

# The Cement Sustainability Initiative

10 YEARS OF  
PROGRESS AND  
MOVING ON  
INTO THE NEXT  
DECADE

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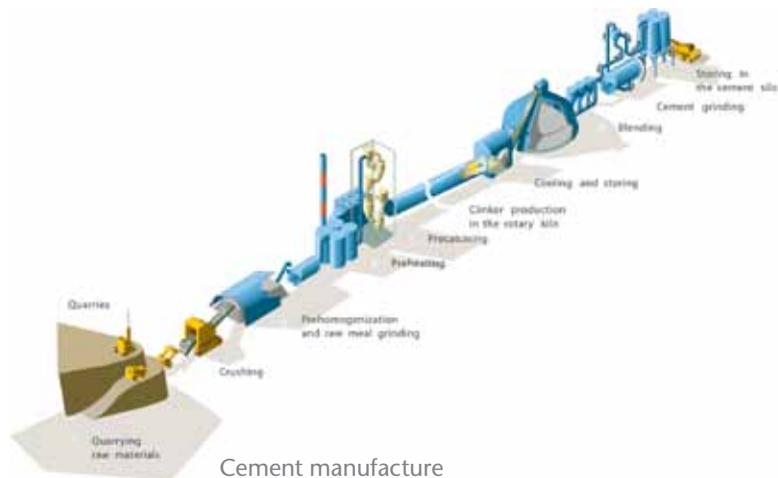
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# Letter from the CSI CEOs:

## *A continued commitment to sustainability*

Dear Reader,

Over a decade ago, a group of leading cement companies came together and created the Cement Sustainability Initiative (CSI), under the auspices of the World Business Council for Sustainable Development (WBCSD). Thus began a journey based on a voluntary, continuous improvement approach, and focused on making the cement industry and business in general, more sustainable. This approach epitomizes the spirit and goals of the WBCSD, an organization founded following the Earth Summit in Rio de Janeiro 20 years ago. As governments are reviewing progress since that first Rio meeting, it is an appropriate time to examine how the CSI has turned words into actions over the first decade of its existence.

The CSI first identified critical sustainability issues for the cement industry, and developed plans and actions to address them. These issues included improving employee health and safety, reducing CO<sub>2</sub> emissions and other airborne pollutants, promoting the most efficient and effective use of fuels and raw materials, managing and minimizing local impacts of operations, and expanding communications with their stakeholders. In all these areas, the CSI has effectively added value and contributed to sustainable solutions through the development of transparent and commonly agreed methodologies, and by facilitating the sharing of best practices among members.

In facing the challenges of climate change, the CSI has been fully engaged in policy development at the highest levels, working with governments throughout Europe, Japan, and Mexico (among others), and with the UN, to contribute substantive industry proposals and examples to discussions within the UN Framework Convention on Climate Change. This work has helped open the way for more, and stronger, business participation in this, and other UN processes.

*The CSI has effectively added value and contributed to sustainable solutions through the development of transparent and commonly agreed methodologies.*

The CSI has moved with global trends, and now focuses more attention on emerging markets, given that the majority of the world's cement is now produced in these regions, with China alone accounting for more than half of global cement production. The now 24-member-strong CSI has increased membership from China, India, Brazil and other developing nations, and nations in transition. Today two-thirds of the CSI members come from outside Europe.

*The world expects business not only to manage its own sustainability issues, but to help Society manage wider issues.*

The world expects business not only to manage its own sustainability issues, but to help society manage wider issues. Therefore, the CSI's ambitions have moved beyond those set out in our 2002 *Agenda for Action*, and now includes improving management of biodiversity, water, and other impacts in our upstream quarrying activities at one end, and encouraging sustainable construction practices downstream with our products at the other end.

The original "Agenda" was a list of objectives, this report is a record of achievements and also outlines our view of the path forward. We are proud of this progress, but even prouder of – and very grateful to – our employees and the many other stakeholders, who made this progress possible, both individually and collectively. CSI will make sure that this collaborative spirit, supported by strong leadership and ambitious commitments, remains as the motivation of the initiative.

During the next 10 years, the world will undoubtedly change markedly again. However the CSI remains dedicated to leading the cement industry in setting its objectives, achieving its goals, and to remaining at the forefront of sustainable business development.

# I ntroduction

The Cement Sustainability Initiative (CSI) is a voluntary CEO-led global program initiated by leading cement companies in 1999, and operating under the auspices of the World Business Council for Sustainable Development (WBCSD). The member companies of the CSI believe there is a strong business case for the pursuit of sustainable development, and that, in addition to their respective individual commitments and achievements, collective action by business is crucial to create a sustainable future.

Today, the CSI represents 24 member companies, with operations in over 100 countries, accounting for about one third of global cement production. Members are headquartered in Brazil, China, Colombia, France, Germany, Greece, India, Ireland, Italy, Japan, Mexico, Portugal, Switzerland, and Thailand.

In addition, the CSI is partnering with more than a dozen national or regional cement trade associations, to cooperate on all aspects of its work, and ensure a proper information sharing process at national, regional and international levels. On the basis of the work carried out at international level, such as common methodologies and reporting guidelines, the CSI can leverage on these partners' established links with the respective national authorities and policy-making bodies to gain support, and promote the interests of the cement sector. Reciprocally, these partners also provide specific national and regional inputs into the international processes managed by the CSI.

Whilst being aware that the proper understanding and management of sustainability issues would be a prerequisite to development and growth for the sector, the founding members of the CSI started out with extensive research and stakeholder consultation to develop the baseline from which to address sustainable development in the cement industry. Based on this work, the CSI's *Agenda for Action* was published in

2002. It sets out the work program, including joint and individual company commitments on the major sustainability issues in the cement industry, including:

- *Safety*
- *Climate protection*
- *Air emissions*
- *Use of fuels and raw materials*
- *Local impacts on land and communities*
- *Communications*

Based on that *Agenda for Action*, the CSI member companies collectively established guidelines for good practice in all these areas, and agreed on key performance indicators (KPIs) and measurable targets, while developing methodologies



to report on these KPIs. All these tools contribute effectively to the sustainable development of the cement sector only if fully and properly implemented by CSI members and the global cement industry beyond. That is why the associated publications are free and available to all for download from the CSI website at [www.wbcscement.org](http://www.wbcscement.org).

Each member commits to implement the CSI guidelines in its operating facilities, as well as to set individual performance targets, and to report publicly on progress.

This report describes the achievements of the CSI and its member companies in addressing the commitments undertaken in 2002, and outlines how the CSI strives to improve the performance of the whole sector, in collaboration with external partners when appropriate. Managing sustainable development issues is a continuous improvement process, CSI aims at building trust in the cement sector, to assume its responsibilities and be a driving

force for the future. In this regard, transparency is key: this report reflects this approach, providing all stakeholders with a view of the CSI's achievements so far, and of the challenges now, and in the years ahead.

