Sustainable development in the cement industry

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Abstract

This article is an introduction to the issues of sustainable development in the cement industry. The nature and size of production in relation to cement and concrete, results in a specific form of sustainable development in this industry. To face these challenges, the Cement Sustainability Initiative was created. This article will present different undertakings within this initiative. The analysis will also highlight some errors that can be seen within the initiative, for example instances of greenwashing — dishonest information disseminated by the companies. This article will then move to propose approaches that allow companies to define their goals in relation to sustainable development giving them a tool for better evaluation and planning.

Introduction

Sustainable development has become one of the biggest challenges facing companies all over the world, especially for those in the cement industry. Bending to outside pressure, enterprises undertake different actions aimed at sustainability. The profits obtained in this way benefit not only the companies themselves but also the environment and local communities. The problem is that most of these actions and undertakings lack clearly defined reference points. Case studies, press notes and sustainability reports present many examples, indicators and trends but the companies seem unable to answer one key question: ‘When exactly will our development be sustainable?’ The proceeding deliberation is an attempt to present the specificity of sustainable development in the cement industry and to provide some much needed reference points.

Below is a collection of data that illustrate the impact of cement and concrete production on the environment.

- 2,857,000,000 tonnes — global concrete use in 2008 (a continuing single digit annual growth).
- Over 50% of the above number is due to China — one of the fastest developing countries in the world.
- Concrete use in China has nearly doubled in just a decade (1998–2008).
- Concrete manufacturing is one of the major contributors to global CO₂
emissions, responsible for about 5% of all emissions (WBCSD, 2002; Isaksson and Steimle, 2009) — therefore one of the key challenges for the industry is limiting its harmful impact.

- The production cycle (from the moment the substrates are extracted to the moment the finished product is delivered) also produces noise, dust, vibrations and hot air. Global cement and concrete production requires about 15 billion tonnes of natural resources, including about a billion tonnes of water (van Oss and Padovani, 2003).

The cement producing companies also have a dominant position in the building materials delivery chain. Their decisions and actions impact all the stages of the delivery chain, starting with the mining companies and ending with the ‘consumers’ (i.e. inhabitants) of finished buildings (Isaksson and Steimle, 2009).

For these reasons the key issues for this industry, in relation to sustainable development, are: climate protection (reduction of greenhouse gasses, especially CO₂), material acquisition (fuel and resources needed to produce cement and concrete), health and safety (of employees and local communities near cement plants), environmental impact (both social and ecological) and concrete recycling.

**Cement Sustainability Initiative**

The global cement industry has been forced to undertake specific actions in order to cope with many new external factors: rising legislative pressure that places increased attention on social and ecological matters; development of public opinion’s conscience that requests companies follow new standards in regard to responsibility; the rapid growth of energy and resource prices; and the stronger competition within the industry. These factors forced cement and concrete companies to search for new activities and programmes.

The most important global initiative in this respect is the Cement Sustainability Initiative (CSI) which consists of the leading cement companies. According to Klee and Coles (2004): ‘in 1999 they [the cement companies] turned to the World Business Council for Sustainable Development (WBCSD)³, for independent evaluation of sustainability issues that the industry was facing. Their aim was to understand the sustainable development and implement changes in business practices.’ In March 2002, the Batelle Institute, commissioned by WBCSD, published a report entitled *Towards a Sustainable Cement Industry* (Batelle Institute, 2002) that presented the key problems and possible solutions

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2 The members are: CEMEX (Mexico), Cimpor (Portugal), HeidelbergCement (Germany), Holcim (Switzerland), Italcementi (Italy), Lafarge (France), RMC (Great Britain), The Siam Cement Group (Thailand), Taiheiyo Cement (Japan), Votorantim (Brazil), Titan (Greece), CRH (Ireland), Uniland (Spain), Secil (Portugal).
3 WBCSD is one of the world’s leading advisers on matters connected with the environment and sustainable development. The Council is a coalition of about 200 international companies, based in over 30 countries and from over 20 different sectors, involved in sustainable development. The Council has a global network of 35 national and regional branches and partner organisations that engage over 1000 leaders of business sector from all over the globe.
in relation to sustainable development and concrete production in the 21st century.

One of key characteristics of CSI is the alignment of sustainability and business objectives. The most important element of this alignment is the consciousness change in people connected with the cement industry — proving that business and sustainable objectives are complementary and that a sustainable company is more competitive. This means stepping beyond a narrow understanding of corporate social responsibility (engaging in external activities of a pro-community or philanthropic character) and turning towards responsible operation of the company itself by focusing on transforming its inner workings.

In 2002, CSI members signed *The Company Charter of Cement Sustainability Initiative* that defined specific actions that were to be undertaken in order to face the main challenges for the industry. By signing the Charter, companies have agreed to implement the chosen solutions within 4 years from joining the initiative. Sadly, the WBSCD cement website lacks any summary of whether the companies actually followed through on their declarations — to get a definitive answer an in-depth analysis of annual sustainability reports of each of the companies would be necessary (dealing with every annual report since a given company joined the Initiative).

