

Alternative Fuels - India

'Incredible India!' is not only the slogan of the Indian tourism industry - It's always my first thought when I visit India. To understand India, numbers can give only a limited view of the country and people. The Republic of India has 1.18bn people in the World's biggest democratic country. It also has a huge emerging market with continuing growth rates of 8- 9% every year.

Right: Table 1 - Summary of UK cement and clinker production and domestic cement sales.

India produces 200Mt of cement every year, which requires 40Mt of coal and 320Mt of limestone. However, these are just big numbers; to understand India you have to visit this beautiful country and to see the incredible development. You will be amazed from the new International Terminal Three at New Delhi Indira Gandhi Airport, the new three-lane highways that were just small parish roads six years ago.

The Indian cement industry has significant growth rates due to the high local demand driven by entrepreneurs and multinational companies supported by the Indian government. The energy demand, not only in the cement industry, has led to increasing fossil-fuel prices.

This is not the only reason why the Indian cement industry is now focusing on alternative fuels. An undeveloped waste management and recycling industry gives 'incredible' space for alternative fuel projects. This

is the reason that MVW Lechtenberg & Partner began a close collaboration with Tecpro Systems Ltd, one of the leading bulk material equipment suppliers in India several years ago. Tecpro has won the 'Emerging India 2007 Award' of the ICICI Bank, CNBC, TV18 in the infrastructure sector for its outstanding performance and strength, presented by the Honourable Prime Minister Dr. Manmohan Singh.

The use of alternative fuels or refuse derived fuels (RDF) is common practice in the cement industry all over the world. In India, the first RDF production plant was developed in 2006 by Grasim Industries at their Adithya Plant in Rajasthan. Since then, permission for similar developments has been given to 22 cement plants.

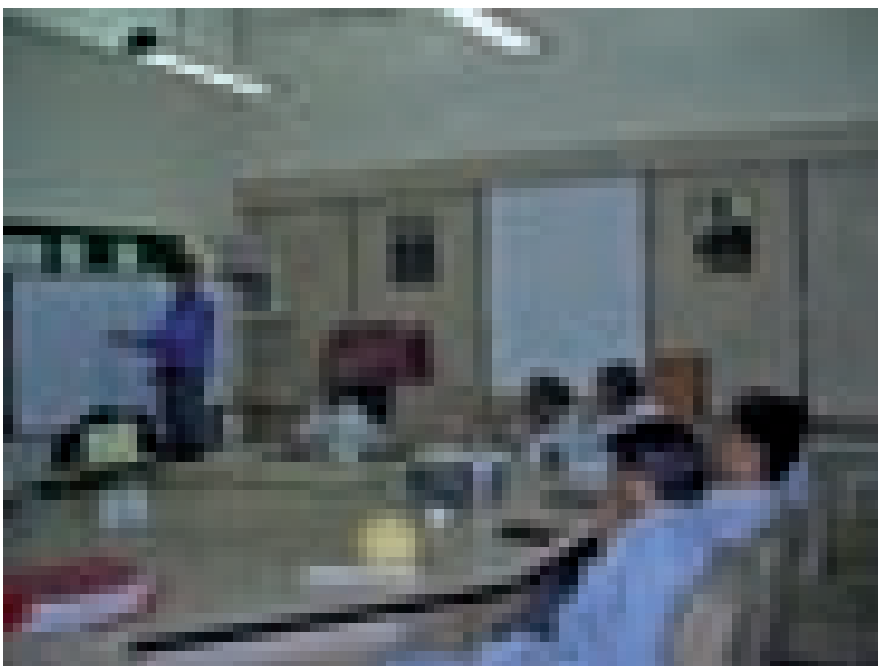
Trials of hazardous waste as fuel

The Central Pollution Control Board (CPCB) has conducted various trials using different types of hazardous wastes as alternative fuels in a cement plant. Based on the results, a national report 'Guidelines on Co-processing of Wastes in the Cement/Steel and Lime Industry' was published in February 2010, offering new, detailed guidelines on how to control the implementation of alternative fuels in general and hazardous wastes specifically. These guidelines are also useful to all stake holders in joining hands to promote gainful utilisation of hazardous waste and protect natural resources of the country. It is also attaining the national mission of reducing carbon emission.