#### CSI CHARTER

By joining the initiative, companies sign up to the CSI Charter. It summarizes the individual member actions included in the CSI's *Agenda for Action*, as well as those added later. Each member commits to implement these actions within three years as a minimum requirement of membership, and as part of their contribution to sustainable development. For example, the Charter requires companies to use the jointly developed CSI tools, such as the Cement CO<sub>2</sub> and Energy Protocol and the Emissions Monitoring and Reporting Guidelines, to set reduction targets for CO<sub>2</sub> and other major air emissions, and to report annually on progress towards reaching these targets. Details about the Charter can be found on the CSI website: [www.wbcscement.org](http://www.wbcscement.org)



# F

## uture challenges and commitments

When the CSI began, sustainability was a relatively new concept in business. The basics of the concept were globally, albeit unequally, understood, but they had not been translated into sector-specific actions. The world today is different and expects business not only to manage its own sustainability challenges, but to help society manage theirs. The next ten years will see more systematic attempts to measure and account for the full cost of externalities – environmental as well as social, with demands on business likely to increase. Companies' access to resources, funding and license to operate will increasingly be linked to their sustainability performance:

- Market trends will be different in developed countries compared to emerging markets.
- In mature markets with low overall growth, cement and concrete, while remaining a building material of choice, are under increasing scrutiny with regards to their environmental and social impacts.
- In emerging markets, rapid growth will drive a significant expansion of cement and concrete production. Voluntary commitments and actions by

cement producers, together with competitive conditions for access to resources, will be the key driver for the sustainability of the sector.

The CSI has identified several global trends, albeit with important regional differences, which are believed will impact the cement industry over the following decade:

- Population growth and urbanization will lead to increasing demand for sustainable building and infrastructure works. Hundreds of millions of people will move into expanding urban centers, primarily in Asia and Africa. Working in hand with urban planners and local authorities, the cement sector will play an important role in building the sustainable cities of tomorrow.
- The extraction of raw material resources will need to be reduced through increased recycling, to offset increasing demand resulting from population growth and rapid urbanization. In other words, the cement sector (and society at large), will have to do more with less.
- Life-cycle assessments over the entire life of buildings and infrastructure, including environmental, social and economic criteria will gain in importance. Producers will increasingly be held accountable for the impacts of end-uses and services that are provided by their products through their value chain. CSI and its members will work to develop commonly agreed tools for the sector in order to play a driving role in this process.
- The promotion of biodiversity and active management of ecosystems (including water) will create new opportunities. Companies capable of managing, restoring and enhancing ecosystems will potentially gain better access to resources and markets, and will be considered as partners of choice.
- Increasing living standards and closer focus on quality of life will increase expectations on companies' work-place health and safety records, scrutiny of emissions from their operations, and the safety of their products for end-consumers. The way companies will manage these issues will determine their appeal, and their ability to retain a talented workforce, in a globalized world driven by mobility and multiple opportunities.
- Community expectations vis-à-vis companies, already very diverse today, will be increasingly driven by local agendas, requiring greater cultural sensitivity and flexible, local approaches, where trust and credibility are key.

When the CSI began, it focused on the sustainability issues of cement production. As the industry moves towards a more integrated model including aggregates and concrete production, the CSI is also expanding its work program to include a focus on the sustainability of concrete. This includes both the production and the use of concrete, and looks at the contribution concrete can make to sustainable buildings and infrastructure.

This broader approach to sustainability will be reflected in the future objectives and targets of the CSI and its member companies. As in the past, firm commitments on specific issues will continue to be communicated transparently, together with the ongoing monitoring of progress.

The following Mission statement summarizes the role the CSI strives to play to promote sustainable development in the cement sector and its value chain:

#### CSI MISSION:

The CSI is an alliance of the leading companies in the global cement business. It will build its role as the recognized international voice of the global cement industry for sustainable development. CSI members will be known for applying sustainability practices throughout their global operations.

The CSI provides a platform for a shared understanding of sustainability issues, developing and distributing practical tools, facilitating effective stakeholder engagement and providing sustainable solutions. It aims to be the partner of choice for international governmental organizations, trade associations, academia and NGOs to develop the critical sustainability research, principles, policy and practice within the cement industry and its value chain.



The CSI will adapt its global response to the different contexts in which its members operate. It will also adapt its membership and associated resources to ensure proper representation of the current and future cement and concrete market, with further development and expansion in fast growing countries like China and India, and also other regions of the world where it is currently less present.

The following sections of this report outline the CSI's achievements on the issues described in the original *Agenda for Action*, as well as future action on these and other new topics. CSI will handle these different issues with adapted action plans:

- For the original issues, the CSI will adapt and broaden its actions, strengthen implementation plans to ensure targets and objectives are achieved as efficiently and rapidly as possible.

- For newly emerging issues, depending on the level of available knowledge, the CSI will initiate research to increase its understanding and where appropriate, define, develop and implement targets and action plans.

The objective of the following chapters is to provide the reader with an overview of the background and objectives for each aspect of the *Agenda for Action*. The CSI will use exemplary evidence for achievements, for the sake of keeping this report short. The figures and data quoted herein are sourced from latest CSI records available at the time of this report. Further information and latest updates on CSI-defined KPIs and members' performance in addressing them can be found on the CSI website

[www.wbcscement.org](http://www.wbcscement.org).



CSI

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Cement Sustainability Initiative



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CEMENT  
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# Safety

The CSI's research and comparison highlighted that the cement industry needs to work significantly to improve its safety performance to reach the targeted level of best-in-class industries. To address this, work focused initially on ensuring common performance indicators and measurement methodologies, so that members could have a common guidance for monitoring accidents including fatalities evolution over time. In 2005, the CSI published guidelines for measuring and reporting safety (subsequently updated in 2008 and 2012), and companies have been sharing examples of good practice in health and safety management throughout the past years.

As a result of this work:

- CSI members track and report common metrics on employee safety.
- CSI members have gradually reduced the number of accidents and injuries among employees, but have had less success in reducing fatalities, particularly among drivers and contractors (where a significant number of fatalities happen).

The CSI developed and is implementing detailed recommendations reflecting best practices, both within and outside the CSI, to address issues relating to driving and contractors. Companies are implementing the recommended practices individually, and reporting progress back to the CSI under a common framework.

Safety is not a competitive issue. All companies are interested in working together to ensure the safety of their employees, contractors and third parties with whom they interact. All CSI materials are made freely available to the rest of the cement industry to support global improvements.

