



The
cement
sustainability
initiative

progress report

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About WBCSD

In 2002, ten international cement companies set out to help the industry play a stronger role in support of sustainable development. Today, an expanded group of 16 companies reports on our progress.

When this Cement Sustainability Initiative (CSI) wrote *Our Agenda for Action* in 2002, we represented about one third of world cement production outside China. We now represent over half.

We spoke then of the “fundamental challenge” that the goal of sustainable human progress presents. The challenge remains, as large as it was three years ago. But we have identified several paths forward for our industry to reduce its footprint, better manage its impacts and be more eco-efficient.

Our industry uses a great deal of fossil energy and materials quarried from the earth; the conversion processes in our kilns release significant amounts of CO₂. Our markets are growing fastest in the developing world, where populations are also growing more quickly. So while we can find ways – many explained here – to consume less energy, use less natural resources, and release less pollution per unit of cement produced, we expect to supply more cement for the growing population of our customers.

By using some by-products of other industries in our kilns and grinding plants, we can help society manage certain

growing streams of wastes, keeping them out of landfills and the wider environment. Some of these by-products can help us reduce CO₂ emissions. We have found ways to produce more with less – ways which can reduce our costs and also reduce the intensity of quarrying and manufacturing activities associated with our products – the basic definition of eco-efficiency.

We are proud of this report, in a sense prouder of this than the *Agenda*, as that was a list of promises, but this report documents our first implementation steps. We have used a succinct approach: each of five working groups describes its issue, reminds you of what we promised in 2002, tells you about our progress since then, names our collaborators in these efforts, and describes the metrics we will use to measure further progress.

To keep this interim report short and readable, we have located background material on our website www.wbcscement.org. Please look there for more details.

A reminder: we are competing companies, which places limits on our abilities to cooperate in some areas due to legal limits and commercial interests. Despite this, we have produced agreed approaches to complex issues such as CO₂ and emissions measurement, and the assessment of impacts on local communities and our workforce. We wish to thank all of our many colleagues and collaborators for the hard work that they put into the progress reported here.



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Introduction

In 2002, a large segment of the global cement industry embarked on a systematic effort to improve its environmental and social impacts and confirmed its commitments with the launch of its [Agenda for Action](#) in 2002. To do this work, cement companies formed the Cement Sustainability Initiative (CSI) and partnered with the World Business Council for Sustainable Development. This is the interim report on our progress that we promised when we delivered our [Agenda for Action](#) in 2002.

The CSI member companies do not speak for the entire cement industry. However, given that we account for more than half of the cement manufacturing capacity outside of China, we are representative of the industry and can therefore hope to affect its thinking and performance by sharing our vision for the future and examples of good practice.



We believe industry has a responsibility to understand and promote sustainable development: forms of progress that meet present needs without limiting the abilities of future generations to meet their needs. The cement industry clearly affects present and future well-being. Cement (and the concrete made from it) is the basis of much of civilization's infrastructure and of much of its physical development. After water, concrete is the planet's most used material, and this year three tonnes¹ of it will be used for every one of the six billion people on Earth. Its use is growing fastest in the developing world, where populations and infrastructure needs are growing most rapidly.

Its manufacture involves quarrying and emissions, particularly the emissions of gases associated with climate change. Yet its manufacture can also safely recover by-products from other industries. By-products containing minerals such as fly ash from coal-fired power stations and blast furnace slag may become part of the product itself; other by-products, and renewable fuels such as biomass, may be used to fuel the kilns. Thus the cement industry can help improve the environment, and is finding ways to become more eco-efficient by producing more cement with fewer natural resource inputs, less waste, and less pollution.

As rising populations increase pressure on natural resources such as land and energy, all industry must find ways of using resources more efficiently. This search has become a key agenda for governments, businesses, and non-governmental organizations (NGOs). Given cement's key role in development, we as an industry need to engage with that agenda and understand what it means for our own, and the planet's, long-term future.

The beginnings

In 1999 three cement companies came together under the auspices of the World Business Council for Sustainable Development (WBCSD) to understand more about society's expectations for our business, increasing constraints on carbon emissions, and the greater need for communicating about our impacts in a clear and transparent manner. We believed this work could help us shape an agenda for change and deal thoughtfully not only with external and internal stakeholders, but also with local and global pressures on our industry. The WBCSD offered us a unique platform for working with others outside our industry to gather the necessary input to and feedback on our work.

As more companies joined, in 2000 the group commissioned the not-for-profit Battelle Memorial Institute to study the industry from the viewpoint of sustainability. Their report was frank and offered challenging recommendations. Under the heading of climate protection, for example, it told us to establish corporate carbon management programs, to set company-specific and industry-wide medium-term CO₂ reduction targets, and to begin long-term process and product innovation. Each is a significant task. (See report on www.wbcdcement.org/climate.asp)



¹ Tonnes refers to metric tons: 1,000 kg, roughly 2,200 pounds.

As part of our assessment process, we initiated a series of seven stakeholder dialogues in 2001. Those in Brazil, Thailand, Portugal and Egypt were for local and national government representatives, residents' groups, employees, consumer organizations, suppliers, and NGOs. Those in Washington, D.C. and Brussels were aimed at global environmental interest groups, policy-making bodies, and multilateral finance and development organizations. The final session, in China, was held with representatives of the Chinese cement industry and government officials to discuss what we had learned and how it might be applied in China.

We were surprised at the broad spectrum of the concerns, from global to very local. All groups cited climate change as a major issue, but stakeholders everywhere perceive that the cement industry (with other heavy industries) has not worked closely enough with neighboring communities, who feel there are still local environmental and social problems that need to be solved.

This in-depth research work identified opportunities as well as challenges in the pursuit of sustainable progress. We have implemented process innovations leading to raw material and energy efficiencies that also make us more competitive over the long term. However, this research work also confirmed the need for further product and service innovations that enable us to meet new demands for construction products with still lower environmental impacts. We saw the opportunity of working more closely with other industries to use their by-products in cement production.

