World Business Council for
Sustainable Development

Cement Sustainability Initiative – Sectoral Approach briefing note
May 2009

1. Background

Many countries and businesses recognize the need to address CO_2 emissions. They seek ways to do so without endangering the success of their national economies or businesses. A sector-based analysis of the problem, often called a Sectoral Approach, offers a number of possible advantages over more traditional geographically organized responses.

The company members of the Cement Sustainability Initiative (CSI) – a voluntary business initiative – have been addressing climate change issues for more than a decade. Over the past two years, the CSI has been exploring the sectoral approach concept and thinks it could make a useful addition to the suite of policy options available to deal with climate change. We offer a summary of our initial thoughts and analysis below.

Sectoral approaches are now on the international climate policy agenda, and have been discussed at the two recent UNFCCC[i] COP[ii] meetings in Bali (2007) and Poznan (2008). They will be an important part of the negotiations to take place at the next COP meeting in Copenhagen in December 2009.

What is a sectoral approach?
For the CSI, a sectoral approach involves organized action by key product producers in a specific industry sector and their host governments to address the greenhouse gas emissions from their products and processes, within the UNFCCC framework. Specific actions taken would differ from sector to sector, dictated by the characteristics of each sector's structure and technologies. Actions would also differ from country to country, following the principle of common but differentiated responsibilities laid out by the UNFCCC. Thus a sectoral approach is not a one-size-fits-all recipe, but a blend of policies and actions organized around each sector's unique characteristics and the location of production facilities. While focused on the characteristics of each sector, a sectoral approach would not exclude actions across different sectors.

What it is not
A sectoral approach is not a way to bypass existing country programs and policies. It is not a way to "escape" action. Neither is it a program to capture all industries or all participants in a single industry. In practice, a sectoral approach would aim to address a major portion of the greenhouse gas emissions with action by the major producers in each sector and their host governments. In line with the 80/20 rule, an objective could be to address 80% of the greenhouse gas emissions with the top 20% of the producers and governments. E.g. for the cement sector, the G8+5 countries would encompass 80% of the world's cement production.

Potential Benefits from a sectoral approach

The key advantages of a sectoral approach to greenhouse gas emissions management are the possibilities of

(1) Greater speed in implementation due to the smaller number of parties involved in building a workable program
(2) Greater scale in terms of addressing sector-wide emissions, rather than emissions on a project-by-project basis as is presently done under existing mechanisms
(3) Faster technology development and deployment through international cooperation, particularly for carbon capture and storage (CCS).
(4) More capacity building to establish effective systems and measures which work at a sector level (and could be scaled up) without trying to manage economy-wide impacts.
(5) Better policy design with sector-tailored tools to manage competitive impacts which can result from different carbon policies in different countries or regions.

Individual participants will no doubt see pros and cons to this approach. For most governments, a sectoral approach offers significant national control to tailor management of emissions and efficiency goals to local circumstances and capabilities.

Benefits for developing countries

In developing countries, which are urbanizing at a rapid pace, cement demand is growing to provide necessary housing and infrastructure. A sectoral approach, allowing a mix of policy tools in different regions and countries, can be structured to reduce emissions compared to business as usual, without imposing growth limits on these countries.

On the contrary, emissions efficiency goals (emissions per unit of product) can move an industry sector toward improved efficiency and improved competitiveness with better economic results, without limiting growth. Specific agreements for participation will need to be decided by national or regional governments in consultation with industry and other stakeholders. In some countries, participation may be through efficiency-based emissions goals; in others through a cap-and-trade emissions trading system; in others through the adoption of technology or efficiency standards, etc.

For governments in developing economies, a sectoral approach provides an opportunity to:

(1) continue growing while improving energy and emissions efficiency, both of which offer significant energy security benefits
(2) start curbing greenhouse gas emissions without an economy wide commitment.
(3) experiment with different approaches and learn what will work in individual economic sectors, again without the risk of economy-wide consequences
(4) retain greater control over setting emissions goals
(5) grow capacity for managing climate initiatives, such as local data, monitoring and enforcement systems
(6) develop criteria for prioritizing which sectors of a given economy may have the most impact on greenhouse gases, and which would be most impacted by emissions management programs
(7) earn tradable credits by out-performing agreed targets

(8) Share and benefit from global best practices within the sector

Many knowledgeable people have argued that current policy tools do not work quickly enough, nor do they mitigate sufficient volumes to offset growing emissions from a growing world. For governments interested in addressing climate change, a sectoral approach could offer a much greater scale of mitigation opportunities than many current policies which focus on project-by-project implementation.

