

Wealth from waste

Rapid urbanisation and industrialisation and increasing household income are leading to higher waste volumes in India. The safe and effective disposal of this increasing level of waste generation is a key concern for authorities at local, state and government level. One way forward is the promotion of large-scale co-processing in the cement industry, and efforts to create a more conducive regulatory environment are in progress.

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According to data from India's Central Pollution Control Board (CPCB), the country generates about 50Mta of municipal solid waste and 7.9Mta of hazardous waste. This increasing volume of waste generation means that local administrations, civic bodies and policy makers are tasked with the challenge of finding effective and safe disposal methods. For example, of the 7.9Mta of hazardous waste generated, more than half is recyclable (3.98Mta), while 0.6Mta can be incinerated, leaving 3.32Mta destined for landfill.

The increased use of waste as alternative fuel and raw material (AFR) in cement kilns can make a considerable contribution to effective and safe waste disposal efforts. In addition, this will not only help with the Indian cement industry become more competitive on a global stage, but is also in line with Prime Minister Modi's 'Swachh Bharat Abhiyan' (Clean India Campaign), which has been launched throughout the country as a national movement.

Cement industry contribution

India is the world's second-largest cement producer with a capacity of 350Mta. Fuelled by growth in sectors such as real estate and construction, this capacity is likely to double over the next decade. Recent government initiatives such as the development of 100 Smart Cities and the



India's cement industry can make a significant contribution to reducing waste volumes being sent to landfill by using them as alternative fuel

adoption of cement instead of bitumen on all new road projects, will provide a further boost to the sector.

While the domestic cement industry has made significant strides in terms of enhancing energy efficiency and optimising productivity, the use of alternative fuels and raw materials (AFR) is still a major area that can be developed. Thermal substitution of coal remains low compared to the European average of 40 per cent and varies dramatically from plant to plant. While some leading facilities report substitution rates of between 15-20 per cent, most achieve less than three per cent.

Benefits and barriers

Though current AFR usage is low, there is immense potential for improvement.

According to estimates by the Climate Change division of India's Ministry of Environment, Forest and Climate Change (MoEFCC), an AFR thermal substitution rate of just 10 per cent has the potential to reduce CO₂ emission by 3Mta of CO₂e, which translates to 0.2 per cent of the country's 2007 emissions.

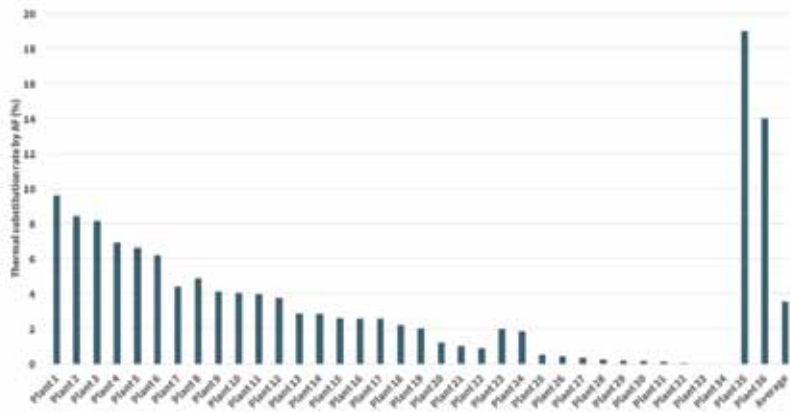
Moreover, enhanced AFR usage will help cement plants achieve or even exceed their energy consumption reduction targets under the Perform Achieve and Trade (PAT) scheme, a market-based cap-and-trade scheme announced by the Indian government. It aims to improve energy efficiency in industries by trading in energy efficiency certificates in energy-intensive sector. Associated benefits include an effective and efficient means of managing urban and industrial waste.

However, there are political and legal barriers to the achievement of higher fuel substitution rates. Enabling policy and suitable regulatory environment are the key factors to drive waste utilisation in the cement industry forward. Strong and well-constructed regulations have helped developed countries manage waste as a resource and TSR is often higher than 40 per cent with some countries achieving in excess of 75-80 per cent.