During its research phase, the CSI established an assurance group chaired by Dr. Mostafa Tolba, former executive director of the UN Environment Program. Members included William Reilly, former administrator of the US Environmental Protection Agency; Corinne Lepage, former Environment Minister of France; Professor Victor Urquidi, past President and Professor Emeritus of Colegio de Mexico, and Professor István Láng, past President of the Hungarian Academy of Sciences. This group provided the valuable service of monitoring our progress, critiquing draft research reports, highlighting other points to consider, and ensuring a balanced treatment of the issues. Details on recommendations made are available on our website: www.wbcscement.org/assurance_group.asp

2 CEMEX acquired RMC in 2005 reducing the CSI membership from seventeen to sixteen companies.

3 The Agenda for Action effectively incorporated the CSI Charter, a listing of detailed commitments. See page 8 of this report.

Pledge to act

After this lengthy research phase, 10 companies issued the CSI's Agenda for Action (www.wbcscement.org) in 2002. Since then seven other cement companies – from India (2), Greece, Portugal, Spain, the United States and Ireland – have joined the CSI (see page 25 for a detailed list of participants and their roles).² However, this program is more than a simple agenda; it is a personal pledge on the part of the 10 corporate leaders who signed the report (and leaders of the other companies that have joined more recently). They noted that: “in signing this document we are committing our companies to a series of joint projects and individual actions. Perhaps the most important are those regarding climate protection and use of fuels and raw materials, issues where our industry can play a significant role in developing sustainable solutions.” More recent members have also signed a Charter,³ committing their organizations to adhere to the CSI goals. The project adopted a 20-year time horizon, divided into five-year cycles, roughly in keeping with the investment and business planning cycles of the cement industry and the longer-term policy cycles of governments and international agencies.

The Agenda focuses on six critical issues:

- climate protection and CO₂ management;
- responsible use of fuels and materials;
- employee health and safety;
- emissions reduction;⁴
- local impacts on land and communities;
- reporting and communications.

Task forces were established in each area. The Agenda promised an interim report on progress in 2005. This is the promised report. It also promised to complete its first five-year segment of work during the year 2006 and produce a full progress report in 2007.

4 The task force name was subsequently changed to Emissions Monitoring and Reporting, reflecting the joint work of the participants. Individual companies remain responsible for setting specific emission reduction targets and reporting their progress.

Progress thus far

In the following pages – and we have kept it to very few pages, with web links for those who want to know more – five of the six task forces report on progress. The sixth, on reporting and communications, is responsible for this report and other CSI communications. Each task force reports on the nature of the issue it is addressing, what the CSI promised to do about the issue, what it actually accomplished, with whom it worked, and how progress is being measured.

For each issue, we draw important distinctions between what the CSI can efficiently do collectively and what individual companies must undertake. For competitive reasons, and to comply with competition law, companies may only cooperate to a limited extent. Thus individual companies are responsible for setting their own targets and reporting progress. Each company will normally report on the

aggregated performance for those kilns (or facilities) of companies in which they have a majority ownership (> 50%) or management control. New members, joining in 2002 or after, have four years from joining to meet the Charter commitments. Where facilities are newly acquired, the acquirer is expected to implement guidelines and their corresponding KPIs within three years of the acquisition. The results described in this document are self-reported by the member companies of the CSI.

We are committed to have the key CSI documents – all of which are available on our website (www.wbcscement.org) – widely distributed and promoted through trade associations and our other communications partners. However, these guidelines are not meant to, and can neither replace nor supersede local, national, or international requirements.

Among the highlights, and not including action by individual companies, the CSI has:

- Produced and then updated a protocol for accounting and reporting CO₂ emissions that establishes a common approach to monitoring and reporting all direct and indirect CO₂ emissions from cement manufacturing;
- Developed a set of guidelines on fuels and materials use, promoting good practice and setting out a consistent approach in line with the principles of sustainable development;
- Agreed on an industry-wide set of safety metrics enabling consistent and accurate reporting;
- Agreed on a common emissions monitoring and reporting protocol that identifies measurement methods for nitrogen oxides, sulfur compounds, and particulates (the high-volume emissions); and defines an approach to obtain a fingerprint of key micro-pollutant emissions;
- Drafted detailed guidelines for an Environmental and Social Impact Assessment process to enable companies and communities to work together on issues during each phase of a cement facility's development, operation, and closure;

Recognizing that “what is measured is what gets done,” each of the guidelines includes Key Performance Indicators (KPIs) to help companies track their progress. In addition, the CSI has:

- Established a Senior Advisory Board chaired by Dr. Mostafa Tolba and including Dr. Claude Martin (Director General WWF International) and Jim MacNeill (former Secretary of the Brundtland Commission on Environment and Development). Their role is to advise the CSI leaders on critical issues.
- Met with 40 stakeholders in Brussels to discuss guideline development and ensure that critical concerns would be addressed;
- Made its website a comprehensive reference source for the critical sustainability issues facing the industry.