[www.wbcscement.org/safety](http://www.wbcscement.org/safety)

Figure 1  
**Employee lost time incident frequency rate  
 (per million manhours, directly employed) for all activities**

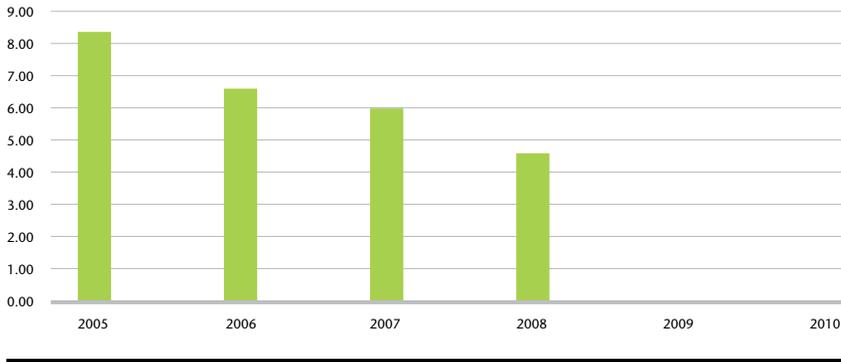
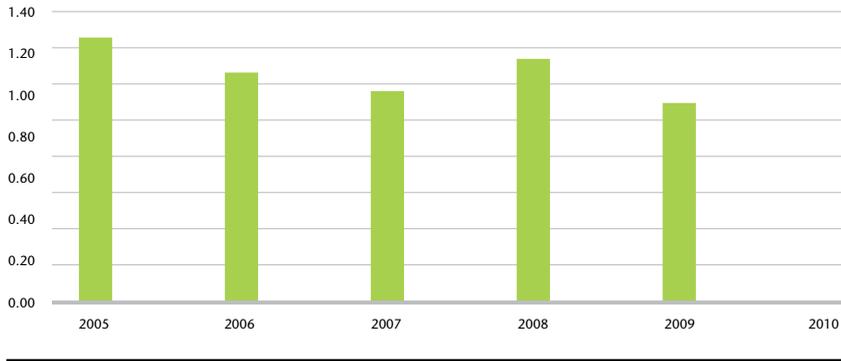


Figure 2  
**Employee fatality rate (per 10,000  
 directly employed) for all activities**

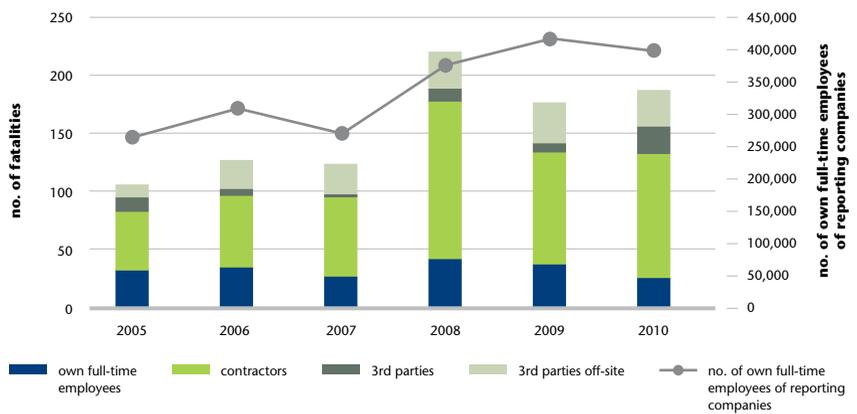


Note:

- The CSI guidelines for measuring and reporting safety was published for the first time in 2005. Before that, the data collected covers only cement activities instead of all different type of activities of member companies, i.e. aggregates, ready-mix, etc. Hence, only data from 2005 onwards are presented here to provide a comparable basis.
- “Lost time incident frequency rate” in Figure 1 refers to the employee lost time in hours per 1,000,000 manhours of directly employed full-time employees; “Fatality rate” in Figure 2 is calculated based on total number of fatalities in all activities (cement, aggregates, ready-mix, etc) per 10,000 directly employed full-time employees.

With fluctuation in the early years, a mild decreasing trend is noted in fatalities of companies’ own full-time employees and contractors from 2008. However, fatalities of third parties increased during the same period. Even after taking into account the factor of better and wider scope of reporting, the situation still warrants more efforts to improve companies’ performance in the area.

Figure 3  
**Total number of fatalities for all activities  
 by employment type**



## *Going forward*

The vision and ultimate goal of CSI is to completely eliminate fatalities from the sector, in all operations under the control of its member companies. Within 10 years, the average safety performance of the CSI companies will match that achieved by the leading industrial sectors.



To achieve this, the CSI works continuously to enhance individual members' efforts by collecting and sharing information on safety events (incidents and accidents), focusing on sharing and discussing good safety practices on critical activities, to address the root causes of fatal accidents and prevent such accidents from occurring again in any location.

Being aware that experience, learning and information sharing are crucial in this process, CSI is partnering with the Global Road Safety Partnership. This partnership is operating in some 30 countries, bringing governments, businesses and civil society organizations together to help tackle the man-made, global road accident crisis, particularly in emerging regions. Hosted by the International

Federation of the Red Cross and Red Crescent Societies, it has unique credibility and access to all sectors of society. This partnership will assist in tackling road safety fatalities, a major cause of fatalities in the cement industry.

The CSI is also setting up country level workgroups with its members operating in the area to address safety issues at the local level. So far, local initiatives are operating in India, Brazil, Thailand, Egypt, Mexico and China. In addition to addressing rising safety concerns from the operations, the CSI is also working with a leading by example approach by engaging company CEOs of its members to share, discuss and agree on safety leadership practices at the most senior level.

The focus of the CSI's work in the past has been on safety, with good reasons. Nevertheless, a healthy work force goes hand-in-hand with safe operating practices. With that in mind, CSI has embarked on a scoping exercise to identify how a coordinated approach to health issues, through CSI, could bring added value to members (in addition to their individual initiatives), and also to the cement sector as a whole. Cooperation with trade associations that are doing significant work in this area will identify potential synergies in that approach.

# E<sub>nergy</sub> and Climate

Carbon emissions are an important sustainability issue for the cement industry as global cement manufacture accounts for about five percent of all man-made CO<sub>2</sub> emissions. CSI's climate-related work has followed five distinct tracks: (1) monitoring and verification, (2) reporting and analysis, (3) promoting best practice for CO<sub>2</sub> reductions in operations and products, (4) participating in policy work at global and national levels, and (5) building engagement with the cement industry in developing markets. Over the past decade, this work has led to many significant accomplishments.

CSI member companies commit under the CSI Charter to develop a climate change mitigation strategy and to report their CO<sub>2</sub> emissions, reduction targets and progress towards reaching those targets. 15 of the 24 member companies are doing so in their annual sustainability reports, with members who joined more recently still working towards this goal as part of the CSI Charter implementation process. Reporting is based on key performance indicators (KPIs) defined in the Cement CO<sub>2</sub> and Energy Protocol (CSI CO<sub>2</sub> Protocol).

The CSI CO<sub>2</sub> Protocol is a cement sector-customized version of the Greenhouse Gas Protocol (GHG Protocol) jointly developed by WBCSD

and the World Resources Institute (WRI). It was first released in 2001 and updated in 2005 and 2011. It is used by the majority of cement producers worldwide and serves as the basis for the development of an international standard for assessing greenhouse gas emissions in the cement sector [www.wbcsdcement.org/co2protocol](http://www.wbcsdcement.org/co2protocol).

