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The cement industry in the Middle East and north Africa - Progress towards sustainability



Cement production in the countries of the Middle East and north Africa (MENA) has almost tripled over the past 15 years to approximately 500Mt/yr, a positive development that is also one of the central topics at this year's AUCBM conference. To tie in with this major conference theme, Dirk Lechtenberg here presents the reasons behind this noticeable growth and describes the measures that the cement industry has taken towards sustainable development in some of the region's key markets.

Above: Rapid urbanisation in the MENA countries has led to increased waste, but also more opportunities for alternative fuel use.

The population in the MENA countries has doubled in the past 30 years from around 110m in 1980 to almost 220m in 2010. This shows that the MENA region has one of the fastest growing populations worldwide. The highest growth rates can be observed in cities, more than 10%/yr in many cases. Estimates assume that the rate of urbanisation in the MENA countries will exceed 70% in five year's time. The average for all developing countries is 54%.

The immense growth rates of cities in this region result on the one hand from mostly young people immigrating from rural regions and on the other hand from increasing birthrates in the already-growing cities. A high percentage of the population, up to 50%, is younger than 25 years. In some countries children under the age of 15 represent almost half the population. In Yemen this group represents an incredible 46% of the total population.

In contrast to the general consensus, the substantial growth rates seen in the cement industry over this time do not reflect the overall development of the economy, which was not able to keep pace with the growing population. While the global economy grew by a factor of 3.2 between 1980 and 2005, the total economy of the MENA region grew by a factor of just 2.2.⁵ A comparison of the growth in the gross national income (GNI) for the same regions during the same period shows a growth rate of 128% across the globe and a growth rate of just 18% in the MENA region.²

The consequences

Growth: The proceeding urbanisation and the population increase creates several problems and challenges for national governments as well as the cement industry. Since the start of national revolts and demonstrations in MENA countries in 2011 the region's problems, especially those of the young, have attracted worldwide attention.

Environmental aspects: The environmental problems that accompany a fast-growing population and increasing urbanisation are, among others, increasing consumption of energy and raw materials, increasing land use in order to satisfy increasing food demand, infrastructure development, disposal of increasing amounts of waste and development of sewage systems. Solving these generation-spanning problems is a challenging task for any national government.

Naturally, such high growth rates also affect the cement industry. In the MENA countries there are numerous cement companies, some listed on the stock exchange and some state-controlled. A number of cement companies have, owing to economic reasons, responded to the negative consequences of the rapid population growth.

The following paragraphs describe the cement industry's approaches to push sustainable development in certain sectors. They are partly driven by their own efforts to develop 'green' credentials and partly by regulations of the national governments. In this context

it should be mentioned that the growth of the cement industry is already partly limited by factors that are directly connected with sustainability and raw material supply.

Although the factors differ from country to country and cannot be generalised, there are a few major concerns, for example:

- Fuel shortages,
- Dependence on oil,
- Lack of investment in innovation.

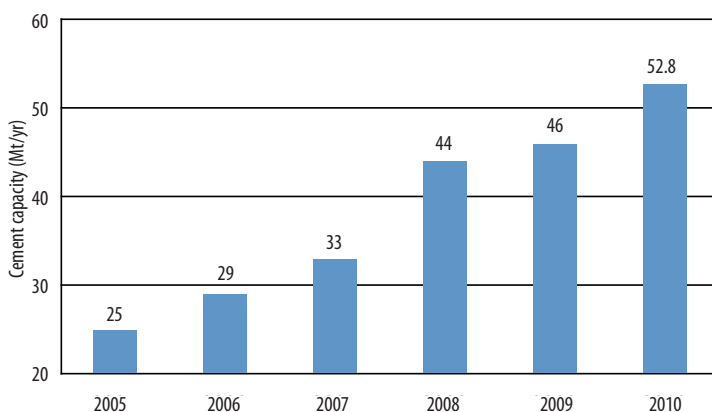
Let's take a closer look on the limiting factors and innovation potential based on practical examples.

Kingdom of Saudi Arabia

In many industrialised countries the continuous and tailored supply to the cement industry of fossil fuels is only a question of price.

But the fact that, of all countries, it was cement plants in Saudi Arabia that have repeatedly reported shortages of fossil fuels (specifically heavy fuel oil), was certainly a significant reason for the government to become closely involved in this matter.

Cement producers in Saudi Arabia obtain state-subsidised natural gas at a price of US\$0.75/mmbtu from the state-owned oil company Saudi Aramco. Previously, the resultant cement production costs were on average US\$28.80/t of cement. This compared very



favourably with its neighbours: Kuwait US\$59.20/t, UAE US\$47.80/t and Oman US\$37.00/t, which made it redundant to deal with the topic of energy. In India, a country with one of the highest energy costs in the world, the production of cement cost US\$70.00/t in 2010.

Owing to such low energy prices and a steadily growing demand, the production capacities grew constantly as can be seen in Figure 1.

Currently, industry accounts for approximately 40% of the overall energy demand in Saudi Arabia. Analysts estimate that this demand will double within the next 15 years. However, the government has planned to reduce this disproportionate energy demand.