Summary of the Agenda for Action

Joint projects	Individual company actions
<p><i>The Cement Sustainability Initiative intends to create joint projects to:</i></p>	<p><i>As part of our ongoing commitment to good practice and innovation in sustainable development, companies agree to:</i></p>
Climate protection	
<ul style="list-style-type: none"> ▪ develop a Carbon Dioxide (CO₂) Protocol for the cement industry. ▪ work with WBCSD/World Resources Institute (WRI) and other organizations to investigate public policy and market mechanisms for reducing CO₂ emissions. 	<ul style="list-style-type: none"> ▪ use the tools set out in the CO₂ protocol to define and make public their baseline emissions. ▪ develop a climate change mitigation strategy, and publish targets and progress by 2006. ▪ report annually on CO₂ emissions in line with the protocol.
Fuels and raw materials	
<ul style="list-style-type: none"> ▪ develop a set of guidelines for the responsible use of conventional and alternative fuels and raw materials in cement kilns. 	<ul style="list-style-type: none"> ▪ apply the guidelines developed for fuel and raw material use.
Employee health and safety	
<ul style="list-style-type: none"> ▪ set up a Health and Safety Task Force. ▪ establish a Health and Safety information exchange. 	<ul style="list-style-type: none"> ▪ respond to the recommendations of the Health and Safety Task Force on systems, measurement and public reporting.
Emissions reduction	
<ul style="list-style-type: none"> ▪ develop an industry protocol for measurement, monitoring and reporting of emissions, and find solutions to more readily assess emissions of substances such as dioxins and volatile organic compounds. 	<ul style="list-style-type: none"> ▪ apply the protocol for measurement, monitoring and reporting of emissions. ▪ make emissions data publicly available and accessible to stakeholders by 2006. ▪ set emissions targets on relevant materials and report publicly on progress.
Environmental impacts	
<ul style="list-style-type: none"> ▪ develop guidelines for an Environmental and Social Impact Assessment (ESIA) process which can be used at all cement plant sites and associated quarries. 	<ul style="list-style-type: none"> ▪ apply the ESIA guidelines, and develop tools to integrate them into decision making processes. ▪ draw up rehabilitation plans for their operating quarries and plant sites, and communicate them to local stakeholders by 2006.
Business processes*	
<ul style="list-style-type: none"> ▪ investigate methods to track the performance of the cement industry, including development and use of key performance indicators. ▪ produce a full progress report after 5 years, and an interim report after 3 years. 	<ul style="list-style-type: none"> ▪ integrate sustainable development programs into existing management, monitoring and reporting systems. ▪ publish a statement of business ethics by 2006. ▪ 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.

*Task force originally called "Internal business processes", was changed to "Reporting and communications" in-line with its primary functions.



Climate protection and CO₂ management

The Issue

Concrete (and the cement used to make it) is a fundamental construction material widely used across the spectrum of man-made structures from homes to hospitals to airports and roadways. Making cement also produces a nearly equal quantity of carbon dioxide, a major greenhouse gas (GHG).

Globally, the cement industry produces about 5% of global, man-made CO₂; half of this is from the chemical process of clinker production and 40% from burning fuel. The remaining 10% is split between electricity use and transportation (See Figure 1 on next page).

Governments today are considering and imposing limits on industry energy use and GHG emissions (examples include the Kyoto Protocol, the EU Emissions Trading System, the UK's Climate Change Levy, and California's newest laws on car emissions). These limits can have significant financial impacts (both positive and negative) on our industry. CSI members take climate protection, and in particular management of CO₂ emissions, very seriously.

What we said we would do

Our Agenda for Action pledged that we would:

- Continue to develop and improve a CO₂ protocol guidelines for the cement industry, working with stakeholders who share our concerns.
- Investigate public policy and market mechanisms for significantly reducing CO₂ emissions, working with competent authorities such as the International Emissions Trading Association (IETA), the World Resources Institute (WRI), and others.

Each company agreed to use the approaches set out in the CO₂ protocol guidelines to define and make public their baseline emissions by 2006. Each also agreed to develop a climate change mitigation strategy and to publish individual targets and then track their progress by 2006. As a result of implementing the CO₂ protocol, each company will report annually on CO₂ emissions as discussed at the end of this section.

What we did

This task force has produced, along with WBCSD and WRI, a protocol for accounting and reporting CO₂ emissions that is consistent with the WRI/WBCSD Greenhouse Gas (GHG) Protocol.⁵

The protocol establishes a common approach to monitoring and reporting all direct and indirect (from electricity and on-site transport) CO₂ emissions from the cement manufacturing process.

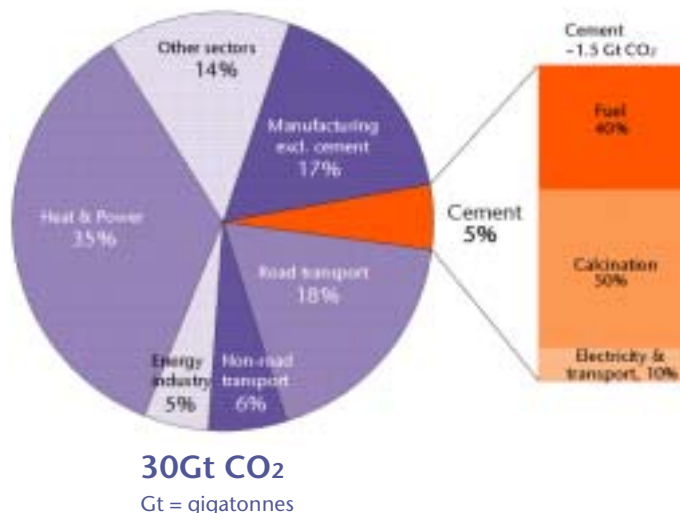
By August 2004, 94% of the 619 kilns of CSI member companies had developed CO₂ inventories, which follow the CSI CO₂ Protocol guidelines; as of early 2005 three companies had published emission reduction targets and reported progress.

After two years of testing, we updated the protocol based on feedback and comments from the US Environmental Protection Agency, the Intergovernmental Panel on Climate Change (IPCC), KPMG, and others. We also

modified the protocol to take account of technical improvements identified as companies applied it, and to incorporate relevant comments of the recent review of the overarching WRI/WBCSD GHG Protocol. This update was released earlier this year (2005).

Within the CO₂ Protocol guidelines we have reviewed and updated emissions factors for a number of traditional and alternative fuels based on new measurements. We have also incorporated accounting practices that allow for emission credits and trading to meet the requirements of current and future trading systems. We worked with the WBCSD Energy and Climate Program, IETA and WRI, as well as consultants engaged by the European Commission to assist in developing the monitoring and reporting protocol for the cement sector, for use according to the EU Emissions Trading Scheme (ETS).

Figure 1: Global CO₂ production



Source: IEA 2003, Battelle 2002

5 The Cement CO₂ Protocol: CO₂ Accounting and Reporting Guideline for the Cement Industry," published by WBCSD in October 2001, updated January 2005. For more information see the WRI-WBCSD Greenhouse Gas Protocol Initiative website at www.ghgprotocol.org.