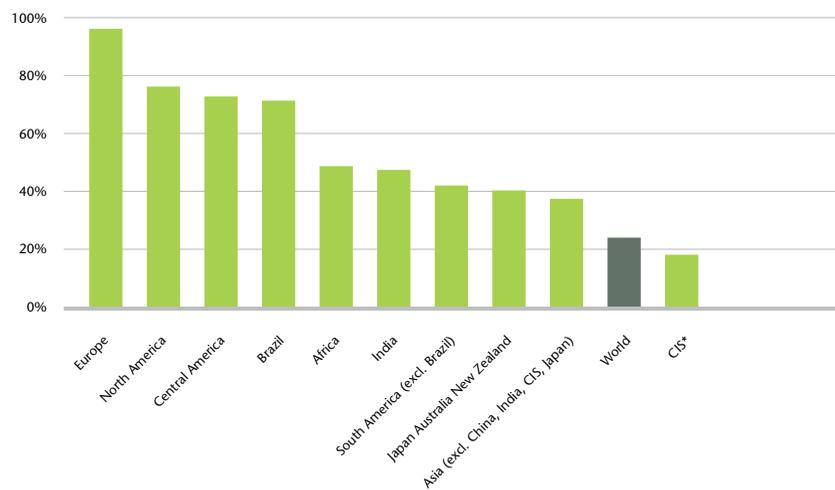
A global database, called "Getting the Numbers Right" (or GNR), tracks historical CO<sub>2</sub> emissions and energy consumption from cement production facilities, collected through the CSI CO<sub>2</sub> Protocol. It provides aggregate data that offers a sound analytical base for cement manufacturers and policymakers. Most recent data from this database, from 2010, covers 930 individual facilities producing 827 million

tonnes cement. This comprises 25% of global cement production, with significant differences in coverage across world regions (see Figure 4), from over 95% in Europe, over 70% in the Americas, to less than 20% in the Middle East, Commonwealth of Independent States (former Soviet Union countries), and China (which accounts for more than 50% of the world's cement production). The CSI is working on increasing coverage in these regions.

In terms of assurance, 79% of the data is verified independently at the participating company level, which makes the database a reliable source of information for companies, research organizations, policy makers and individuals interested in the broad issue of carbon emissions.

[www.wbcsdcement.org/co2data](http://www.wbcsdcement.org/co2data)

Figure 4  
**GNR coverage (% of cement production, 2010)**



Source: GNR database

\* CIS: Commonwealth of Independent States (former Soviet Union countries)

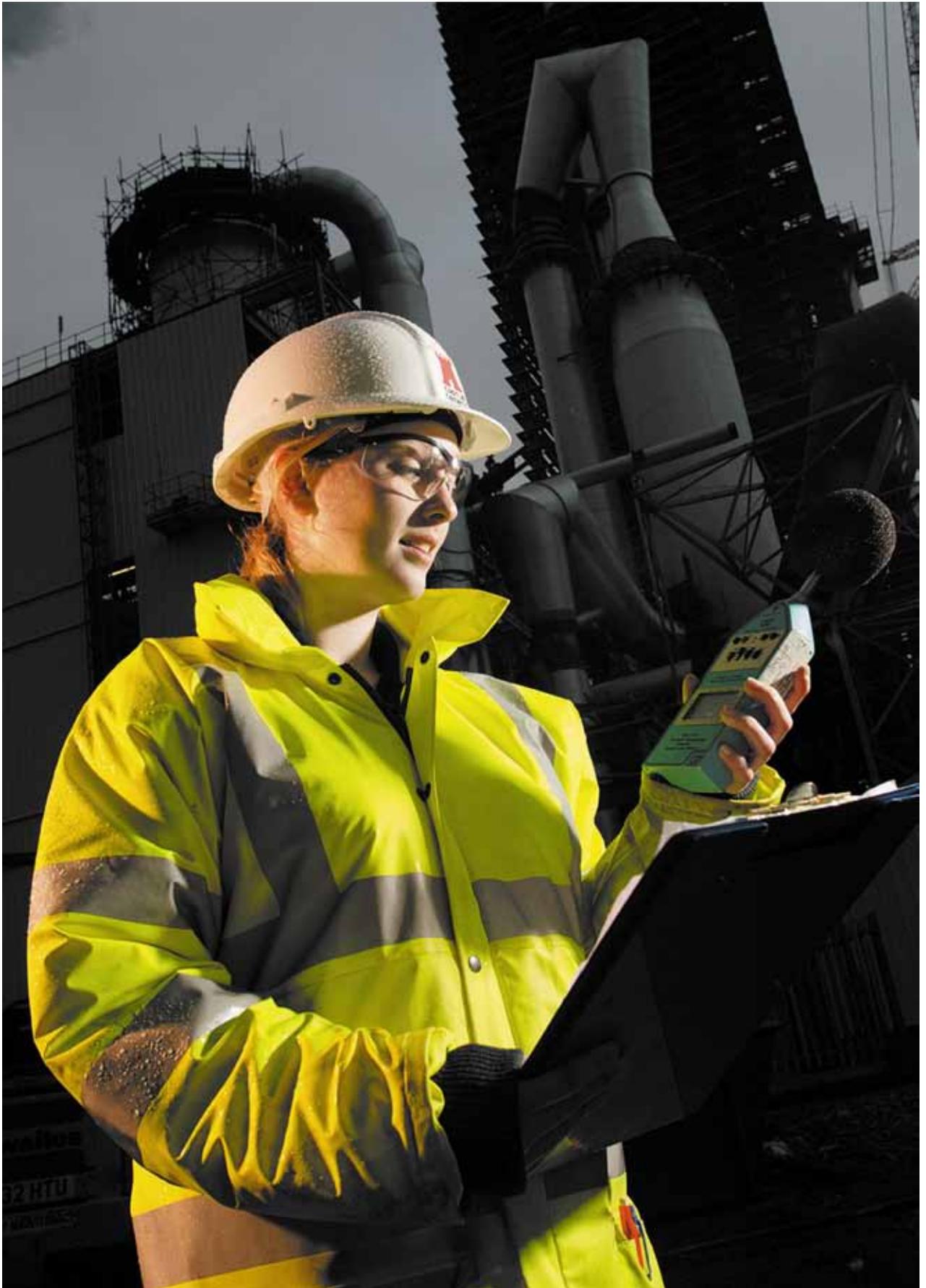
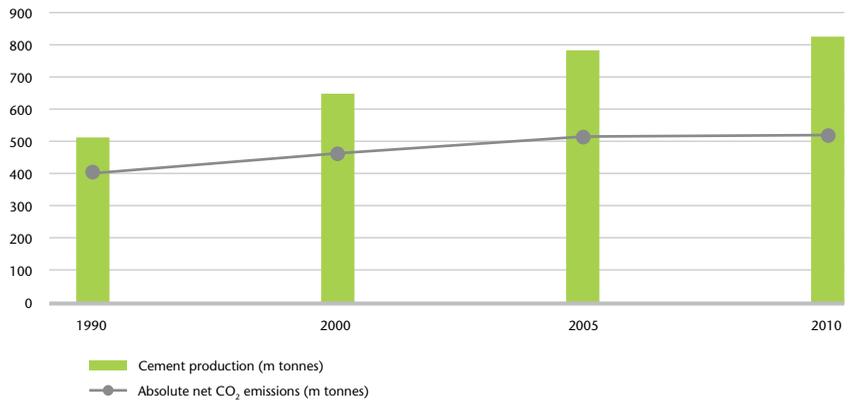


Figure 5 shows the increase in cement production by the companies reporting to GNR between 1990 and 2010. While the production grew by 61%, the associated CO<sub>2</sub> emissions grew by 39%, which shows evidence of a decoupling of production and related emissions.

