



Confederation of Indian Industry

# Status Paper on Alternate Fuel Usage in Indian Cement Industry



MAY 2018

## Confederation of Indian Industry (CII)

CII is a non-government, not-for-profit, industry-led and industry-managed organization, playing a proactive role in India's development process. Founded in 1895, India's premier business association has around 9000 members, from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 300,000 enterprises from around 265 national and regional sectoral industry bodies.

CII - Sohrabji Godrej Green Business Centre (CII - Godrej GBC), a division of Confederation of Indian Industry (CII) is India's premier developmental institution, offering advisory services to the industry on environmental aspects and works in the areas of Green Buildings, Energy Efficiency, Water Management, Renewable Energy, Green Business Incubation and Climate Change activities.

CII has been closely associated with the Indian cement industry at both technical & policy level.

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This report is an attempt to estimate the quantity of waste utilised as Alternative Fuel in Indian Cement Industry.

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## Desired Interventions for large scale co-processing

- Apex body at central and state level for effective implementation of resource recovery from waste
- Developing comprehensive quality standards for RDF manufacturing from MSW
- Possibility of segregating MSW separately for commercial & industrial establishments (dry & higher calorific value) and households (wet & lower calorific value)
- User fees for waste generators (Including households) and utilization of the same for managing MSW
- Government to encourage & support urban local bodies (ULBs) for implementing integrated waste management system
- Government to create an enabling environment for utilising waste in cement plants
- Government to create awareness and promote high level of waste utilisation through waste management awards, recognition through different avenues, print media, programs through schools, etc.
- Detailed inventory on waste generation at industry/ ULB level (including contact persons) with yearly updates
- Capacity building for all stakeholders (cement plants, policy makers, waste generators, government officials, local communities, etc.) about waste co-processing
- Developing environmental professionals in waste management
- Long-term partnership between cement plants & ULBs for utilising RDF from MSW, including pre-processing platforms in PPP model in all cement clusters

## References

- ❖ Ministry of Environment, Forest and Climate Change
- ❖ Central Pollution Control Board
- ❖ Low Carbon Technology Roadmap for Indian Cement Industry
- ❖ World Business Council for Sustainability Development, GNR Database
- ❖ CII Database



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## Solid Waste Management rules

The Environment Ministry has revised Solid Waste Management Rules in 2016 after 16 years. The SWM Rules 2016, notified on April 8, 2016 mandates:

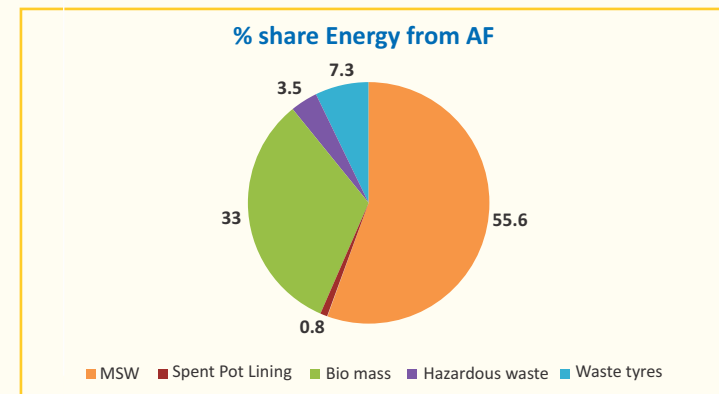
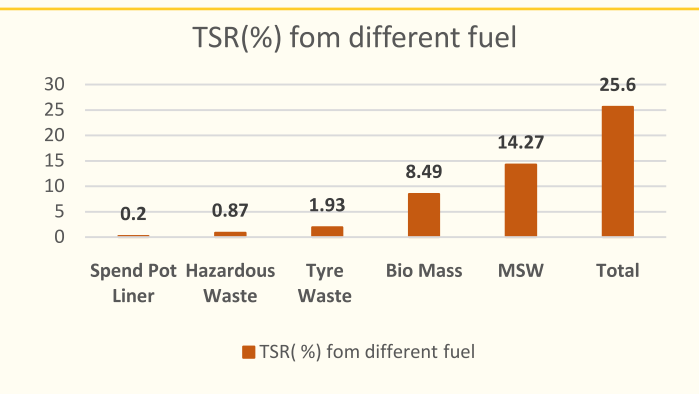
- All industrial units using fuel and located within 100 km from a solid waste-based RDF plant shall make arrangements within six months from the date of notification of these rules to replace at least 5 % of their fuel requirement by RDF so produced.
- Non-recyclable waste having calorific value of 1,500 Kcal/kg or more shall not be disposed of in landfills and shall only be utilized for generating energy, either through refuse derived fuel or by giving away as feed stock for preparing refuse derived fuel.
- High calorific wastes shall be used for co-processing in cement or thermal power plants.
- Setting up of solid waste processing facilities by all local bodies having 1,00,000 or higher population within 2 years.
- Setting up common or standalone sanitary landfills by or for all local bodies having 5,00,000 or higher population, and setting up of common or regional sanitary landfills by all local bodies and census towns under 5,00,000 population within three years.
- Developers of special economic zones, industrial estates, and industrial parks to earmark atleast 5% of the total area of the plot or minimum 5 plots/ sheds for recovery and recycling facility.