The business case

Leading businesses believe that climate change is real, and that meaningful action is necessary. A sectoral approach offers business the opportunity to support policy makers identify and use the most effective mitigation tools for each sector. In many cases the right policies could provide significantly more effective (and less expensive) mitigation actions. Equally important, a sectoral approach provides an opportunity to engage developing economies – where more than 80% of cement is now produced – in dealing with the sector's climate impacts. Without this engagement, even draconian efforts in the world's developed economies will have little impact

Potential Disadvantages of a sectoral approach

Like any policy choice there are potential disadvantages to a sectoral approach:

(1) It is new and untested. This approach gives a larger role to business than approaches of the past, and may not be greeted with enthusiasm by all policy makers.
(2) It requires cooperative agreements within an industry sector, and between a set of national governments who have not necessarily worked in this way before, although initiatives such as the Asia Pacific Partnership for Climate Change and Development have shown promise using a similar structure.
(3) Developing an effective crediting system is important to developing countries, and will be a challenge. While we believe there are other benefits than cash payments for emissions reductions, (e.g. shared CCS technology development, opportunities for climate management capacity building, etc.), many will focus on financing.

On balance, we believe a sectoral approach, developed with appropriate policies and incentives set by governments, has potential to deliver both substantial climate and business benefits, compared to business as usual.

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The CSI developed a number of principles which we believed must underlie a successful sectoral approach. However, we still did not know how well this approach might work compared to or in concert with other policy options. For this reason the CSI undertook economic and policy modeling studies to better understand potential benefits and pitfalls of a sectoral approach. The remainder of this material describes what we have learned from this work to date.

This briefing paper is organized into a series of short reviews covering:

- The Model
- Modeling Policy Scenarios
- CSI Cement Industry Model Results
- What is Needed from Governments for Success in CO_2 Reduction

2. The Model

The CSI has worked with the international consultancy, ERM, to develop an economic model of the global cement business which helps in thinking through different business and policy scenarios. The model separates the world into eight different regions and calculates regional production and interactions between regions to meet a predicted global cement demand.[1] Model inputs, generally drawn from public information, describe the features of each region including GDP growth rates, the energy performance and the mix of cement-kiln technologies, costs, and materials availability. These are combined to meet the forecast global cement demand at minimum cost. The model results include calculated cement production, trade, and CO_2 emissions in each region over the period 2005 – 2030.

Carbon policies and emission goals can be set across regions (and over time). The model incorporates the goals and costs associated with different carbon management approaches into its analysis. Different policy scenarios are applied to calculate differences in carbon emissions as a result of different policies. In this way, the impacts of different carbon policy choices can be analyzed and compared on a consistent basis. For example, it is possible to see how changing cement demand is met through a dynamic combination of regional production, imports and exports. These comparisons can be used to help inform decision-makers about the relative merits, costs, and impacts of different carbon and trade policy choices.

China plays a major role in the world's cement markets, today producing nearly half of all cement. Data from China is changing rapidly as the industry modernizes and grows, and is also difficult to collect. To address this uncertainty, we have included a number of sensitivity studies to address the different growth rates in Chinese cement demand and the mix of technologies used to meet this demand.

To ensure fair and accurate treatment of the many different variables involved in such a model, the CSI requested and received formal peer review of the model by several organizations, including:

- Lawrence Berkeley National Laboratories (USA)
- The International Energy Agency (Paris, France)
- Research Institute of Innovative Technology for the Earth (Japan)

Data sources include the International Energy Agency, JP Morgan, the CSI "Getting the Numbers Right" (GNR) database of 800 cement plants energy and CO_2 performance, Baltic Dry Index data, and the US Energy Information Agency, among others. Input was also sought from a number of other organizations during the course of the model development. Comments received were included in revised model calculations where necessary to meet the reviewers' concerns.[2]

[1] Based on data from the Global Cement Report (2007) and forecast analysis by JP Morgan.
[2] A detailed set of specifications for the model, and a summary of how the different model elements are assembled are available for those interested in further information. See www.wbcsdcement.org.