Perimeter of CO<sub>2</sub> emissions considered: only direct CO<sub>2</sub> emissions related to the production of cement and clinker, excluding on-site electricity production.

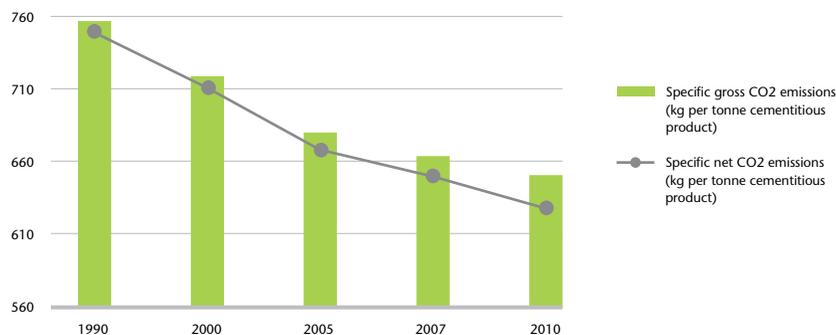
Figure 5  
**CO<sub>2</sub> emissions from cement production (1990-2010)**



Source: GNR database

The slowing of CO<sub>2</sub> emissions from cement production is shown in Figure 6. Gross CO<sub>2</sub> emissions per tonne of product have been reduced by 14% since 1990. When considering net CO<sub>2</sub> emissions (i.e. gross CO<sub>2</sub> emissions minus emissions from the use of alternative fossil fuels), the reduction in emissions per tonne of product has been 16%.

**Reduction of specific CO<sub>2</sub> emissions (1990-2010)**



Source: GNR database

Gross CO<sub>2</sub> emissions:  
direct CO<sub>2</sub> emissions  
(excluding on-site electricity production) minus emissions from biomass fuel sources

Net CO<sub>2</sub> emissions:  
gross CO<sub>2</sub> emissions minus emissions from alternative fossil fuels (see also Figure 7 below)

Cementitious product:  
the total of all cement and clinker produced by a cement company and mineral components sold directly to the market, excluding the clinker purchased from another company and used to make cement.

The energy efficiency of cement kilns is one lever to reduce CO<sub>2</sub> emissions. The average thermal energy consumption of the companies reporting to GNR reduced from 4260 Megajoule (MJ) per tonne clinker in 1990 to 3580 MJ in 2010, a 16% decrease. In some regions, notably in parts of Asia, thermal energy consumption is below 3400 MJ, with the Indian cement industry leading on efficiency, with 3130 MJ per tonne clinker in 2010. Details on this can be found on

[www.wbcscement.org/co2data](http://www.wbcscement.org/co2data).

CSI data formed the basis for comparing economic and trade impacts from different climate policy options, in a series of papers widely

shared with government policy-makers. Similarly, this data was the starting point for a new Clean Development Mechanism (CDM) methodology proposal to the United Nations.

The WBCSD and the International Energy Agency (IEA) jointly published the Cement Technology Roadmap to 2050, outlining the existing and potential technologies, as well as policy needs, that could contribute to greenhouse gas reductions in the cement sector up to 2050. A customized version is being developed in India, and it is planned that further exercises of this kind will follow.

### CDM METHODOLOGY

The CSI and the Dutch consulting group Ecofys developed a new CDM methodology based on sectoral benchmarking CDM in order to increase the use of the CDM process for the cement industry. This methodology is performance-based (i.e. measured in CO<sub>2</sub> per ton of clinker or cement) and allows combining several emissions reduction measures and process improvements. It uses statistical information from the GNR database to define systematically and objectively a baseline benchmark (taking into account “business-as-usual” improvements) and an additionality benchmark.

With this innovative methodology and the choice of adequate additionality and baseline benchmarks, the CSI aimed at enabling a crediting

system that provides an effective business incentive for companies to reduce overall CO<sub>2</sub> emissions to a stringent and ambitious performance level. The methodology was submitted to the CDM Executive Board (EB) in 2009. Unfortunately the CDM Methodology Panel and the CSI could not find consensus on the balance between business incentive and ambitious environmental integrity, leading to the rejection of the methodology by the Meth Panel in 2011.

The methodology, however, seems to have inspired the development of the CDM EB’s new guidelines for standardized baselines and the more recent policy debate on new market mechanisms and sectoral baselines.

The CSI aims at maintaining its role as a recognized and influential leader in the energy and climate debate. It will continue to provide practical approaches to energy and carbon management, based on careful analysis of the available emissions reduction levers of the industry. It will expand the global database with emphasis on participation in key developing markets like China, India and Latin America, while maintaining a high data assurance level. To encourage and assist this overall process, the CSI will build more effective communications platforms with cement companies, trade associations, national governments and NGOs in the different regions.

CSI member companies will continue to monitor and report their CO<sub>2</sub> emissions according to the highest standards and they will develop new reduction targets when the initial objective is achieved. In practical terms, the CSI will:

- Support the work of the European Committee for Standardization (CEN) and International Organization for Standardization (ISO) to turn the CSI protocol into an international standard.
- Develop a common methodology for scope 3 emissions in the cement sector
- Define rules for Environmental Product Declarations for concrete to communicate information on carbon footprint and other environmental impacts of concrete products.
- Select potential collaborations with respected international research or policy organizations that could support the credibility of CSI work. For instance, a Memorandum of Understanding was signed in early 2012 between WBCSD and IEA to cooperate on various energy-related issues.
- Review the potential for CSI to add value to research on greenhouse gas emission reductions, e.g. low-carbon cement, carbon capture etc.

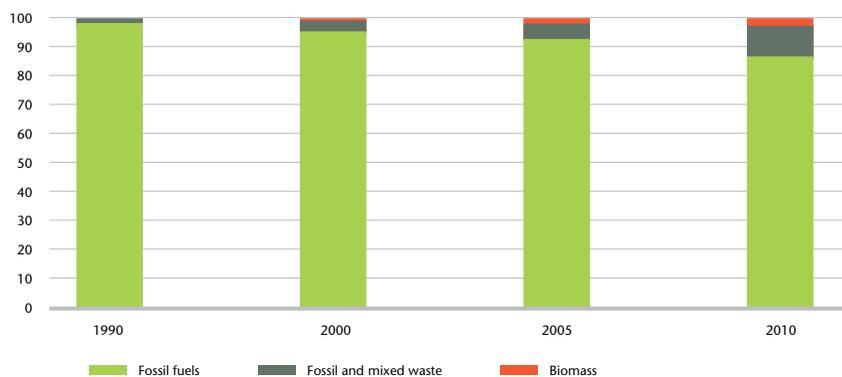
# Alternative Fuels and Raw Materials

The use of alternative fuels and raw materials is a further important lever for the reduction of CO<sub>2</sub> emissions from cement production. Also, the cement kiln, operating at high temperature with a long residence time, provides an effective, environmentally sound way to help society dispose of unwanted waste materials, such as discarded tires, waste oils, plastics which can no longer be recycled, municipal solid waste and sewage sludge.

