systems. With over 1.6 billion tonnes of cement produced each year, quality control and economic, repeatable production is of paramount importance to cement producers worldwide. However, cement production is also a highly capital and energy-intensive process. The cost of a new plant averages out at some \$130 million per million tonnes of cement produced i.e., a long payback period which equates to about three years worth of production revenue at a typical plant. With rotary kilns continually operating at temperatures of over 1500°C massive fuel requirements are inevitable. Any reduction in overheads, whether through more accurate process control or improved energy efficiency, can quickly have a significant effect on costs, on the carbon dioxide process-related burden, and ultimately the company's bottom line. Cement companies are operating in an intensely competitive commercial environment, but at the same time is facing increasingly strong regulatory and stakeholder pressure. Every ton of cement produces a ton of carbon dioxide ([www.bca.org.uk/activities/indaffair/research.html](http://www.bca.org.uk/activities/indaffair/research.html), <http://www.cembureau.be/Documents/Publications/Activity%20Report%202007.pdf>).

### **CEMENT INDUSTRY AND VARIOUS ISSUES - THE NEW PICTURE**

There has been a dramatic increase in the expectations of what business should deliver to society. Beyond jobs and profits, companies are increasingly held accountable for social and environmental achievements. The cement industry is working to learn how it fits into this new picture.

- What new roles must it play?
- What issues are important to stakeholders?

The cement industry faces a set of issues which attract attention at both the local level, near the plant, and at an international level. They are complex issues ranging from local dust and noise concerns to the potential impact of cement manufacturing on climate change. Some issues have generated a great deal of emotional debate, such as those related to managing alternative fuels and raw materials.

International Cement Review, April 2002 started the 'Towards a sustainable cement industry' initiative under the lead of the World Business Council for Sustainable Development (WBCSD 2001) and aims to find how the industry can become more sustainable. Initiated by a group of cement companies, the project solicits the views of a large number of stakeholders as part of an investigation into the specific challenges, barriers and opportunities facing the industry in its drive towards making it a leading participant in a globally sustainable future.

### **ENVIRONMENTAL IMPACTS AND CEMENT PRODUCTION**

Cement manufacture causes environmental impacts at all stages of production.

- Emissions of airborne pollution in the form of dust and gases.
- Noise and vibration when operating machinery and during blasting in quarries.
- Damage to countryside from quarrying.
- Large quantities of fuel used during manufacture.
- Problem of restoring exhausted limestone quarries.
- Release of carbon dioxide from the raw materials; Cement production generates more carbon emissions than any other industrial process, accounting for around 5% of the world's anthropogenic carbon emissions.

The three leading members of the cement industry, Cimpor, Holcim and Lafarge, approached the WBCSD and asked them to organise a structured evaluation of the sustainable development issues

facing the industry. Further, seven producers quickly joined, and together they formed a group which represented every continent and almost one third of the world's total cement output. The resulting two year initiative entitled "Toward a Sustainable Cement Industry", took the form of thirteen highly focused sub-studies covering a range of issues including climate change, land use, biodiversity, determination of key sustainable development performance indicators, industrial ecology, environmental performance and public policy ([www.wbcscement.org](http://www.wbcscement.org)). The Council turned to the Battelle Institute to conduct the study in order to ensure both objectivity and transparency. The study further ensured its independence via an external assurance group, chaired by Mostafa Tolba, former Director General of the United Nations Environment Programme.

## **SUSTAINABLE DEVELOPMENT AND THE CEMENT INDUSTRY**

Sustainable development is most frequently defined as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development focuses on social, environmental and financial factors and on appropriate governance mechanisms to help manage the delicate balance between competing objectives. Sustainable development involves local as well as global issues ([www.wbcscement.org](http://www.wbcscement.org)). It is not the same in all countries, or in all businesses. Depending upon local circumstances the balance between economic growth, social progress and environmental management can vary considerably.

### **Cement Sustainability Initiatives That Can be Taken by Companies**

#### **1. Climate protection and CO<sub>2</sub> management**

- Develop a carbon dioxide (CO<sub>2</sub>) protocol for the cement industry.
- Work with stakeholders and experts to develop a common protocol to investigate public policy and market mechanisms for monitoring key emissions such as nitrogen oxides (NO<sub>x</sub>), sulphur compounds (SO<sub>x</sub>) and dust.
- Use the tools set out in the CO<sub>2</sub> protocol to define and make public their baseline emissions report annually on CO<sub>2</sub> emissions in line with the protocol.

**2. Responsible use of fuels and materials:** The mining and power generation industries produce mineral by-products such as fly ash from coal-fired power stations. Blast furnace slag may become part of the product itself. Other by-products, and renewable fuels such as biomass, may be used as a partial fuel substitute and help reduce CO<sub>2</sub> emissions.