Our stakeholders

In addition to the many stakeholders noted above, CSI companies with significant positions in Latin America worked with the Lawrence Berkeley Labs (LBL) to develop a user-friendly method to estimate regional emission baselines for Clean Development Mechanism (CDM) projects.⁶ Unfortunately, this collaboration was halted at the end of 2003 because the concept of international regional baselines did not have sufficient political support. Some companies have submitted new methodologies for CDM projects to the CDM Executive Board, and are working with stakeholders to obtain approval for these projects. Our experience suggests that the CDM approval process needs streamlining and improving.

The task force is involved in activities of the working groups that will develop the IPCC 4th Assessment Report on Climate Change, due to be published in 2007, and is helping update guidelines for national GHG inventories, due to be published by the IPCC in 2006.

How we will measure progress

Progress will be measured by the number of companies using the tools set out in the CO₂ protocol guidelines, developing climate change mitigation strategies, publishing their baseline emissions, and reporting annually as called for in the protocol.

Key performance indicators (KPIs) include:

- 1 Number of facilities and percentage using the WBCSD CO₂ Protocol Guidelines for their emissions inventory;
- 2 Company-wide total CO₂ emissions (gross and net), tonnes/year;⁷
- 3 Company-wide gross and net CO₂ emissions per tonne of cementitious product.⁸

⁶ The Clean Development Mechanism (CDM) is one “flexibility mechanism” of the Kyoto Protocol that allows developed countries to invest in projects in developing countries, getting credit for reducing greenhouse gas emissions while doing so.

⁷ All CO₂ measurements to be made in accordance with the WBCSD/WRI CO₂ Protocol, see the website for the most current version (www.ghgprotocol.org/standard/tools.htm)

⁸ For a definition of “cementitious product”, please refer to the “The Cement CO₂ Protocol: CO₂ Accounting and Reporting Guideline for the Cement Industry,” www.wbcscement.org/climate.asp





Responsible use of fuels and materials

The Issue

To sustainably meet the demands of a growing world population, all industries must become smarter about how they use, reuse, and recycle raw materials, energy, and wastes. In the cement industry, we are engaging in industrial ecology, in which by-products from one industry become inputs for another, so that industry begins to mimic Nature in its circular management of materials.

We can recover and use many industrial by-products,⁹ waste streams and other materials in cement manufacturing. Some are used as raw materials, some are incorporated into the final product while others provide the fuel needed to convert limestone into clinker.

Using new forms of waste material and by-products from other industries as inputs allows us to reduce our environmental impacts. The mining and power generation industries produce mineral by-products that can be used in cement or concrete production. Other types of by-products from domestic, industrial, or agricultural sources can be used as fuels, partially replacing traditional fossil fuels. Biomass can be used as a partial fuel substitute and help reduce CO₂ 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. Using by-products and/or wastes as fuel also decreases the loads on landfills and incinerators and their environmental impacts, including potential groundwater pollution, methane generation and hazardous ash residues.

Cement kilns can be used for energy recovery from non-hazardous wastes such as tires and biomass, as well as some hazardous wastes.¹⁰ In Norway, national policy makes cement kilns the preferred method for hazardous material management, including destruction of polychlorinated biphenyls (PCBs), an approach that has been used safely and successfully for more than 10 years. In recent years, animal bone meal has been successfully destroyed in a number of kilns following its implication in “mad cow” disease.

Many developing countries that lack a waste management infrastructure are also adopting similar practices.

9 By-products include a variety of materials which are co-produced (perhaps inadvertently) in manufacturing processes. Fly ash from burning coal to make electricity, and blast furnace slag are two examples.

10 The list of hazardous waste can vary greatly from country to country.

11 The waste management hierarchy ranks waste management activities from more to less desirable depending on the fate of the waste material and the environmental “footprint” associated with its management. Preference is given first to waste prevention, followed in a decreasing order of preference by waste reduction, reuse, recycle, energy and materials recovery, and ending with responsible disposal. A given waste material may move to different points in the hierarchy at different times depending on current technology, it’s “price” or value, legal requirements and other factors.

Some wastes, such as nuclear or infectious medical waste and biological or chemical weapons destined for destruction are totally unsuitable and would never be used as fuel or raw material, nor as a constituent of cement, nor in our waste recovery and disposal operations. They pose unacceptable risks in handling, transport, employee and community exposure, as well as to product quality.

In the past, individual companies have managed fuel selection at a local facility level based primarily on heating value and cost. Some companies already have guidelines on what materials can be used, and under what conditions. However, these guidelines and the materials covered vary from company to company and have generally not been a matter of public record.

This complex picture has left many stakeholders concerned and uncertain about emissions from our facilities and the contribution that the industry can make in helping to solve society’s and industry’s waste problems. There are clear business and environmental benefits to be gained from using by-products. However, we will only use them in accordance with the waste hierarchy¹¹ where we can do so safely, without harm to our employees, neighbors, or the environment.



What we said we would do

We pledged to develop a set of guidelines for the responsible use of conventional and alternative fuels and raw materials in cement kilns, engaging relevant stakeholders in the process. Each CSI company will apply these guidelines in its operations by 2006.

What we did

We developed a set of guidelines intended to lay out a consistent approach to the selection and use of fuels and raw materials in the industry. These are built upon the principles of sustainable development, eco-efficiency, and industrial ecology, and integrated into local resource management infrastructures. We have promoted this approach and associated good practices needed to implement it throughout the industry. These guidelines also include material dealing with the occupational health and safety concerns of handling these materials.

Our stakeholders

In November 2003 we held extensive consultations with external stakeholders during a meeting in Brussels. These included organizations like IUCN, WWF, The Natural Step, The Nature Conservancy, UK environmental regulators, and others. We have since worked closely with The Natural Step International and GTZ (German Society for Technical Cooperation), which participated in a number of our task force meetings. As part of our engagement process, we also held an on-line dialogue to review draft guidelines with more than 100 registered participants from more than 20 countries. We have used feedback from all these processes in formulating and fine-tuning our guidelines.