3. Modeling Policy Scenarios

Model scenarios describe different carbon policy choices. These choices include a variety of possibilities ranging from no specific commitments to a full global carbon trading system with absolute limits on carbon emissions. One goal of this work was to better understand the impacts of different policy choices on CO_2 emissions from the cement sector and regional cement production.

We chose to look at a suite of "reasonable" options from a large number of possibilities. A number of sensitivity studies have also been made to look at the effects of different parameters such as carbon price, emission goals, etc. The specific scenarios evaluated include:

1. No Commitments Post 2012. Used as a base case to see the changes in global emissions and trade. No specific commitments are made by governments or industry after Kyoto. However, small energy efficiency improvements continue to occur in the cement sector as older, more energy intensive plants are replaced with newer equipment. In addition, as production continues to shift to developing markets to meet local demand, new, more efficient cement plants grow to dominate the sector's performance.

2. European Caps. Europe continues to develop and use the EU Emissions Trading System (ETS), with a cap on absolute CO_2 emissions as a primary mechanism to control emissions. For modeling purposes a 20% decrease in emissions has been assumed to be reached by 2030, based on 1990 baseline emissions. The scenario assumes that no other countries adopt carbon restrictions.

3. Annex I Caps. An extension of Scenario 2 to include strict limits on absolute CO_2 emissions in other Annex I countries (Japan, Australia, New Zealand, the United States, Canada, and CIS countries). The European emissions reduction target increases to 30% between 2020 and 2030 (from a 1990 baseline). For model calculations, most Annex I regions are assumed to adopt caps of -10% and -15% in the 2012-2020 and 2020-2030 periods respectively. Again, the scenario assumes that developing countries do not adopt any carbon limiting policies.

4. Global Goals. In this scenario, emissions efficiency goals (a specified % reduction in the number of tons of CO_2 per ton of cement product) are adopted in each region. Several choices for goals were considered, including
    - an identical reduction goal for all regions globally;
    - initially differentiated goals based on current regional performance which converge on a common reduction goal over time

    For modeling purposes, these goals were chosen as a 10% efficiency improvement over the 2012-2020 period, and a further 10% improvement by the end of the 2020-2030 period.

5. Sectoral approach. A sectoral approach involves a mix of carbon policies, differentiated by region, applied to the major producers and producing countries in an industrial sector with a goal to mitigate greenhouse gas impacts of the sector. A wide range of different climate policies might be

used. The scenario is modeled assuming a mixture of absolute caps on emissions in Annex I countries (as per Option 3, above) combined with emissions efficiency goals in developing countries, using the same values outlined for Global Goals (Option 4, above). The latter improve emissions efficiency without limiting the absolute volume of emissions.