Using by-products as fuel reduces the amount of fossil fuels needed, and it reduces the associated environmental impacts of finding, producing, transporting and burning these fuels. It also decreases the loads on landfills and incinerators and their environmental impacts, including potential groundwater pollution, methane generation and hazardous ash residues.

**3. Employee health and safety:** There should be effective systems of measuring, monitoring and reporting on health, and safety performance so that there would be information exchanges on rates, origins and types of accidents and incidents. This information would be used to develop recommendations for prevention of injuries like slips, trips, falls, impacts from falling or moving objects, and improper manual handling.

There is a need to introduce more focused prevention programs and to conduct special safety induction in order to improve the safety culture among all employees. All parties must work together with the ultimate goal of zero injuries.

**4. Local impacts on land and communities:** Impacts from quarries and cement plants may be positive (jobs, products, and services) or negative (disturbance to the landscape and biodiversity, noise, and pollutants such as NO<sub>x</sub>, SO<sub>x</sub> and dust). The way companies evaluate and manage the social and economic impacts of locating, acquiring, building and closing sites affect the quality of life in the communities involved and its reputation as an industry. Hence selective mining techniques and optimal quarry exploitation is required.

#### **5. Reporting and communications**

- Develop industry protocol for measurement, monitoring and for accounting and reporting direct and indirect CO<sub>2</sub> emissions from cement manufacturing.
- Develop detailed guidelines for environmental and social impact assessment process to enable companies and communities to work together on issues during each phase of development of cement facility, operation and closure.
- Establish a systematic dialogue process with stakeholders to understand and address their expectations.
- Report progress on developing stakeholder engagement programs.
- Develop documented and auditable environmental management systems at all plants.

#### **CASE STUDIES**

**Progressive Cement:** The company applied stringent environmental guidelines to all plants in its global operations, and devoted considerable resources to regional and community development programs. It also initiated a program of dialogue and communication with local communities surrounding the plant through which it identified needs and helped with financial assistance programs. It used advanced techniques to minimize negative impact of plants. It worked with local construction companies to develop new products and construction techniques amenable to local conditions. Regional development, community and employee well being were considered company hallmarks (NCB Report 2006). Has been a top industry performer in reducing emissions.

Overall, it is well positioned to gain market share of cement sales in developing countries because it has a good reputation and finds it easy to work with governments and other institutions to site new plants. It, thus, provides good shareholder value.

**Super Tech Cement:** It partnered with suppliers and focused on process technology development. They developed several new processes for pollution control, efficiency improvement, as well as a novel process for making a new form of cement using lower temperatures. At first they found that they sometimes overemphasized technology and ignored the social dimension of sustainability. This caused difficulties with regional, community and employee stakeholders. Henceforth, they have begun to pay careful attention to these issues ([www.indiabizclub.com/qxzpmd](http://www.indiabizclub.com/qxzpmd)).

They now profitably produce cement in almost zero-net emission plants. The company also has a substantial income from the licensing of its process technologies to other cement companies and other industries. Emission reduction, climate protection and resource productivity are hallmarks of the company. As a reward for their efforts, financial markets view them as providing excellent shareholder value and are very receptive to providing venture capital for the bold new technology ideas that Super Tech pursues.

#### **CONCLUSION**

Sustainability is not a straightforward issue. The major cement producers realise that their viability

and prospects of future existence, let alone growth, depend on adopting a responsible approach to the subject. Integrity and impartiality have been watchwords throughout the study - the long term success and survival of the cement industry may ultimately depend on its outcome.

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## ENVIRONMENTAL NEWS

### **Waste Gasification Plant**

Bradford, West Yorkshire, will soon have world's largest waste gasification facility to be fuelled by residual waste. A permission has been granted to BioGen Power for this purpose.

The facility will process 160,000 tonnes of residual waste each year, generating 83,300 MWe of electricity.

Energos, owned by Manchester-based energy solution provider Ener-G, will supply the gasification technology. BioGen Power chief executive Christian Reeve said "Our approved application here will ensure that Bradford benefits from a well proven, economical, green and clean alternative to the outdated and un-environmentally friendly acceptable practice of landfill."

*Materials Recycling Week, April 7, 2010*

### **Wind Farms May Harm Birds**

The Wildfowl and Wetland Trust (WWT) is concerned offshore wind farms in the Firth of Forth and off the UK coast as these could be an obstacle for the birds.

It had tagged five male Svalbard barnacle geese, in the Solway Firth, with GPS trackers. The tracking will gather information on migration routes and altitudes.

Dr. Larvy Gariffin, WWT principal research officer said, the birds' main flight corridor took them into sites earmarked for new turbines, as part of the UK's planned massive expansion in offshore wind power.

He also wants to discover how they cope with existing wind farms they encounter on the Norwegian coast. "If they are flying through there in the darkness or in sea fog conditions, my concern is there is potential of a collision.

The WWT said data gathered from the barnacle geese could be used to influence where new turbines were placed, or whether lights need to be added to make them more obvious to the geese.

*BBC News, April 14, 2010*