¹² Specific heat consumption gives a measure of overall thermal efficiency. Specific heat consumption, alternative fossil fuel and biomass fuel rate, and clinker/cement factor are defined according to the WBCSD-WRI CO₂ protocol issued in September 2001. See www.wbcscement.org/climate.asp for details.

¹³ Alternative raw materials are defined as non-quarried raw materials for the purpose of clinker and cement production.

¹⁴ Some regulations limit the use of alternative materials aimed at reducing the clinker/cement factor. This can limit progress on this KPI in some locations.



How we will measure progress

CSI companies have agreed to measure and report against the following KPIs:

Energy use

- 1 Specific heat consumption of clinker production, in MJ per tonne of clinker;¹²
- 2 Alternative fuel rate: consumption of alternative fuels, as a percentage of total thermal consumption;
- 3 Biomass fuel rate: consumption of biomass, as a percentage of thermal consumption.

Raw materials use

- 1 Alternative raw materials rate: consumption of alternative raw materials, as a percentage of total raw materials for cement and clinker production (calculated on a dry basis);¹³
- 2 Clinker/cement factor: ratio between clinker consumption and cement production, calculated according to cement protocol.¹⁴



Employee health & safety

The Issue

The Battelle Report on the cement industry concluded that the most important priority for cement companies with regard to employee well-being is the assurance of occupational health and safety, both for employees and contract personnel. It said that, “the health and safety performance of the cement industry as a whole is lagging behind that of other sectors of manufacturing industry.” In the short term, it said, “the best way to improve performance is to share knowledge and good practices so that these can become the industry norm.” It is important that “the industry continues and expands its work to harmonize incident reporting requirements, so that data can be collected and analyzed to identify the underlying causes of accidents and ill-health.”¹⁵

¹⁵ See all detailed sub-studies for the CSI, particularly Sub-Study 10, at www.wbcdcement.org/publications.asp.

What we said we would do

The *Agenda for Action* pledged that the CSI would develop effective systems of measuring, monitoring, and reporting on health and safety performance and 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.

What we did

The task force agreed on industry safety definitions and reporting criteria in the document “Safety in the Cement Industry: Guidelines for Measuring and Reporting.”¹⁶ This was the first set of internationally-agreed definitions enabling consistent reporting. These definitions cover fatalities, fatality rates (for direct employees), lost-time injuries, and lost-time injury frequency ratio (for direct employees). We drafted other optional definitions, including a lost-time injury severity ratio, for future consideration.

Agreeing on these definitions has enabled us to prepare a common CSI safety reporting format. We have compiled a report based on data submitted by 14 CSI companies covering the years 2003 and 2004 (See table on page 17). We initially agreed to report on cement activities only, and are now discussing an extension to cover our associated ready-mix concrete activities.

Fatality prevention is a key priority. We have carried out analyses of fatalities in a number of CSI member companies over the years 2000-2004. These analyses pointed to three main causes of deaths: vehicle accidents, falls from heights, and problems in electrical isolation procedures. The analyses also indicated a significantly higher risk of fatalities for contractors. See Table below.



The results have helped us focus on the key related prevention programs.

We also completed a preliminary analysis of lost-time injury (LTI) trends. Available data show some common causes for injuries: slips, trips, falls, impacts from falling or moving objects, and improper manual handling. The task force analyzed and discussed these to help companies introduce more focused prevention programs. Further analysis also reinforced the need to improve the safety culture among all our employees. All parties must work together with the ultimate goal of zero injuries.

Arising from these analyses, we prepared the document, “Health & safety in the cement industry – examples of good practice.” This outlines the key elements needed for effective health and safety management. It gives practical examples of good practice in safety procedures in the industry based on our experience, and based on identified fatality and accident causes. It also gives occupational health guidelines, again based on the most typical health concerns. Most CSI companies have already implemented such guidelines, but we now need to disseminate these to the wider industry and external stakeholders, and ensure that they are fully followed at all our own facilities.

CSI company fatality analysis	
High risk categories	Prevention practices
Contractors Young / Temporary employees	Contractor safety management Special safety induction
Direct causes	Prevention practices
Traffic & mobile equipment (43%) Falls from heights, objects falling from heights (21%) Caught in starting / moving equipment (15%)	Driver training Safety procedures for work at heights, overhead protection Plant electrical isolation procedures

¹⁶ See “Safety in the Cement Industry: Guidelines for Measuring and Reporting,” (WBCSD, Geneva, October 2004) for precise definitions of terms. See www.wbcdcement.org/health.asp for the most recent version.

Our stakeholders

We reviewed the Safety Definitions and Reporting Criteria document with health and safety experts at the International Finance Corporation (IFC) and used their comments where appropriate. We also contributed to a set of safety metrics being developed by the Global Reporting Initiative (GRI). The compilation of Good Practices refers to many recognized guidelines from the International Labor Organization, the IFC, the European Agency for Health and Safety at Work, and several other international sources.

How we will measure progress

The KPIs for employee health and safety include:

Fatalities

- 1 Number of fatalities and fatality rate per 10,000 for directly employed;
- 2 Number of fatalities for indirectly employed (contractors and subcontractors);
- 3 Number of fatalities involving 3rd parties (not employed).

Lost-time injuries

- 1 Lost Time Injuries, and injury frequency rate (per 1,000,000 man-hours) for directly employed;
- 2 Number of Lost Time Injuries for indirectly employed (contractors and subcontractors).

Recent CSI member company fatality and injury data

Reporting scope	Year 2004	Year 2003
Number of CSI members reporting (out of a total of 16)	14	11
Total directly employed	138'940	130'752
Millions manhours worked, directly employed	269	246
Number of Lost Time Injuries (LTI's)		
Number of LTI's, directly employed	1'585	1'651
LTI frequency rate directly employed (per million manhours)	5.88	6.71
Number of LTI's, indirectly employed	739	652
Number of fatalities		
Number of fatalities, directly employed	27	28
Fatality rate (per 10,000 directly employed)	1.94	2.14
Number of fatalities, indirectly employed	54	32
Number of fatalities, third parties	11	21
Of which, logistics fatalities were:		
Directly employed	5	9
Indirectly employed	10	9
Third parties	5	17



Emissions monitoring and reporting

The Issue

The production of cement is resource- and energy-intensive and releases different types of pollutants into the environment, primarily as airborne emissions. Many of our emissions are carefully monitored and reported, in compliance with environmental regulations at a local, national, and sometimes international level. Our companies work with regulators to ensure that emission limits are both effective and practical.