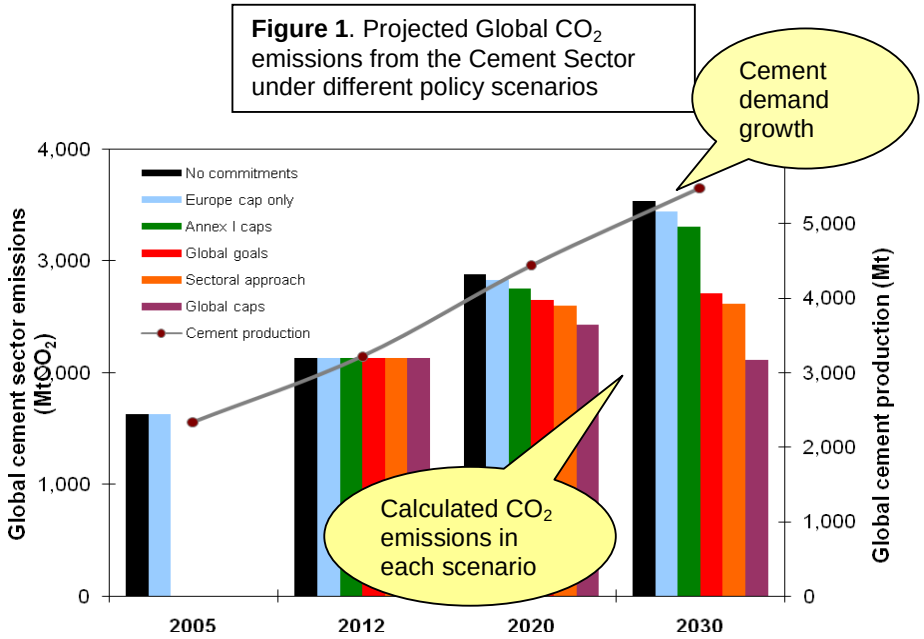
6. Global Caps. An extension of Scenarios 2 and 3 to include strict limits on CO_2 emissions in all regions. Annex I caps follow Option 3 (above) while developing country caps are set at 0% change from a 2005 baseline.

When arrayed in order of increasing stringency, the policy options appear as follows for the eight regions included in the model.

Scenarios involve different combinations of carbon prices, mitigation options, national or regional carbon policies and commitments. Many other policy combinations possible in model in the Sectoral Approach. One has been chosen for modeling.

4. CSI Cement Industry Model Results

Figure 1. Projected Global CO_2 emissions from the Cement Sector under different policy scenarios



Cement demand forecast from International Cement Review and JP Morgan

1. Cement production, driven by demand, is expected to more than double by 2030. This growth is shown by the single line above with a scale on the right-hand axis. Emissions also increase significantly, albeit at a slower pace than cement production.

2. The absolute emission values depend heavily on Chinese production estimates (China produces half the world's cement), for which there is a broad range of values.

3. Emissions increase in all the policy scenarios reviewed, but the trend can be influenced by policy choices. The bar heights show projected cement sector emissions under each policy scenario (left-hand axis).

4. Impacts of policies occur late in the scenarios (post 2020, if at all) because of the time needed for technology diffusion and the impact of rising carbon costs over time.

5. Scenarios that show significant impacts on emissions, listed in increasing order of effect, include Global goals, a Sectoral approach, and Global caps.

6. The cement sector has four significant "levers" that can be used to reduce carbon emissions.

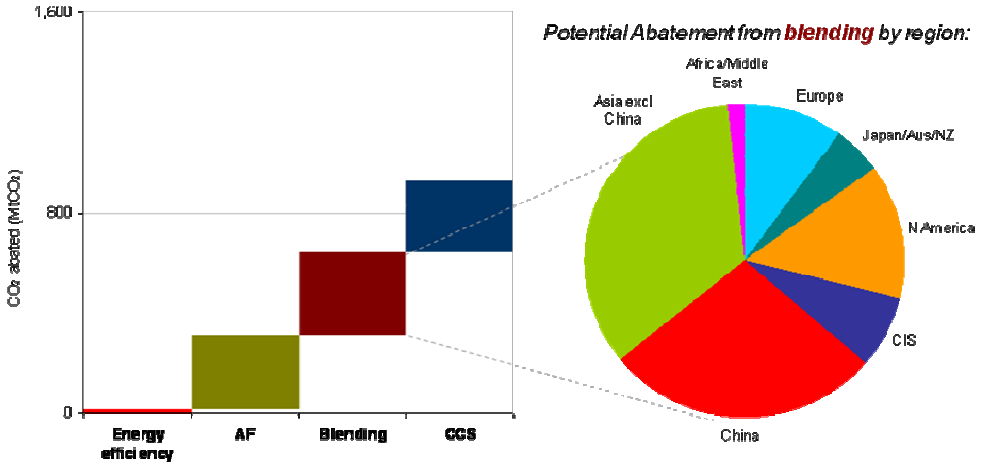


Figure 2: Modeled use of blending materials and other CO_2 "levers" in 2030
(Quantities shown are relative to the "no-commitments" baseline scenario in 2030)

- Energy efficiency improvements. These have limited potential. Modern plants are approaching theoretical efficiency limits. Replacing older plants with newer ones reduces energy use, but most of the future growth is expected in developing countries with new energy-efficient plants.

