Growing urbanization creates ever-increasing needs for cement. The cement industry holds some advantages that can allow it to meet this demand, limit its carbon footprint and participate in the development of the regions where it is established. Cement is cheap, adaptable and in strong demand. It can be manufactured while improving its environmental impact. The sector also creates a lot of employment.

With economic growth in emerging countries, rural exodus and demographic dynamism, the planet is experiencing unprecedented urban development. As Lewis Mumford predicted back in 1961, the planet is turning into a city. In 2008, for the first time in the history of humankind, the number of urban dwellers overtook the number of rural dwellers. Over 3.3 billion people now live in cities. The urbanization rate continues to rise every year; according to United Nations’ forecasts it is expected to reach 59.7% by 2030 and 69.6% by 2050 (UN, 2008). This urban growth is particularly strong in Asia and Africa. The urban population in Africa is consequently expected to rise from 373 million people today (33 million in 1950) to 1.2 billion by 2050. It is in these regions that there are the greatest needs – both present and future – for infrastructure and housing. In March 2011, the new Egyptian authorities consequently announced that one million social housing units would be built within the next five years in order to both meet the needs of disadvantaged populations and support the building sector, which creates a lot of employment.

The economic and financial crisis has not slowed down global cement consumption. It rose from 2,830 million tons in 2008 to 2,998 million in 2009 and to 3,294 million in 2010 (International Cement Review, 2011). Almost 80% of the cement has been used in emerging countries. The cement industry has considerably scaled up its production capacities in developing countries in order to meet this demand and support urbanization. However, a purely quantitative approach is now no longer sufficient to succeed on these markets. In the age of sustainable development and with the Millennium Development Goals being reaffirmed at the UN summit in New York in September 2010, the cement industry must see itself as a partner of the regions where it is established. It has its own way of investing in order to tackle the challenge of urbanization via two main approaches. The first one concerns the intrinsic quality of cement material which, given the latest technical developments in this field, can provide a better response to the challenges of sustainable cities in emerging countries. The second approach seeks to foster the positive impacts that the cement industry has on the economic, social and environmental development of the regions where it is present.

Proven value

The success of cement in developing countries is not new. What held true right back at the end of the XIXth century for countries that are today developed also currently holds true in developing countries. Indeed, cement makes it possible to build “solid” constructions at affordable prices and for the masses. It has become essential for water conveyance and purification, for the development of highways, urban spaces and leisure spaces; it is essential for public transport requiring major infrastructure (railway lines, tramways, canals, etc.). The concrete road that Vicat Group will soon be
testing in Senegal would appear to be well-adapted to extremely hot areas, where it is difficult to envisage regular maintenance operations. According to the tests conducted in North America, this road will also have the advantage of reducing the consumption of the vehicles - particularly the heavy trucks - that use it by roughly 4% (Maillard and Smith, 2007).

In the housing construction sector, there is a demand for cement from both building professionals and individuals, which are very often self-builders. For example, if there has been a good harvest in Senegal, a farmer’s primary concern will be to build a “solid” construction using cement. A city dweller will do exactly the same thing once he has the means to do so (see Box).

**The cement market in Senegal**

In Senegal, according to Vicat Group estimations 95% of cement consumed is sold in bags and 5% in bulk form (major building companies). The bags are mainly marketed through national or regional “wholesalers” that supply a network of small stores, hardware stores and paint stores. Cement is considered as a staple product and the wholesalers that market it are also those that sell rice and sugar. The brand is extremely important for the final customer for whom it is a guarantee of quality and safety. The areas with the highest consumption are the urban areas of Dakar, Touba and Sally-Thiès - which are estimated to account for roughly 65% of the Senegalese market.

Cement is a material that will be used for many years to come; it benefits from a positive image that earth material in Senegal, for example, does not have. Densifying construction would provide a partial solution to the problems of urban sprawl observed in the major emerging megapoles; this requires building high-rise constructions, therefore made of concrete in most cases, and pushing for a collective approach to real estate construction.

**An innovative material for sustainable cities**

The “sustainable” dimension of cement is more recent. It is linked with contemporary debates on the notion of “sustainable cities” - cities which, at the very least, must limit their ecological footprint. Cement emits high levels of carbon dioxide due to the very nature of its manufacturing process (limestone decarbonation). It can, however, improve its environmental balance, firstly in terms of energy efficiency. In France, the latest innovations in concrete construction now make it possible to comply with “Low Consumption Building” (LCB) standards. They could provide a solution that could be transposed to developing countries, where one of the main concerns is the energy cost of air-conditioning. The empirically observed inertia that is specific to concrete can give extremely interesting results in hot countries. Moreover, when cement is used in the form of concrete (mixture of cement, aggregates and water) – its normal use –, its carbon footprint must be measured. Cement has a carbon footprint that is completely competitive in comparison with other materials. This is demonstrated by the methodological guide, *Bilan carbone®* (carbon balance) applied to buildings, published by the French Environment and Energy Management Agency and by the Scientific and Technical Center for Building. Finally, producing cement locally for a given market further reduces its carbon footprint by removing carbon dioxide emissions from transport.