A common concern among community residents near cement plants is the possible health effects from plant operations, particularly from handling more diverse alternative fuels. The CSI works to ensure that companies take the appropriate measures when handling alternative fuels and raw materials to maintain safety standards and reduce to a minimum any environmental impacts. Sharing of best practices via CSI guidelines is a key focus of CSI. Strict quality controls for cement products, together with the nature of the manufacturing process, mean that only carefully selected waste is suitable for use. It has been shown that operations based on current state-of-the-art knowledge and technology do not have negative impacts on the environment, nor on the health of workers and surrounding residents.

Figure 7:

**Average thermal energy from alternative fossil fuels, biomass and fossil fuels (in %, 1990-2010)**



Source: GNR database

#### Alternative fossil fuels:

Fuels derived from waste (excluding biomass) used for fossil fuel substitution in clinker production

In 2005, the CSI produced a clear set of guidelines for alternative fuel and raw material use defining appropriate practices for materials control, emissions monitoring, and employee safety (among other subjects). Individual companies use these guidelines within their own operations and they report certain performance indicators, such as the rates of alternative fuel and biomass fuel rates and alternative raw materials rate.

The Figure 7 shows the increase of the use of alternative fossil fuels and biomass in cement production, expressed in average thermal energy derived from these alternatives to fossil fuels.



Substitution of clinker with alternative materials containing mineral components (gypsum, pozzolana, limestone, fly ash and slag) also contributes to reducing CO<sub>2</sub> emissions from cement production, and these materials can add important properties to produce different types of blended cements. The use of mineral components by companies reporting to the GNR database has increased significantly, which is expressed in a lowering of the clinker-cement ratio. This ratio fell from 82.9% in 1990 to 75.3% in 2010, a 9% reduction. Details can be found on [www.wbcdcement.org/co2data](http://www.wbcdcement.org/co2data).



### *Going forward*

Co-processing of waste as a replacement of traditional fossil fuels is playing an ever more important role as, with rapid population growth and economic development, waste generation has increased considerably in particular in rapidly developing economies. Interest in co-processing municipal solid waste and sewage sludge in particular is rising. As a consequence, the cement industry can use part of this waste as alternative fuels and raw materials, thus reducing the use of fossil fuels while providing a benefit to society by reducing the need for incineration or land-filling of waste.

Cement companies must continuously prove that their ability to co-process waste materials in appropriate and safe ways that match the expectations of stakeholders with regards to the responsible way in which these resources are used. The acceptance of co-processing by local communities is a key element in the development of the activity.

As the knowledge of alternative fuels and raw materials for the cement sector has improved and the availability of such alternative resources has increased over recent years, the CSI works to update its existing guidelines on the core rules for the environmentally sound and safe handling of waste materials, both hazardous and non-hazardous, and to provide examples of what can be achieved to support local legislation on this issue. In addition, the CSI will contribute to the wider dissemination of that knowledge and the new guidelines, particularly in fast growing countries. CSI will support the activities of regional and national trade associations in that respect, including with local authorities, to facilitate the development of the responsible use of alternative fuels and raw materials.

[www.wbcdcement.org/fuels](http://www.wbcdcement.org/fuels)

# Air Emissions

Cement plants, like other energy intensive operations, produce air emissions (other than CO<sub>2</sub>) that must be controlled and mitigated. In 2005, the CSI published guidelines on emissions monitoring and reporting which identified the specific pollutants and emission sources which all CSI member companies agreed to monitor. The objectives of the guidelines were to:

- Encourage uniform monitoring and reporting of cement process emissions.
- Provide credible, relevant, and easily understandable information on emissions.
- Provide internal management with a tool for gathering relevant information to plan cement emissions monitoring and reporting.

The guidelines called for regular measurement of main pollutants, nitrogen oxide (NO<sub>x</sub>), sulfur oxide (SO<sub>x</sub>) and dust, using agreed analytical techniques, and regular reporting and verification. In addition, companies have set individual reduction targets for main pollutants, and report annually on their progress in reaching these targets. The guidelines called also for status analysis for other pollutants, Volatile Organic Compounds (VOCs), (volatile) trace metals and dioxins and furans (PCDD/Fs).



Furthermore, the CSI conducted extensive research on documenting and minimizing minor emissions of hazardous materials, such as persistent organic pollutants (POPs) and mercury from cement kiln operations. In a study commissioned by the CSI to the SINTEF, more than 2000 measurements of PCDD/Fs were collected from individual CSI members. Working with the United Nations Environmental Program (UNEP) and the Stockholm Convention, the CSI played a strong role in developing and promoting control techniques to minimize inadvertent PCDD/Fs emissions. In a study commissioned together with the European Cement Association (CEMBUREAU), from the University of Liège (ULg) in Belgium, the CSI provided an overall inventory of mercury emissions in the cement industry worldwide, and identified the best practices available to reduce such emissions.

In 2012, the CSI published an update of its emissions guidelines. This update takes into account the experience

gained during implementation and evaluation of the first guidelines and of the development of the regulatory framework in the years since. The main changes from the previous guidelines are the requirement for continuous emission monitoring of main kiln stack emissions (NO<sub>x</sub>, SO<sub>x</sub>, dust), recommendation for continuous monitoring of VOCs and regular measurement of mercury, PCDD/Fs and metals (volatile and other heavy metals). The guidelines provide increased precision on measurement standards, and options on the type of equipment to be used. CSI member companies have committed to implementing the new guidelines by the end of 2015.

[www.wbcscement.org/emissions](http://www.wbcscement.org/emissions)

Table 1 summarizes the commitments CSI member companies have taken on emissions and the main changes between the old and the new emissions guidelines (the detailed status of companies' commitments can be viewed on the CSI website):

Table 1: Comparison of CSI emissions guidelines 2005 and 2012 and their implementation

ISSUE	2005 EMISSIONS GUIDELINES		2012 EMISSIONS GUIDELINES
<b>MAIN POLLUTANTS<sup>1</sup></b>	Recommended frequency of measurements: Continuously, but at least once a year		The use of continuous emission monitoring (CEM) technology is mandatory (to be implemented by the end of 2015)
<b>STATUS OF COMMITMENTS</b>	KPI: % clinker produced with continuous monitoring of major emissions	13 of 15 reporting companies have installed CEMS, covering 50-100% of their respective clinker production <sup>3</sup>	
	KPI: Published reduction targets for major emissions	12 of 15 reporting companies have published targets <sup>3</sup>	
<b>OTHER POLLUTANTS<sup>2</sup></b>	Recommended frequency of measurements: Status analysis (fingerprint) for each kiln. Repeated analysis necessary, if significant changes in process, raw material composition, fuels or operations occur		Frequency of measurements: Continuously or at least once a year for VOC; once a year for Mercury <sup>4</sup> ; once every two years for Dioxins/ Furans and all other heavy metals
	KPI: % of clinker produced with monitoring of major and minor emissions	13 of 15 reporting companies monitor emissions, covering 50-100% of their respective clinker production <sup>3</sup>	