We know we must look beyond legal compliance to reassure our stakeholders that we are managing emissions responsibly. Some stakeholders feel that existing emissions regulations are not strong enough. In some developing countries, standards may not have been developed or they may be poorly enforced. Stakeholders told us they want clear information on the nature of our emissions, their impacts, and what we are doing about them. The variation in measuring and reporting systems across the world means that data has not been comparable between companies and between countries. Thus we have been working with stakeholders and experts to develop a common protocol for monitoring emissions, and a standard format for reporting data.

What we said we would do

The task force on Emissions Monitoring and Reporting was charged with developing a protocol for measuring, monitoring, and reporting on key emissions such as nitrogen oxides (NO_x), sulfur compounds (SO_x), and dust. We agreed to find solutions to better assess emissions of other substances such as dioxins/furans (PCDD/F), volatile organic compounds (VOCs), and trace metals. We also agreed to consult with external stakeholders on both projects, and subject the protocol to external validation.

Each company agreed to apply this industry protocol for measuring, monitoring, and reporting emissions and to make emissions data publicly available and accessible to stakeholders. By 2006, each company will have set its own targets on relevant emissions and then report publicly on progress toward those targets.



What we did

The task force agreed on a common protocol. It identified NO_x, SO_x, and dust as the main polluting emissions in terms of volume. All the member companies have agreed to monitor these pollutants at the main stacks according to international or national standards accepted by the local authorities. These pollutants must be measured at least on an annual basis for each kiln. Continuous measurements are much preferred and should be carried out where possible.

Member companies also agreed to pay increased attention to other, low-volume pollutants, (sometimes called other pollutants or micro-pollutants), such as dioxins, VOCs and trace metals. For these, companies must establish the current performance (fingerprint analysis) of each cement kiln. The results can help companies decide, for each plant individually, whether and what further measurements or remedial actions are necessary. Significant changes in the process, such as fuel mixture, raw materials composition, or major changes in operational conditions require new analyses.

The task force recommended that to ensure the quality of these sometimes difficult measurements, companies only use test houses and analytical laboratories accredited to ISO 17025 or comparable local standards (accepted by local authorities). To date we have not found a body to validate our approach, although we have discussed it with many stakeholders.

Many stakeholders have told us that the public is concerned about hazardous emissions from burning waste materials or by-products. Consequently, we have undertaken a thorough scientific investigation regarding persistent organic pollutants (POPs) emissions, initiating a study of dioxin emissions from the cement industry. The Foundation for Scientific and Industrial Research (SINTEF) of Norway considered more than 1,700 emission data sets from public databases and new data provided by CSI companies, including a number from developing countries.¹⁷

¹⁷ Draft report "Formation and Release of POPs in the Cement Industry," prepared by SINTEF and released March 31, 2004 by WBCSD. The report is available in pdf format from www.wbcdcement.org. Final version will be completed in 2005.

The study concluded that emissions on dioxins and furans from well-operated, dry preheater/precaliner, kilns are usually below 0.1 ng TEQ/Nm³ (a value less than one part per Billion or 1/10,000,000,000),¹⁸ and slightly lower than emissions from wet-process kilns. In most cases the data for dry kilns includes co-processing waste and alternative raw materials, as this is common practice in many countries. The comparisons of performance of the same kiln with traditional and with alternative fuels showed no direct relationship between dioxin emissions and the fuel used. The US Environmental Protection Agency drew similar conclusions in 1999 when it stated “hazardous waste burning does not have an impact on PCDD/F (dioxins and furans) formation.”¹⁹ The Environment Agency for England and Wales has also concluded that co-processing waste materials in cement kilns does not pose a significant health or environmental risk, and is preferable to disposal by landfill.²⁰



¹⁸ This small value, in units of nanograms per normal cubic meter, is the equivalent of one cup of water in a swimming pool measuring 10,000 meters on a side and 100 meters deep. Higher dioxin emissions can be found from home barbecues.

¹⁹ Federal Register, 1999. “National Emissions Standards for Hazardous Air Pollutants – US EPA – Final Rule”. Part II, 40 CFR Part 60, et al, September 30, 52876.

Our stakeholders

We held a multi-stakeholder consultation in Brussels in 2003. In our study of PCCD/F emissions from the cement industry, we employed SINTEF and worked with UNEP. Data from our POPs analysis was provided to the Secretariat of the Stockholm Convention (on POPs) to assist in their review of control techniques.

How we will measure progress

We have identified three simple, reliable and representative KPIs to help companies track their progress.

Companies will measure and report on:

- 1 Percentage of clinker produced by kilns covered by a monitoring system, either continuous or discontinuous for main and other pollutants;
- 2 Percentage of clinker produced by kilns that have installed continuous measurements for the main pollutants;
- 3 Company-wide specific (g/tonne of clinker) emissions, and absolute quantities (tonnes/year) for:²¹

- a) NO_x
- b) SO_x
- c) Dust

Each company will make its emissions data publicly available and accessible by 2006 to stakeholders using our agreed reporting format.

Each company will determine the current level of emissions for micro-pollutants and complete analyses for all kilns where the data is not already available. Depending on the results of these analyses, further actions may be necessary by individual companies.

²⁰ “Proposals to Revise the Substitute Fuels Protocol for use on Cement and Lime Kilns,” Consultation Paper, Environment Agency for England and Wales (2004)

²¹ See “Guideline for Emissions Monitoring and Reporting Protocol for the Cement Industry,” for detailed definitions.
www.wbcscement.org/emissions.asp



Local impacts on land and communities

The Issue

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_x, SO_x and dust). Impacts can be significant; quarries and plants are major features of the local landscape and economy. The way companies evaluate and manage the social and economic impacts of locating, acquiring, building and closing sites affects the quality of life in the communities involved and our reputation as an industry. Maintaining our “license to operate” as an industry is dependent on being able to earn and keep the support and trust of local people, and this includes treating their environment and communities with respect.