- Use of alternative fuels which have lower carbon emissions than fossil fuels. Alternative fuels, both waste materials and biomass, are widely used in many parts of Europe, but much less widely elsewhere. Current use is limited by waste management policies which do not encourage

energy and materials recovery, inadequate waste management infrastructure, and public concerns about air pollution from cement kilns.

- Use of blending materials to reduce energy-intensive clinker making. Substituting other cementitious materials like blast furnace slag and fly ash for clinker is the most efficient way to reduce emissions. This is done in some countries now and is well understood. But using more blended cements will take policy changes, new purchasing habits and revised standards in some markets.

  Regional and global limits in the availability of materials for making blended cements mean that (a) all regions cannot achieve the same level of emissions management, and (b) blending will contribute relatively little to emissions reductions after 2020.

- Carbon capture and storage (CCS) will be a critical technology. However, this technology is still not developed for wide-spread commercial application in cement plants. Additional research, development, and pre-commercial demonstration projects are necessary, for which government support and investment will be needed.

7. The ability to use each of these "levers" varies regionally as illustrated by Figure 2, above, which shows the calculated application of blending under a sectoral approach scenario. This means that individual country or regional policy combinations must be used instead of a single global formula.

8. Some policy choices (for example, decisions about emissions allowance allocation) can have significant impact on cement costs, with corresponding impacts on trade and regional market shares. Market distortions are most pronounced when one or more regions adopt strict caps on emissions, auction allowances, and allow for cost pass-through, but other regions do not.

9. Potential trade distortions caused by different carbon policies can be managed by one or a combination of tools, including allowance allocation policies, border carbon adjustments (BCAs) and import/export tariffs.

10. It should be possible to develop a crediting system that rewards performance improvements beyond agreed goals. Financial flows resulting from a carbon trading scheme include possible allowance allocation revenues, higher prices reflecting the added cost of carbon, credits for overachievement of agreed goals, and border adjustments via taxes, tariffs, etc. In addition there may be international funds established to help catalyze action. There are many details still to be defined in developing a crediting scheme, and further work is needed from many sides to define a fair, affordable, and manageable approach.

5. What is needed from governments for Success in CO_2 Reduction

1. The CSI believes a sectoral approach can be a useful tool to improve the speed and effectiveness of industry's greenhouse gas mitigation efforts. If properly designed it could offer strong participation incentives to developing economies, businesses and governments.

2. The CSI would like to see the sectoral approach incorporated into international climate language as a policy option, with explicit details to be further defined after the Copenhagen COP meeting in December 2009. If the Sectoral Approach option is retained at Copenhagen, further work by the CSI in consultation with governments and national trade associations would be needed to put this approach into effect.

3. The CSI is ready, willing and able to work with governments potentially involved in a sectoral approach to elaborate the details of a suitable sector participation scheme and nationally appropriate carbon commitments. Such work would include:
   - Defining key elements needed to make a sectoral approach feasible:
     - Sector data requirements
     - Measurement, Reporting and Verification (MRV) practices
     - Goal setting and crediting policies

   - Definition of effective policy measures that could be adopted at national level, as appropriate, to help reduce cement sector CO_2 emissions such as:
     - Revised cement product standards based on performance rather than composition
     - Construction codes with increased emphasis on "green" building products, and energy use reductions over the lifetime of a building
     - Government purchasing choices oriented toward greener products
     - Greater availability and use of alternative fuels via landfill bans
     - More wide-spread use of blended materials (which can reduce the energy intensity of cement)

   - Structuring enhanced technology development and deployment programs for the cement sector, particularly around the application of carbon capture and storage (CCS).

[i] UNFCCC = United Nations Framework Convention on climate Change
[ii] COP = Conference of the Parties, an annual UNFCCCC meeting held to discuss and negotiate further progress under the Kyoto Protocol.