Table 1: generation and treatment of municipal solid waste in India

MSW generation (tpd)	133,760
Collection efficiency (%)	68
Processed/treated MSW (composting, biogas plants, palletisation, waste-to-energy) (t)	25,884
Landfilled waste (t)	65,489
<i>Source: Report of the Task Force on Waste to Energy, Planning Commission of India, 2014</i>	

Thermal substitution rate in selected Indian cement



Source: Status Paper on AFR Usage in Indian Cement Industry, CII

The challenges faced by the Indian cement industry include:

Slow policy development: the slow pace of revision of waste management rules to keep pace with current advancements in waste management approaches – ie co-processing and the absence of a proper waste hierarchy that recognises waste stream suited for co-processing – has been a long-standing barrier for co-processing in the country.

Limited waste availability: the level of co-processing depends on the plant location and available surrounding waste market. At present, obtaining a regular supply of homogenous waste is a significant challenge for cement plants as detailed information on quality, quantity and the type of waste generated is not readily available in the public domain. Since data on the quantity and quality of waste is minimal or outdated, cement producers have to spend a considerable amount of time and resources in exploring the availability of different types of AFR, thus weakening the business case for waste utilisation.

Lengthy permit process: the long permit processes further compounds the issue. To initiate co-processing, cement plants must conduct trial runs to obtain clearances from local and pollution control authorities, which is not only a lengthy process but also cost intensive. Although state regulatory bodies are working to simplify procedures, an approach based on the infrastructure and Measuring, Reporting and Verification (MRV) system in place at co-processing sites would be more

appropriate than a trial-based one.

Moreover, the inter-state movement of waste (except agricultural waste) comes with its own challenges. The inter-state movement of hazardous waste in India is not usually encouraged, requires additional permissions and is marred by the lack of certified transporters who can safely move materials from waste generators to cement plants.

Permitting the inter-state movement of waste would certainly support the uptake of waste utilisation in the cement industry. However, clearly-defined responsibilities for each stakeholder in terms of collection, packaging, transportation, handling and storage, etc would go some way to helping authorities in their decision-making process.

Similarly, the development of operational guidelines with built-in safety features for the aforementioned associated-activities will aid safe and environmentally sound co-processing.

Promoting large-scale efforts

Aiming to address these challenges, Shakti Sustainable Energy Foundation (SSEF) launched an initiative to promote large-scale co-processing in the Indian cement industry. The starting point was a White Paper proposing possible intervention opportunities. The initiative focusses on the removal of barriers through the dissemination of information, capacity building, advocacy and the development of legal and institutional frameworks, etc.

Targeting the development of an enabling regulatory mechanism for co-processing, the organisation has been successful in bringing together various

stakeholders, including waste generating industries, cement plants, regulatory bodies and non-profit organisations, to foster synergies and partnerships. Following up on the positive response received from all quarters, especially regulatory bodies, an expert committee has been constituted, drawing members from central and state pollution regulators.

One of the potential approaches under consideration by the expert committee looks at the identification of wastes that are ideal for co-processing in cement kilns, by introducing a new category – ‘co-processing waste’ – to the existing waste hierarchy. The expert group is also examining various kinds of incentives that can be accorded to both waste generators and waste users that pursue co-processing opportunities. Incentives could be, for instance, financial, government recognition, or faster approval process, etc.

The co-processing movement has received further stimulus from the the Clean India Mission, as the government

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is currently working on the revision of various waste management rules. The initiative recognises co-processing as one of the approaches for waste management, as well as emphasises the importance of segregation of waste at source which will help ensure the homogeneous supply of waste for co-processing.

Though India still has a long way to go in terms of forming a comprehensive co-processing system, now is an opportune time for domestic cement industry to focus on how co-processing can help increase its competitiveness on a global stage, and assist with the disposal of the country's every-increasing volumes of waste. ■