What we said we would do

The most useful tool for understanding and managing these impacts is a thorough Environmental and Social Impact Assessment (ESIA), undertaken with careful scientific analysis and stakeholder engagement.

We pledged to work with interested stakeholders to develop guidelines for an ESIA process that can be used at all cement plant sites and quarries, and for all new projects, site acquisition and development, and closures. The guidelines are subject to external validation.

We undertook this knowing that many organizations have labored to develop general environmental impact assessment tools and social impact assessment techniques. Indeed, these are already used in our industry. However, we believe that our companies will benefit from a set of guidelines on an ESIA process tailored to the cement industry and based on close engagement with our stakeholders.

Each company will apply the ESIA guidelines and develop tools to integrate them into their decision-making processes for site development and management. Before our five-year progress report in 2007, each company should have written rehabilitation plans for its existing operating quarries. Where operating quarries are newly acquired, plans should be developed within three years of acquisition. The plans are to be communicated to local stakeholders, and to be regularly reviewed and updated. Each company should draw up rehabilitation plans for specific cement plant sites, once closure timing is known, and review them with local stakeholders.



What we did

We produced guidelines for an ESIA process for the cement industry to enable companies and communities to address some of the critical issues during each phase of a cement facility's development, from site acquisition through construction, operation, and closure.

ESIA reports should cover methods and key issues, the legislative framework, the consultation process, the social and environmental baseline, consideration of alternatives, prediction and evaluation of significant social and environmental impacts, mitigation and/or offset measures, and environmental and social management and monitoring plans. We hope the guidelines are equally helpful to all cement companies and public bodies, and that they are widely distributed and used, particularly in countries and regions where specific requirements have not yet been identified. However, these guidelines are not meant to, and can neither replace nor supersede local, national, or international requirements, which must be followed.



Our stakeholders

A stakeholder dialogue was held in Brussels in November 2003. We reviewed the general content and purpose of the guidelines. We sent draft material to a number of NGO specialists, and distributed the draft during the World Conservation Union (IUCN) World Congress in Bangkok in November 2004 for additional comments. The organizations that have provided comments to date are The Natural Step, CARE International, the Limestone Association of Japan and The Nature Conservancy.

How we will measure progress

Each company agreed to use the following KPIs:

- 1 Percentage of sites with community engagement plans in place;
- 2 Percentage of active sites with quarry rehabilitation plans in place;
- 3 Number of active sites where biodiversity issues are addressed.

The task force will identify typical elements that might be included in community engagement plans, recognizing that local impacts are local and need to be addressed within local circumstances, legal frameworks, community interest and resources.



Where next

This is an interim report. Our full progress report, available in 2007, will report our progress and identify issues where future actions may be required. Between now and then we have a full and complex job integrating these commitments, processes and measurements into our organizations. The CSI is identifying and facilitating actions that companies can take as a group and individually to accelerate the move towards a more sustainable society; providing a structure through which other cement companies can participate; and providing a framework for working with stakeholders. We encourage others in our industry to adopt and adapt the tools, processes and guidelines to improve their own operations.

We noted in *our Agenda for Action*: “We firmly believe that integrating sustainable development principles and goals into our companies and our industry will create long-term shareholder value and benefit our stakeholders. The Cement Sustainability Initiative intends to encourage this integration in three spheres: in internal systems and processes, in business partnerships, and in our relationships with civil society.”

Looking toward the future, we are evaluating various assurance processes that we will apply to some (or all) of the key performance indicators on which we will report. We want to ensure the credibility of our reports as individual companies, while trying to manage the complexity, time and costs frequently associated with many verification and certification approaches.

As noted earlier, our Agenda is based on a 20-year timeframe, divided into five-year blocks, matching the cement industry business planning cycles, capital spending and a typical public policy timeline. We recognize that there are other issues that could be addressed by the CSI. However, our first priority is to reduce our footprint from today’s operations. The next two years will give us time to review and analyze possible future approaches. We will report fully on our conclusions and recommendations in our progress report in 2007, along with the status of the key performance indicators described here.

Statement from senior advisory board

The work presented in this report is the result of a collaborative effort among 16 cement companies over several years under the umbrella of the Cement Sustainability Initiative (CSI). We are pleased to have an advisory role in this program, but stress that the results reported here are those of the company participants.

This Initiative represents a serious effort by an important industry sector to tackle complex sustainability issues in a practical, results-oriented way. Using a common set of key performance indicators, which address both business and stakeholder concerns, while requiring public reporting of individual company achievements is a major step forward in providing an important level of accountability for a voluntary program. We encourage the CSI to continue to address ongoing assurance concerns as this work moves forward.

We believe the approach used here could well be applied to other industrial sectors. We encourage others to make the most from both the results and the collaborative, research-based, results-driven approach used in this program.



Dr. Mostafa Tolba, Chair
President ICED, Cairo
Former Director, UNEP



Dr. Claude Martin
Director General
WWF International, Switzerland



Dr. Jim MacNeill
Distinguished Fellow
International Institute for Sustainable Development, Canada

Glossary

- CEMBUREAU** – the European Cement Industry Association
- CDM** – Clean Development Mechanism
- CSI** – Cement Sustainability Initiative
- ESIA** – Environmental and Social Impact Assessment
- ETS** – European Union Emissions Trading Scheme
- GRI** – Global Reporting Initiative
- GTZ** – German Society for Technical Cooperation
- IETA** – International Emissions Trading Association
- IFC** – International Finance Corporation (a member of the World Bank group)
- ILO** – International Labor Organization
- IPCC** – Intergovernmental Panel on Climate Change
- ISO** – International Organization for Standardization
- IUCN** – World Conservation Union
- KPI** – Key performance indicator
- LBL** – Lawrence Berkeley Labs
- LTI** – lost-time injury
- NGO** – non-governmental organization
- NO_x** – nitrogen oxides
- PCB** – polychlorinated biphenyl
- PCDD/F** – dioxins/furans
- PFA** – pulverized fly ash
- POP** – persistent organic pollutant
- SINTEF** – Foundation for Scientific and Industrial Research of Norway
- SO_x** – sulfur compounds
- UNEP** – United Nations Environment Program
- VOC** – volatile organic compound
- WBCSD** – World Business Council for Sustainable Development
- WWF** – World Wildlife Fund (US); Worldwide Fund for Nature (Switzerland)
- WRI** – World Resources Institute

Core members and participating companies

The CSI established different levels of participation: core members who manage and largely finance the Initiative; participating members who have a less active role and a smaller financial commitment ; project partners who have participated in specific task force activities, and communication partners who help us promote and communicate about the Initiative.