Permitted fuels and common sources

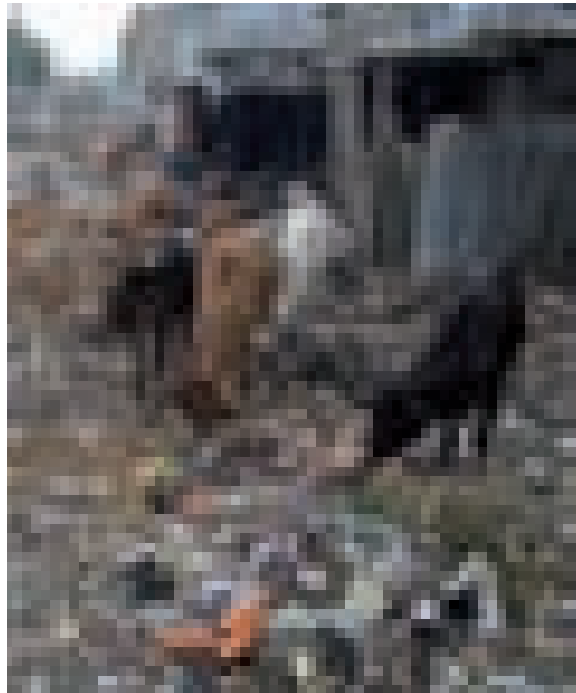
The categories of hazardous wastes and other substances for which regular permission has been granted by CPCB for co-processing in Indian cement plants are paint sludge from the automotive industry, petroleum refining sludge, TDI tar waste, ETP sludge from M/S

Below: Dirk Lechtenberg gives training on use of alternative fuels recycling at Grasim Industries, India.



BASF India Ltd., plastic waste and tyre chips.

In India, approximately 6.4Mt of hazardous waste is produced annually, 3.09Mt of which are recyclable. 0.41Mt incinerable and 2.73Mt that must go to land-fill. Most of the waste has characteristics suited to its utilisation as resource material, either for recovery of energy or materials like metals or their utility in construction, manufacture of low-grade articles or recovery of the product itself, which after processing can be utilised as a resource material. Hence, there is a new mind-set treating the hazardous waste as a resource material rather than a difficult material for disposal.



Right: 1bn people producing 500,000t/day of rubbish makes a lot of MSW - Potentially a large amount of fuel for the cement industry..

The role of the cement industry

The cement industry will take a significant role in the hazardous waste management of India, as the Indian government has understood the environmental and cost effective benefits of co-incineration of such wastes at high temperatures in controlled environments such as those in a cement kiln.

Besides hazardous wastes, some projects for the use processed municipal solid waste (MSW) are underway. In Ajmer, Rajasthan, the consortium of Tecpro Systems and MVW Lechtenberg is constructing a processing plant for municipal solid wastes, at which the recyclables are separated, the high calorific valuable materials are processed into RDF and the wet organics can now even be treated as environmental friendly, carbon-neutral fuel.

The constituents of MSW generated in Indian cities are highly heterogeneous and their percentages vary widely depending on the sources like residential areas, markets or office areas. Seasonal changes also contribute to the higher level of heterogeneity in MSW. To assess the suitability of any technology for processing MSW, it is very important to broadly analyse the composition and the weight-fraction of each of the

constituents with reference to the different sources.


As a result of various analyses and sorting tests, MVW Lechtenberg & Partner defined an average composition of MSW in India. Based on calculations, a maximum of 20% municipal solid wastes can be used as refuse derived fuel, therefore the processing of the wet organic part into a suitable RDF will give a significant increase in the thermal utilization rate. It is also important to understand how the building construction/demolition waste, hospital/medical waste, industrial waste and hazardous waste are handled in each city. Some of the municipal corporations make separate arrangement to collect, transport and dispose of the building construction/demolition waste mainly as land filling/leveling purpose. The waste generated in hospitals, nursing homes and clinics are generally incinerated separately and hence it does not become part of MSW. Industrial waste also does not become part of MSW as those are separately treated and disposed off.

As a result of recent experience and development, MVW Lechtenberg & Tecpro Systems will strengthen their cooperation in the development of an alternative fuel department, concentrating on waste handling, RDF processing, dosing and feeding systems for the cement & lime industry in India.

RDF processing is not only the collection and processing of waste. The most important issue is the knowledge about the constituents of waste, the physical and chemical behaviour, and the knowledge in processing various types of wastes, the definition and use of the right equipment and a well developed quality management system. Based on this, the first Indian engineers are now trained by MVW Lechtenberg's premises in Germany in sustainable RDF production.

Mass of MSW produced	500,000t/day
Organic / Bio-mass	35%
Woody bio-mass	15%
Paper	5%
Rags / Textiles	5%
Plastic	0.05%
Glass	0.05%
Rubber / Leather	4.85%
Metal	0.05%
Stones	20%
Sand / Earth	15%
Moisture content	45-55%

Potential

Calculating that only 20% the MSW is useable, MVW Lechtenberg calculates that waste for the RDF production will be approximately 100,000t/day with a calorific value of >3000 kcal. This is sufficient energy content to substitute for 75% of the heat-demand in the whole Indian cement industry. Based on a current coal price of US\$120/t more than US\$500m could be saved every year, even before considering the CO₂ emission savings. 

Right: Average composition of MSW in India as calculated by MVW Lechtenberg & Partner.