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## Alternative fuels: Providing growth and sustainability

'Incredible India,' the slogan of the Indian Tourist Board, might also be used to label India's overall economy. The world's biggest democracy now has the chance to show that, in terms of the cement industry, growth and sustainability need not be divergent interests...

**Above:** Under-developed waste management systems, an expensive coal deficit and a need for higher cement production all point to one direction for the Indian cement industry - Alternative fuels!

According to the International Monetary Fund, India's nominal GDP stands at US\$1.53tn. In terms of purchasing power parity, India's economy is the fourth largest in the world at US\$4.06tn. With future growth, India could emerge as the world's third largest economy by 2030, benefiting from strong domestic demand and favourable demographics, according to a Standard Chartered Global Research study.<sup>1</sup> The same study also showed that India is likely to grow faster than China, on average, over the next two decades.

### Urbanisation<sup>2</sup>

India, with a population of over 1.21 billion according to its 2011 census, accounts for 17.5% of the world population. According to the provisional census figures, 377 million people live in the urban areas of the country, 31.2 % of the country's total population.

The growth of the urban population is much faster than the growth of the rural population and India already has 475 Urban Agglomerations (UA). Three of these have populations of over 10 million. The largest UAs are: 1. Greater Mumbai, with 18.4 million

inhabitants; 2. Delhi, which has 16.3 million; 3. Kolkata, with 14.1 million; 4. Chennai, with 8.7 million and; 5. Bangalore, where there are 8.5 million people. Growing cities such as these require constant construction and hence cement, accompanied by steadily-increasing energy demand.

### India's industry is dependent on coal

In India 54% of the total installed electricity generation thermal capacity is coal-based and 67% of the capacity that was planned to be added during the 11th Five Year Plan period (2007-2012), was coal-based.<sup>3</sup> Furthermore, over 70% of the electricity generated in India is from coal based power plants.<sup>3</sup>

In order to achieve economic growth of 8-9% in terms of GDP, the country's total coal demand, even after allowing for the slippage that has occurred in the current plan period, has been projected to increase from ~730Mt in 2010-11 to ~2Bnt in 2031-32, as shown in the table, left. Of this ~2Bnt, about 75% of coal would go to power plants.

Given the projected increase in coal requirement, the domestic coal industry alone cannot fully meet the demand. The present demand-supply gap is around 85Mt/yr and it is expected to increase gradually to nearly 140Mt in 2017.<sup>3</sup>

The coal-mining state-monopolist has been unable to expand output significantly over recent years and, therefore, cannot keep up with the demand. Consequently, the firms that run power stations are forced to import costly foreign coal, but the grid companies cannot afford the power they produce. With too little coal and unsecured customers, many private firms that have built new power stations are in financial trouble.

**Below:** Historic and projected coal demands (Mt) from various Indian industrial sectors from 2005-6 to 2031-2. **Source:** 'India Energy Book'

Industrial sector	2005-2006	2006-2007	2011-2012	2016-2017	2021-2022	2026-2027	2031-2032
<b>Electricity (A)</b>	310	341	539	836	1040	1340	1659
Iron & Steel	43	43	69	104	112	120	150
Cement	20	25	32	50	95	125	140
Others	53	51	91	135	143	158	272
<b>Non-electricity (B)</b>	116	119	192	289	350	403	562
<b>TOTAL (A + B)</b>	<b>426</b>	<b>460</b>	<b>731</b>	<b>1125</b>	<b>1390</b>	<b>1743</b>	<b>2221</b>

## Cement industry

After posting the poorest show in a decade in 2010-11, at a sales growth rate of less than 5%, India's cement industry recovered in the following financial year, thanks to the robust demand revival in the second half of the year.

According to the Business Standard newspaper of 13 January 2013, the 330Mt/yr-capacity industry grew by 6.4% against less than 5% in the prior financial year. This was better than the cement makers' earlier estimates of 6.0%. However, later in the year when demand revived, industry officials and sector analysts turned positive, with growth projections of 6.5-7.0%.<sup>4</sup>

The industry sold 223Mt of cement, compared with 209.5Mt a year earlier. Production also rose, to 223.6Mt, against 210.5Mt, a rise of 6.2%.