Under the patronage of HRH Prince Abdulaziz Bin Salman, Saudi Aramco is developing a so-called

Mandatory Energy Efficiency Programme (MEEP) for all of Saudi Arabia's industries. The plan of MEEP is, 'to establish mandatory policies and regulations with the objective of reducing existing and future energy consumption levels in the industrial sector.'³

For the national cement industry this approach implies investments in energy-saving measures. Key points of an energy-efficient industry are identified as:

- Use of alternative raw materials,
- Use of alternative fuels,
- Training and education in energy-efficiency.

As the use of alternative fuels and raw materials is not yet common in Saudi Arabia, guidelines and a regulatory framework that set standards for the use of alternative or waste-derived fuels like municipal solid wastes, dried sewage sludge, drilling wastes and others have yet to be defined. This has to include:

- Types of wastes and alternative fuels that may be used by the cement industry,
- Standards for the production of waste-derived fuels,
- Emission standards and control mechanisms while using alternative fuels,
- Standards for permitting procedures.

Appropriate standards also need to be established for alternative raw materials that are to be used for clinker and cement production. In order to achieve energy-efficient production special education, further training and workshops for the staff involved have to be carried out.

Egypt

The current political developments in Egypt have influenced the local cement industry significantly. The government expects additional sources of revenue on

Left - Figure 1: Increase in cement capacity in Saudi Arabia from 2005 to 2010 according to Al Jazeera Capital Report, Saudi Cement Sector, December 2011.

Below: Cemex Assuit Cement in Egypt has plantations specifically for fuel uses. The image is of casuarina.





Above: Processing tyres as a fuel in Egypt.

Right: Olive kernels are an example of a potential alternative fuel for the cement industry in Tunisia, although European regulations mean that they are currently exported to Europe for power generation. This is an inefficient use that leads to high fossil fuel imports into Tunisia.

Below: 'Scavengers' are informal recyclers in Egypt, taking what is of value and selling it on.

the one hand from selling licenses for the construction of new cement plants and on the other hand from a reduction of subsidies for fossil fuels. As this news was not a surprise for the local cement plants, they have started to invest in the implementation of alternative fuels, mostly biomass-derived fuels.

One such producer is Cemex Assiut, which has not only started using different kinds of biomass, but has also established plantations for the production of biomass that are irrigated with pretreated sewage water from the city of Assiut.

The literature⁴ states that, "Egypt is the 14th biggest rice producer in the world and the 8th biggest cotton producer in the world. Egypt produced about 5.67Mt of rice and 0.64Mt tons of cotton in 2011. The area of cotton crop cultivation accounts for about 5% of the cultivated area in Egypt. The total amount of crop residues is about 16Mt/yr of dry matter. Cotton residues represent about 9% of the total residues."



Tunisia

Some years ago, Tunisia already invested in the establishment of an organised waste management system in the form of a state-owned agency named ANGED. Funded by the national German KfW development bank, numerous waste collection points as well as organised landfills have been built. Additionally, a special collection centre for hazardous waste was erected in Jradou.

This centre was operated by MVW Lechtenberg's Partner Nehlsen AG, the German Waste Management Group, collecting and processing wastes such as used oils and solvents. Such wastes are ideal alternative fuels, a fact that has not escaped the local cement companies which planned to use them in their plants. Unfortunately, due to public opposition, the centre was closed and the projects for the processing of alternative fuels have since been suspended.

Right: A waste processing facility in Dubai, UAE.

Tunisia is one of the largest producers and exporters of olive oil in the world. It also exports dates and citrus fruits that are grown mostly in the north of the country. It seems a paradox that olive kernels, the waste from Tunisian olive production, are exported to European power plants in order to save fossil fuel-derived CO₂ emissions there, while Tunisia imports approximately 90% of its energy demand, consisting of fossil fuels.

Morocco

The Moroccan cement industry has already achieved a greater success regarding the use of alternative fuels. Cement plants, mostly owned by the international companies Lafarge, Cimpor, Holcim and Italcementi, have already invested in the environmentally-friendly use of alternative fuels and alternative raw materials due to the development of world market prices.

The only local competitor, CIMAT, has also started preparing for the implementation of alternative fuels immediately after completion of its new plant, a five-stage double string calciner from Polysius, in Ben Ahmed, near Casablanca.

Right: Dirk Lechtenberg looking for the ideal alternative feeding point in the preheater tower of a Moroccan cement plant.



Below: Preheater tower of a Moroccan cement plant.



UAE

The UAE, represented by Dr Rashid Ahmad Bin Fahd, Minister of Environment and Water, recently issued a decision streamlining the activities of cement plants all over the country. The resolution will affect all existing and new cement factories across the country. Its provisions oblige the industry to prepare a report assessing the impact of cement plants on the environment.

In accordance with the decision, this report has to be prepared by a consulting firm that has expert knowledge regarding environmental protection in the cement industry. This is certainly the first step to evaluate the current situation, which will be followed by an investigation of alternatives towards sustainable development. Interest in the implementation of alternative fuels already exists among the national cement industry, which is confirmed by the numerous planned investment projects.

Summary

The cement industry in the MENA region will change significantly over the coming years. This change will focus on the improvement of energy efficiency and on the increased use of alternative raw materials and alternative fuels.

It will include significant investments in technology and in the human resource sector where the creation of new jobs, especially in the field of environmentally friendly and sustainable development, provides a perspective for the growing, young population of the MENA countries.

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