On 3 July 2003, CSI published *Our Agenda for Action* that further detailed the commitments put forward in the *Company Charter of Cement Sustainability Initiative*.

**Examples of actions undertaken**

Business in the Community, an international organisation that cooperates with different companies in matters concerning sustainable development, stated that due to actions directed at eco-efficiency (like, e.g. using refuse from other industries), Lafarge Cement UK have managed to reduce the quantity of landfill waste from 13 kg to 2.9 kg, per ton of cement, in a period of just five years (2000 to 2005). This change brought the company savings amounting to £1.5 million GBP a year (the amount that would be spent on waste disposal). Programmes using production waste have also resulted in the reduction of CO$_2$ emissions by 180,000 tonnes a year. Other waste that is utilised in cement and concrete production are the so called alternative fuels: tires, finely divided rubber, plastics, textiles, paper, wood and sewage sludge. A good example of a waste-related sustainable initiative undertaken by a concrete company may be the restoration of Eversley Quarry in Hampshire (England) — after the mining operations finished, Cemex have transformed the site into a recreational spot and a protected area due to its high ecological value.

The company has also undertaken innovative actions in order to bring new benefits for both themselves and the communities. Patrimonio Hoy (PH) is a programme developed by Cemex in order to promote social and economic
development among poor inhabitants of Mexico. PH allows families with low income to obtain services, cement and other construction materials through a system of loans. Cemex divides the participants into three-person groups that pay the debt together. The programme started in 1998 and already some 260,000 families have participated (Cemex, 2010). During the first few years of operation, PH generated an income of over $1.3 million USD (Epstein, 2008). This initiative is an example of a successful *Base of the Pyramid* (Prahalad, 2004) approach, that utilises purchasing power of the largest and the poorest social group that lives on less than $2 USD a day, and that is based on creating new business models to fit the specific economic situation of this group.

The challenges arising from the idea of sustainable development also resulted in attempts to find a replacement for the traditional cement and concrete; these replacements are becoming more widely used every year. Below are two examples of such replacement materials:

- Autoclaved Aerated Concrete (AirCrete, <www.aircrete.co.uk>) is a technology that has been used in Europe for quite a while now and while it does not aspire to replace traditional concrete, it has nevertheless resulted in reduction of its use, as AirCrete is manufactured in a foam form. Such a form of concrete is still strong but due to its structure it also provides thermal insulation that is unattainable with regular concrete.

- CermiCrete, produced by Argonne National Labs, utilises components based on magnesium, replacing the traditional lime-based components. This substitution results in a material that has twice the strength of regular concrete, resulting in a lower quantity required for construction purposes. Also, in case of this material, industrial refuse may be utilised as a source of magnesium oxide — which limits the extraction of natural resources and, in effect, greatly reduces the energy spent for production purposes.

The cement companies must take into consideration the increased utilisation of the above products, and similar alternatives to concrete and cement.

**Questions and doubts**

Data and reports presenting sustainability achievements of companies must be carefully scrutinised, which will be shown using Cemex as an example. The case study in Times 100 (set of didactic materials for business students) states that:

‘Cemex transports over 30 million tonnes of semi-finished products, cement and fuel by roads, railroads and waterways. About 12% of the whole transport takes place via railroads — train transport equals five times less emissions than road transport.’

An inquisitive reader should ask a few questions after being presented with such a piece of information.

- Is 12% of railroad transport in fact a high or low percentage in relation
to the total transport?

– What is the reason for using railroads — perhaps this is the only accessible mean of transport in some areas?
– And finally — how important is this fact for the company’s sustainable development strategy?

We should remember that this type of elaboration and case studies, due to limited length, are unable to present all available data and thus focus only on the key information. However, one of the elements to be examined is whether the text references sources where additional (or missing) data can be found, allowing for the information to be put into proper context. Sadly, this is not a commonly recognised approach that would be required from the companies. Similar criteria on evaluating a company’s report were presented in a textbook published by the Sendzimir Foundation (Kronenberg and Bergier, 2010, pp. 336–338).

An important and unwanted development is a set of methods stressing the ‘sustainable’ benefits offered by concrete and cement as construction materials. Such pieces of information border on greenwashing (understood as the use of marketing and public relation tools that misinform about the ‘eco-friendliness’ of services or products of a given company). In the cement industry an ample supply of such proclamations can be found in a presentation entitled Sustainability Advantage of Concrete Structures given during the European Sustainable Energy week in 2009. The presentation lists the following advantages of concrete:

– ‘all components used to manufacture cement are natural or recycled’ — there are no other possible sources of components in the universe, so this cannot be seen as a sustainable benefit.
– ‘Rock material, river gravel material and water are universally and readily available’ — untrue. European Environmental Agency informs that many European regions are characterised by higher water demand than water supply (EEA, 2009).
– ‘By using concrete there is no need to import components from locations thousands of miles away’ — long-range transport of concrete is economically unsound due to its weight, therefore it MUST be manufactured and used locally.