Both core members and participating members have signed the CSI Charter. See page 8 for specific commitments.

Core members²²

CEMEX, Mexico
 Cimpor, Portugal
 Corporacion Uniland, Spain
 HeidelbergCement, Germany
 Holcim, Switzerland
 Italcementi, Italy
 Lafarge, France
 Taiheiyo Cement, Japan
 Titan Cement, Greece

Participating members

Ash Grove Cement, USA
 CRH plc, Ireland
 Gujarat Ambuja Cements, India
 Secil Cement Company, Portugal
 Shree Cement Ltd, India
 Siam Cement, Thailand
 Votorantim, Brazil

Project partners

British Cement Association (BCA), United Kingdom
 Cement Industry Federation, Australia
 CEMBUREAU (European Cement Industry Association), Belgium
 The Natural Step International, Sweden
 Verein Deutscher Zementwerke E.V. (VDZ), Germany

Communications partners

American Portland Cement Alliance, USA
 Arab Union for Cement and Building Materials (AUCBM), Syria
 Brazilian Cement Association (ABCP), Brazil
 Cement Association of Canada, Canada
 Japan Cement Association (JCA), Japan
 Limestone Association of Japan, Japan
 Portland Cement Association, USA
 South African Cement Producers Association (SACPA), South Africa

²² CEMEX acquired RMC in 2005 reducing the CSI membership from seventeen to sixteen companies.

Key performance indicators of the cement sustainability initiative

Climate change management

1. Number of facilities and percentage using the WBCSD CO₂ Protocol Guidelines for emissions inventory
2. Company-wide total CO₂ emissions (gross and net), tonnes/year²³
3. Company-wide gross and net CO₂ emissions per tonne of cementitious product

Fuels and materials use

Energy use

1. Specific heat consumption of clinker production, in MJ per tonne of clinker
2. Alternative fossil fuel rate: consumption of alternative fuels, as a percentage of thermal consumption
3. Biomass fuel rate: consumption of biomass, as a percentage of thermal consumption

Raw materials use

1. Alternative raw materials rate: consumption of alternative raw materials, as a percentage of total raw materials for cement and clinker production (calculated on a dry basis)
2. Clinker / cement factor: ratio between clinker consumption and cement production calculated according to cement protocol.²⁴

Health and Safety

Fatalities²⁵

1. Number of fatalities and fatality rate per 10,000 for directly employed
2. Number of fatalities indirectly employed (contractors and subcontractors)
3. Number of fatalities involving 3rd parties (not employed)

Lost-time injuries

1. Lost time injuries and injury frequency rate (per 1,000,000 man-hours directly employed.)
2. Number of lost time injuries for indirectly employed (contractors and subcontractors).

Emission monitoring and reporting

1. Percentage of clinker produced by kilns covered by a monitoring system, either continuous or discontinuous for main and other pollutants
2. Percentage of clinker produced by kilns which have installed continuous measurements for the main pollutants
3. Company-wide specific (g/tonne of clinker), and total (tonnes/year) releases for:²⁶
 - 3.1 NO_x
 - 3.2 SO_x
 - 3.3 Dust

Local impacts

1. Percentage of sites with community engagement plans in place
2. Percentage of active sites with quarry rehabilitation plans in place
3. Number of active sites where biodiversity issues are addressed

²³ All CO₂ measurements to be made in accordance with the WBCSD/WRI CO₂ Protocol guidelines. See the website for the most current version (www.ghgprotocol.org/standard/tools.htm)

²⁴ Some regulations limit the use of alternative materials aimed at reducing the clinker/cement factor. This can limit progress on this KPI in some locations.

²⁵ See "Employee Safety in the cement Industry: guidelines for measuring and reporting," for precise definitions of terms. See www.wbcscement.org/health.asp for the most recent version.

²⁶ See "Guideline for Emissions Monitoring and Reporting Protocol for the Cement Industry," for detailed definitions.

About the WBCSD

The World Business Council for Sustainable Development (WBCSD) is a coalition of 175 international companies united by a shared commitment to sustainable development via the three pillars of economic growth, ecological balance and social progress. Our members are drawn from more than 35 countries and 20 major industrial sectors. We also benefit from a global network of 48 national and regional Business Councils and partner organizations involving some 1,000 business leaders.

Our mission

To provide business leadership as a catalyst for change toward sustainable development, and to promote the role of eco-efficiency, innovation and corporate social responsibility.

Our aims

Our objectives and strategic directions, based on this dedication, include:

Business leadership: to be the leading business advocate on issues connected with sustainable development

Policy development: to participate in policy development in order to create a framework that allows business to contribute effectively to sustainable development

Best practice: to demonstrate business progress in environmental and resource management and corporate social responsibility and to share leading-edge practices among our members

Global outreach: to contribute to a sustainable future for developing nations and nations in transition.

Disclaimer

This report is released in the name of the WBCSD and the Cement Sustainability Initiative. It is the result of a collaborative effort by members of the secretariat and executives from member companies participating in the Cement Sustainability Initiative (CSI). Drafts were reviewed among CSI members, so ensuring that the document broadly represents the majority view of this group. This does not mean, however, that every member company agrees with every word.

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