According to the latest report from the working group on the industry for the 12th Five-Year Plan (2012-17), India would require overall cement capacity of around 480Mt/yr. This would mean that the industry would have to add another 150Mt/yr of capacity during the same period.

Currently, the top players, namely Ultratech, ACC, Ambuja Cements, Jaiprakash Associates, India Cements and Shree Cement, collectively control more than half of the cement market in the country. There are 40 players in the industry across the country as reported by the Business Standard.

With predicted demand of 50Mt/yr of coal, it is foreseen that this will be one of the key issues in increasing the capacity and reducing operational costs for the industry in the coming years.

## Alternative fuels as a solution?

The very high rate of urbanisation coupled with improper planning and the poor financial condition has made municipal solid waste management (MSW) in Indian cities a herculean task. At the same time, the cement industry's need for sustainable fuels is increasing. Why not combine these two issues?

Until now the use of alternative fuels in India has been at a very low level. According to an MVW Lechtenberg evaluation, only 1% of the fossil fuels used in the Indian cement industry is substituted by alternative fuels.

Of this 1%, the main alternative fuels are bagasse, rice husks and palm kernels. Small projects for the production of refuse-derived fuels (RDF) are launched, for example by Grasim Industries, ACC and others, to promote the use of such fuels. Some small processing facilities have also started operations. Indeed, Denmark's FLSmidth has just received orders for dosing and feedings systems for such alternative fuels at Grasim South, which is part of Aditya Birla.

Elsewhere, Tecpro Systems, in collaboration with MVW Lechtenberg, has started an RDF production Plant in Ajmer, Rajasthan, with a production rate of 250t/day. The partnership has launched a similar project in Bikaner.

However, many obstacles are found in developing such projects. In Ajmer, the time between submitting

the first bid to process the MSW until start-up at the plant was four years. This was mainly due to the bureaucratic system and permitting issues.

Another main obstacle is winning long-term contracts for the supply with waste, which are necessary in order to secure investments in the plants in the first place. As the recycling and disposal of MSW is under the control of municipalities and nationwide legislation and because frameworks are not implemented yet on a regional basis, a lot of 'groundwork' has to be done by companies that want to enter into co-processing of wastes in India. Many municipalities are even asking to *get paid* for wastes, a circumstance that does not allow a sustainable, all-waste-embracing concept.

According to the Institute for Industrial Productivity (IIP),<sup>5</sup> a multi-stakeholder initiative was launched in India to draw up an implementable action plan to increase the thermal substitution rate in the Indian cement industry from the present low level to 15% by 2020. The plan will identify the five most promising alternative fuels for co-processing in cement kilns and the two most promising blending materials.

The cement industry could play a significant role in the country's effort to find a sustainable waste management solution, greenhouse gas reduction and reduction of costly fossil fuel usage.

Assuming 300Mt/yr of clinker production capacity and a substitution rate of only 20%, a total quantity of 16Mt/yr of refuse-derived fuels can be used! This would accumulate in a saving of approximately 8Mt/yr of coal at a value of US\$984m/yr. This also allows for an off-set cut in CO<sub>2</sub> emissions due to non-combustion of fossil fuels.

## References

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2. Rajendra Kumar Kaushal et. al., 'Municipal Solid Waste Management in India - Current state and future challenges', International Journal of Engineering Science and Technology, Vol. 4, No. 4, April 2012.
3. World Energy Council, 'India Energy Book 2012'.
4. Chandan Kishore Kant, 'Cement industry posts 6.4% growth in FY12', 12 April 2012.
5. Institute for Industrial Productivity website, 'Increasing the thermal substitution rate in India's cement industry', <http://www.iipnetwork.org/increasing-tsr-cement-india>, 

**Below:** Inside the Ajmer refuse-derived fuels plant, which is the first such privately-owned facility in India.