1 Main pollutants:

Dust / particulate matter; Oxides of nitrogen and other nitrogen compounds (NO<sub>x</sub>), Sulfur dioxide and other sulfur compounds (SO<sub>x</sub>)

2 Other pollutants:

Trace metals and their compounds (Hg, Cd and Tl as a minimum in 2005 guidelines; also all other heavy metals in 2012 guidelines: Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V), volatile organic compounds (VOCs), Dioxins/ Furans (PCDD/Fs)

3 Newer CSI members are working towards this goal.

4 If the plant emission level is below 25 µg/Nm<sup>3</sup>, measurements should be conducted at least once every two years

## Going forward

The risks associated with the release of mercury and its compounds on people's health and the environment is of great concern to stakeholders, in particular local communities and regulatory authorities. National or regional legislation (US, EU) are already in place, and work has started under the umbrella of UNEP, on two parallel tracks:

- The Intergovernmental Negotiating Committee (INC), whose work aims at delivering a global, legally binding instrument to manage mercury emissions from the different sectors.
- The Global Mercury Partnership, which will deal mainly with dialogue and experience sharing

in various industry sectors on the management of mercury and its compounds from different activities. This partnership process will feed information and data into the decision making process of the INC track.

The CSI supports the work carried out by UNEP and is co-chairing the cement partnership on mercury as agreed by the Partnership Advisory Group (PAG) of UNEP in November 2011. This overall mercury management process develops and shares knowledge on mercury baseline data, emissions factors, monitoring and control technologies and development of guidance material on best environmental practices.

[www.wbcscement.org/emissions](http://www.wbcscement.org/emissions)

# L

## ocal impacts on land and communities

Cement activities can have significant impacts on the natural environment and local communities in proximity. Limestone quarries are long-lived assets, operating for 50 years. During their operational lifecycle, impacts on the local environment, including dust, noise and other factors, must be properly managed. The removal of soil and changes in topography can affect local ecosystems and water levels.

CSI members have long since recognized that they are responsible for the effective management and rehabilitation of the quarries they operate. As part of the CSI Charter, companies are committed to draw up rehabilitation plans for operating quarries, as well as stakeholder engagement plans, and they have been reporting on the percentages of sites that have these plans in place.

In 2005, the CSI published the Environmental and Social Impact Assessment (ESIA) Guidelines, which became an imperative assessment criteria prior to the launch of any major project. In late 2011, the CSI issued Guidelines on Quarry Rehabilitation, to ensure that standards for rehabilitation projects are further improved, and that CSI members have a common understanding on reporting and monitoring of performance, by employing some key performance related to the local impacts and quarry rehabilitation. More than 40 case studies were shared, giving abundant applicable examples of best practice

[www.wbcdcement.org/QRGcasestudies](http://www.wbcdcement.org/QRGcasestudies).

### 2002

#### Agenda for Action

- Defined CSI Local Impacts KPIs
- Delivered communications guidebook for cement plant managers



### — By 2020

- CSI Guidelines on Quarry Rehabilitation become international good practice for all quarry activity

### 2008

- Setup dedicated task force on biodiversity and land stewardship



### 2005

- Delivered Environmental and Social Impact Assessment (ESIA) Guidelines



## 2012/2013



## 2011

- Delivered Guidelines on Quarry Rehabilitation



- Develop Guidance for Biodiversity Management Plans
- Adoption of common screening tool
- Elaborate on Biodiversity related KPIs
- Review ESIA guidelines

## 2009

- Updated KPIs to extend coverage on biodiversity issues



## Going forward

To assist other efforts in mitigating the industry's impacts on the environment, CSI members want to share their experience and skills that could be of considerable benefit to any company involved in similar quarrying or rehabilitation activities. The CSI supports its members in implementing the Guidelines on quarry rehabilitation, and aims that they should become internationally adopted good practice by 2020. Based on this work, CSI is elaborating its KPIs on biodiversity, and developing a high-level guidance document for biodiversity management plans. The CSI will also review its ESIA guidelines to check their validity in addressing ever-evolving conditions. Furthermore, the CSI member companies are testing screening tools to identify high biodiversity value areas, where implementation of management plans will be prioritized.

Exchange of information and experience of biodiversity management practices among member companies will be supported by the CSI, in order to map out and understand the full range of biodiversity issues (ecosystems, watertables, wetlands restoration, etc.), and how to measure them (e.g. balance of impacts), and to develop a better understanding of the economics of biodiversity (including offsets) and of the opportunities for sustainable stewardship of land.

[www.wbcdcement.org/biodiversity](http://www.wbcdcement.org/biodiversity)

## — We have now...

- 14 of 15 reporting members apply the ESIA and develop quarry rehabilitation plan
- Out of the 15 reporting members, 10 companies have more than 85% of sites with quarry rehabilitation plans in place and 10 companies have more than 55% of sites with community engagement plans
- For 14 of 15 reporting members, 38 to 100% of their quarries with high biodiversity value have biodiversity management plans actively implemented

# Water

The importance of water issues in global sustainability discussions is steadily growing. Many regions of the world are reaching a point of “water stress”, where water resources can no longer support the demands of human populations. The cement industry’s overall water footprint is, however, relatively small compared to other sectors. Cement production requires water for cooling heavy equipment and exhaust gases, in emission control systems such as wet scrubbers, as well as for preparing slurry in wet process kilns (although this process is progressively being phased out and replaced by modern, more efficient dry processes, thus bringing significant reduction in water usage). Water generally evaporates in the process. Discharged water can be affected by high temperatures, altered acidity or the presence of solids. Quarry dewatering can have impact on the river basin depending on the point of discharge. The aggregates business (and ready-mix to a lesser extent) also requires significant quantities of water.

Actions must be taken to offset the industry footprint on water, and mostly at local level, where individual facilities and activities have a direct impact, by using a risk-based approach. Primarily, companies have to understand and manage the quantities of water withdrawn, as well as the quality and quantity of water released, with particular attention in water-stressed areas.

## Reservoir (usable water) picture



### *Going forward*

A dedicated task force has been formed within CSI to identify current best practice in the sector and define practical KPIs to measure water management performance. Based on that work, the CSI will develop a protocol for water reporting and guidance on water measurement. In addition, companies are assessing tools to evaluate water risk at operation sites so they can devise appropriate plans in addressing the issue.