Cement can provide a partial response to the challenges of sustainable construction if it is correctly manufactured; the use of new manufacturing technologies over the past twenty years has helped reduce its carbon footprint. Dry-process kilns have consequently replaced wet or semi-wet process kilns, thus reducing energy consumption by 40% and carbon dioxide emissions by 20%. Vicat Group also fires its kilns using alternative fuels that emit less CO2. Experiments with growing Jatropha have, for example, been conducted in Senegal.

The nut from this bush produces an agrofuel which can replace coal imports. Moreover, this hardy plant does not require the use of agricultural land and provides work for a labor force neighboring the cement plant. The project submitted to the United Nations Framework Convention on Climate
Change consequently aims, when fully operational, to produce 70,000 tons of nuts a year over an area of 11,000 hectares. This production could replace 56,000 tons of coal imports. It should, in addition, eventually create the equivalent of 2,600 full-time jobs. Moreover, the limestone or clay quarries - which in many cases are integrated into the urban fabric as a result of soaring urbanization - are often replanted with trees and become green spaces within city centers. This is the case in Konya, Turkey, at the heart of the Anatolian plateau.

The use of secondary fuels, made of waste produced by man, is another avenue that is worth exploring. In Senegal, Sococim Industries, a subsidiary of Vicat Group, has for example formed a partnership with a new dump in order to install a sorting center on it, with a capacity to collect 22,000 tons of plastic waste, and transform it into fuel. It will be added to the groundnut shells that are already burned in the cement plant kilns. These solutions complete the other waste disposal systems that have still seen little development in urban areas in emerging countries.

A player in economic and social development

A cement plant can be a powerful factor in economic and social development, provided it integrates these objectives right from the design stage and that its owners are aware of their social responsibility. The cement industry is a long-term industry since an extremely high amount of capital is invested in the production equipment. For example, a new cement plant with a capacity of 1.5 million tons established in an emerging country might cost USD 250 millions.

The cement industry supports the creation and development of local job-creating companies, just as it does in developed countries. It is in this spirit that the Sococim Foundation has just been set up in Senegal: to create and develop VSEs. It is also recognized in developed countries that one job in the cement industry creates ten times more indirect jobs in both upstream and downstream economic sectors. This figure may be four to five times higher in developing countries. A cement plant does, therefore, have a real impact on employment in a given region. The activities that are consequently boosted locally do not only concern services; they also concern technical fields such as the boilermaking industry, electromechanical engineering and automatic systems. They allow skills and know-how to be developed that are useful for the establishment of other industries; they contribute to the general development of the region concerned. This knock-on effect is by no means insignificant.

The cement industry is also a powerful vehicle for social progress in these countries. It offers a wide range of employment for all types of skills. It very often helps educate its employees or future employees by supporting the development of schools or higher education establishments. In Rufisque, Vicat Group is supporting Senegal’s first private multimedia library; in Egypt, it grants scholarships to students registered at El-Arish University, which is located near its Sinai Cement Company cement plant. Similar programs are currently being implemented in Kazakhstan and India. Finally, any company that is responsible also pays close attention to the health of its employees. Where required, health centers are opened to treat employees or their families. In Senegal, for example, Vicat has developed a program to combat HIV and malaria.

In order to promote these positive developmental impacts, it must be ensured – and this is the responsibility of public authorities – that production overcapacities are not generated in a given region. Indeed, a high level of competition would put pressure on employment, salaries and suppliers in the short term. It would also lead to the development of export, and therefore to a greater carbon footprint due to transport, whereas cement is a material with a low value-to-weight ratio. Moreover, in the medium term, establishments that could no longer manage to break even would be forced to close down and this would discourage private investors.

Sustainable construction, employment, education, health: the impact that the cement industry has on the countries where it is established is consequently not restricted to simply manufacturing building materials - which is, moreover, essential. This is where its strength lies, as well as its legitimacy to
be present on these markets.

**Footnotes**

¹ The American historian specialized in urban planning published one of his most important works in that year: The City in History.

² On this topic, see the article by Hendrik G. van Oss, in this issue of *Private Sector & Development*.

³ Jatropha curcas (or Curcas curcas) is a type of bush from the Euphorbiaceae family, which comes from Brazil.

⁴ Sococim Industries Foundation, whose article of association were published in the Official Gazette of the Republic of Senegal dated 29th January 2011, aims to “support, on a not-for-profit basis, the projects of small enterprises or private individuals on the territory of Senegal, in order to develop sustainable self-employment, commercial, industrial or service activities that foster job creation.”