What is more, the companies themselves are open in stating that sustainable development in the cement industry is not fully feasible as: ‘no matter what we do, cement manufacture will always result in CO₂ emissions. We are unable to change the basic laws of chemical reactions, thus we are unable to achieve spectacular reductions in emissions. Cement is needed to meet some of the basic human needs and it has no clear substitute, so there is a need to compromise between the narrowly seen economic interest and sustainable development’ (Dimitri Papalexopoulos, Managing Director of Titan Cement, quoted in: The Guardian, 12.10.2007).
Towards real sustainability

The image of sustainable actions undertaken by companies and presented by media, independent organisations, authorities or companies is in most cases fragmented. The fuller picture may be presented by means of sustainability reports prepared by the employees of the company. Such publications usually consist of a number of indicators pointing to key areas in which a given company focuses its sustainability efforts.

Such reports are also not ideal and can be inconsistent in terms of quality. In some cases, even documents created in accordance with the most popular and recognised guidelines — GRI — have been criticised.

Isaksson and Steimle (2009) analysed a number of sustainability reports from the cement industry that were based on GRI guidelines. Among other reservations, they listed the following.

- The key indicators are not presented in context of other companies from the same industry.
- Main trends are not included — none of reports analysed by Isaksson and Steimle presented a longer timeframe than a few years. The sustainability report of Cemex for 2009 presents a perspective spanning at most 4 years (from 2006) and only in the case of a few indicators (Cemex, 2010).
- Reference points are not taken into account — targets of cement companies are presented as e.g. ‘20% reduction in emissions’ but the numbers are not rooted in reality — are they big or small numbers? Will the company be able to say that sustainability was achieved when such a goal is reached?

One of indications of the inadequacy of such reports is the lack of a ‘point of destination’ on the company’s development roadmap. The questions of ‘How is our company going to look when we achieve sustainability?’ or ‘When will we be certain that we are developing in a sustainable way?’ remain unanswered.

Newton (2003) provides the following definition of True Sustainability (TS): ‘it is achieved when the social structure may be profitably sustained for an indefinite period without having a negative impact on the systems that sustain it’. This approach underlines the necessity of analysing the external environment of the company and setting of points at which its operation will have no negative impact upon the environment. A company should also maximise its resilience to changes in external conditions that can affect it adversely.

One of the propositions that allow such analyses is The Natural Step (TNS). This tool was devised as a result of scientific deliberation by a large group of international experts dealing with global development, climate change, economy, etc. It proposes 4 very general (and at the same time very specific) principles of sustainable development. These are boundary conditions that, when realised, will ensure the sustainable development of a company. They
have been created on the assumption that human activity must work in unison with the biogeochemical cycle.

The four principles of sustainable development as envisioned by The Natural Step are:

1. there is no accumulation of substances obtained from the Earth in its environment (including combustion products);
2. there is no accumulation of man-made substances in the environment;
3. the environment does not undergo progressive degradation;
4. people are able to meet their basic needs ('people are not subject to conditions that systemically undermine their capacity to meet their needs').

These rules are universal. Every entity, organisation, society or company should apply them to their own context to find answers relating to the four principles. To counter the accumulation of substances obtained from the Earth, a company could, for example establish at what level of emissions the tail gasses start to accumulate in the atmosphere.

The first rule also means that all refuse is to be recycled (otherwise it accumulates in landfills). To act against accumulation of man-made substances, companies should look for the most precise answer to the following question: What should we do to prevent the build-up of our products? Perhaps we should introduce a program for re-use of concrete. If so, what efficiency are we striving for?

Similar questions should be asked in relation to the remaining three principles. Only when precise answers are obtained (which could require highly technical analysis in many cases), is there a possibility of setting frameworks and reference points for the truly sustainable development of a company. Currently, the criteria are used by a minority of companies and there are no examples of them being used at all in the cement industry. On the other hand, there is a strong trend of ever tighter environmental and societal regulations in relation to businesses. Due to this it is possible that in the near future, companies will be forced to focus their attention on approaches that utilise ‘destination points’ for sustainable development (such as The Natural Step and True Sustainability). If the companies are to begin using such approaches, maybe it is advisable to try exerting pressure on the Global Reporting Initiative (the organisation that created report-creation principles that are currently used by most of the world’s corporations) so that it includes such a requirement in its guidelines? One thing is certain: companies are working towards sustainable development despite all the problems connected with realising this idea. Utilising the concept of points of destination would allow companies to see whether some of their efforts should be redirected (due to, e.g. possible increase in public pressure in a 10-year perspective) — which may result in benefits for both the companies and their environment.
References