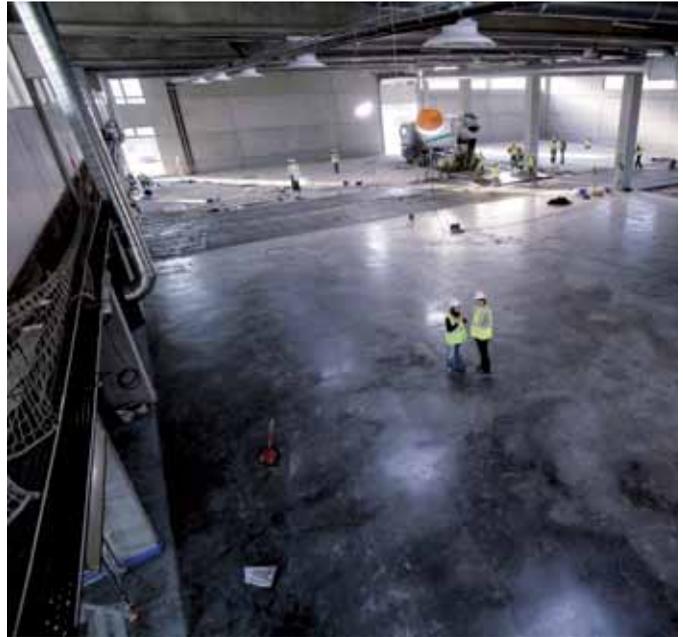
# S

## upply chain issues

As with any other industry, the cement industry needs to include its supply chain in the way it deals with sustainability. Rating agencies today look for companies' stewardship efforts across their supply chain, and frequently ask them to report on this in their sustainability reports. Companies involved in the cement supply chain can have a significant impact on the overall sustainability of the sector. Some cement companies have started assessing supply chain performance, but there is no universal agreement on which factors to consider or their relative importance. Some CSI members already audit their suppliers. They frequently differ from one another in form and in substance, resulting in mixed requirements, extra work and possibly negative perception by suppliers.

The CSI can help both suppliers and companies develop a shared understanding of sustainable development criteria for the supply chain. A more structured, harmonized approach could provide a more valuable understanding of the key issues, a simpler method of obtaining the information, and an opportunity to encourage improved performance.

CSI will aim to provide a framework and analysis tool that can be used by the industry to collect and manage this kind of supply chain information. As a first step, the CSI will conduct an assessment of current practice, in both other industries and in CSI member companies, regarding supply chain monitoring and management, covering key issues such as social impacts, employee health and safety practices, human rights, etc.



# Sustainability with concrete

Cement is the essential “glue” in concrete. It reacts with water to bind aggregates (crushed stone and gravel) and sand. Concrete plays a vital part in our daily lives, through many diverse applications and usages. It shapes the built environment around us, from schools, hospitals and housing, to roads, bridges, tunnels, runways, dams and sewage systems. Few people realize that concrete is, in fact, the most used man-made material in the world, with three tons used annually for each man, woman and child. Its superior properties of strength, durability, thermal mass, affordability and abundance of raw materials, make it the material of choice for many purposes.

Thanks to its properties, concrete can enhance the sustainability of the built environment, as it offers wide flexibility to construction professionals to achieve their sustainability goals. Of course the choice of materials is just one of many factors that contribute to the sustainability of a building, and this contribution should be evaluated from the perspective of the full life-cycle of the building or structure in question.

The CSI is committed to working with other construction industry participants to promote sustainable construction. It is important to develop a set of basic principles for the evaluation of sustainable buildings. The existing building rating



tools have been instrumental for this, and they should be further developed to provide enhanced metrics for assessing sustainability over the life time of structures.

Although sustainability with concrete was not part of the original *Agenda for Action*, the CSI has been addressing the issue for several years. In 2009, it published an assessment of practices to recycle concrete around the world. Recovery rates vary from close to 100% in some parts of the world to nearly zero in countries where most construction waste ends up in landfill. The CSI has argued that the ultimate goal has to be “zero landfill” of concrete ([www.wbcdcement.org/concrete](http://www.wbcdcement.org/concrete)).





### *Going forward*

- In the construction process, reliable and transparent information on the responsible sourcing of building materials is becoming more and more important. The CSI is addressing this through the following work:
- Environmental Product Declaration (EPD) for concrete: The CSI is developing a common methodology to quantify the environmental impacts of concrete, using life-cycle assessment (LCA) methodology. EPDs will be verified by an independent third party.
- Responsible sourcing scheme (RSS) for concrete: The CSI is developing criteria for a globally relevant, responsible sourcing scheme for concrete. Such a scheme would cover environmental, social and economic aspects of concrete production and it would place the commitments of an organization and the governance to support those commitments at the core of the assessment, with the information provided to construction professionals also independently verified.

# Working

While the CSI members are experts on the production of cement and concrete, when it comes to sustainability issues, much more expertise is needed. From its early days, the CSI has worked closely with many experts from industry associations, governments, academia and civil society, to discuss its work and to address critical concerns. This stakeholder dialogue approach is a continuous process which ensures the work of CSI and what it advocates are consistent with and respond to the fast-evolving expectations of its stakeholders.

For instance, good relationships were built with many of the world's major cement associations, including those in Australia, the Arab Union, Brazil, Canada, China, Europe, India, Japan, Latin America, South Africa and the United States. These relationships help the CSI understand local issues more clearly, and the partners in communicating about CSI to their members and in informing them about the different joint projects the CSI has worked on together.

Furthermore, the CSI has also been able to collaborate with a number of well-known and respected organizations, who have provided feedback on specific guidelines, tested some of the CSI tools, or given general advice on how to tackle sustainability in the cement sector. Among these organizations are notably: The International Energy Agency (IEA), The International



Union for the Conservation of Nature (IUCN), the World Bank, The World Resources Institute (WRI) and WWF International.

In addition, the CSI has been fortunate to work with a small group of senior advisors over the years, who have added the wisdom of their experience and academic background to the CSI efforts, suggesting new thinking, new pathways, and new partners, in a variety of areas. In 2011, was formed the current Advisory Group. It includes:

- Claude Mandil (Chairman), former Executive Director of the IEA.
- Florian Barth, Chair US Green Concrete Council, and Former President of the American Concrete Institute.
- Christian Brodhag, Director of Research at École Nationale Supérieure des Mines, Saint-Etienne, former inter-ministerial delegate for sustainable development in France, and specialist in ISO 26000.



- Fabio Feldman, Executive Secretary, Paulista Forum on Global Climate Change and Biodiversity, Brazil.
- Dr. William (Bill) Jackson, Chief Executive of Parks Victoria, Australia, and former Deputy Director General of the IUCN.
- Dr. Leena Srivastava, Executive Director, The Energy and Resources Institute (TERI), India.
- Prof. Zhenjun Zuo, Deputy Director, China International Engineering Consulting Corporation, China.

Building on the strength and consistency of these relationships, the CSI will further enhance its role as the recognized international voice of the global cement industry for sustainable development, and CSI members will strive to proactively and coherently apply sustainability practices throughout our global operations. The CSI remains committed to be the partner of choice for international governmental organizations, trade associations, academia and NGOs to develop the critical sustainability research, principles, policy and practice within the cement industry and its value chain. The CSI and its

member companies are looking forward to continue to work with partners to develop solutions to the identified challenges in the next ten years and beyond!



## Cement Sustainability Initiative

- Ten years of progress and  
Moving on into the next decade



<http://csiprogress2012.org>