## Hazardous Waste Management rules

The Environment Ministry has revised Hazardous Waste Management Rules in 2016 after 8 years. The HWM Rules 2016, notified on April 4, 2016 mandates:

- SPCBs to prepare an annual inventory of the waste generated, recycled, recovered, utilised including co-processed, re-exported and disposed every year
- Rules have been made to distinguish between hazardous waste and other wastes. Other wastes include: waste tyre, paper waste, metal scrap, used electronic items, etc. and are recognized as a resource for recycling and reuse.
- New waste management rules have been designed based on waste management hierarchy in the sequence of priority of prevention, minimization, reuse, recycling, recover and co-processing, and safe disposal has been incorporated.
- Co-processing indicated as preferential mechanism over disposal for use of waste as supplementary resource, or for recovery of energy.
- The approval process for co-processing of hazardous waste to recover energy has been streamlined and put on emission norms basis rather than on trial basis.
- SPCBs/PCCs may grant authorisation to actual users for utilization or recycling of hazardous wastes for which standard operating procedures (SOPs) or guidelines have been provided by CPCB.

## Waste availability for achieving 25% TSR by 2025 in Indian Cement Industry



## AFR Services of CII- Green Business Centre

### Facilitate cement industry for gainful utilisation of alternate fuel & raw material in the manufacturing process

- Training program on AFR utilisation, technologies, experiences and implementation.
- Feasibility study detailing waste mapping & forecasting and technological evaluation for waste utilisation.
- Engagement with relevant stakeholders (municipality, waste generators, technology suppliers) for sustainable waste utilisation.

It is very heartening to note the galloping pace of the Indian cement industry in catching up with the developed world in gainfully utilising wastes as resources. Increasing quantum of co-processing of different kinds of wastes is not only helping us to solve the severe waste management and the environmental degradation problem faced in the country but is also helping substantially in conserving precious natural resources and in reducing GHG emissions.

Apart from the large quantum use of wastes such as fly ash, slag, phosphogypsum, etc. in the cement manufacture, this initiative of utilising different kinds of hazardous & non-hazardous wastes as Alternative Fuels & Raw materials (AFRs) is truly reflecting the cement industry's commitment to the "Swatchh Bharat Abhiyan". The waste management rules 2016 notified by MoEFCC have given preferential status to the waste management option of co-processing and have allowed all kinds of hazardous and non-hazardous wastes to be co-processed without the need of undertaking co-processing trial.

It is clear therefore, that the quantum of wastes co-processed and the number of cement plants co-processing compiled here in this document is only going to increase exponentially in the days to come. This will surely help our country to transform quickly from the present linear economy mode to a circular one



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## Introduction

The Indian cement industry, the 2nd largest in the world, has set voluntary & ambitious emission reduction targets to reduce 45% of its carbon emissions intensity by 2050 from 2010 levels. As one of the global leaders in energy efficiency, the Indian cement industry has also committed to reduce 377 - 485 PJ of energy in 2050 compared to BAU scenario. This is a clear testimony on how the Indian Cement sector is keen to make a difference.

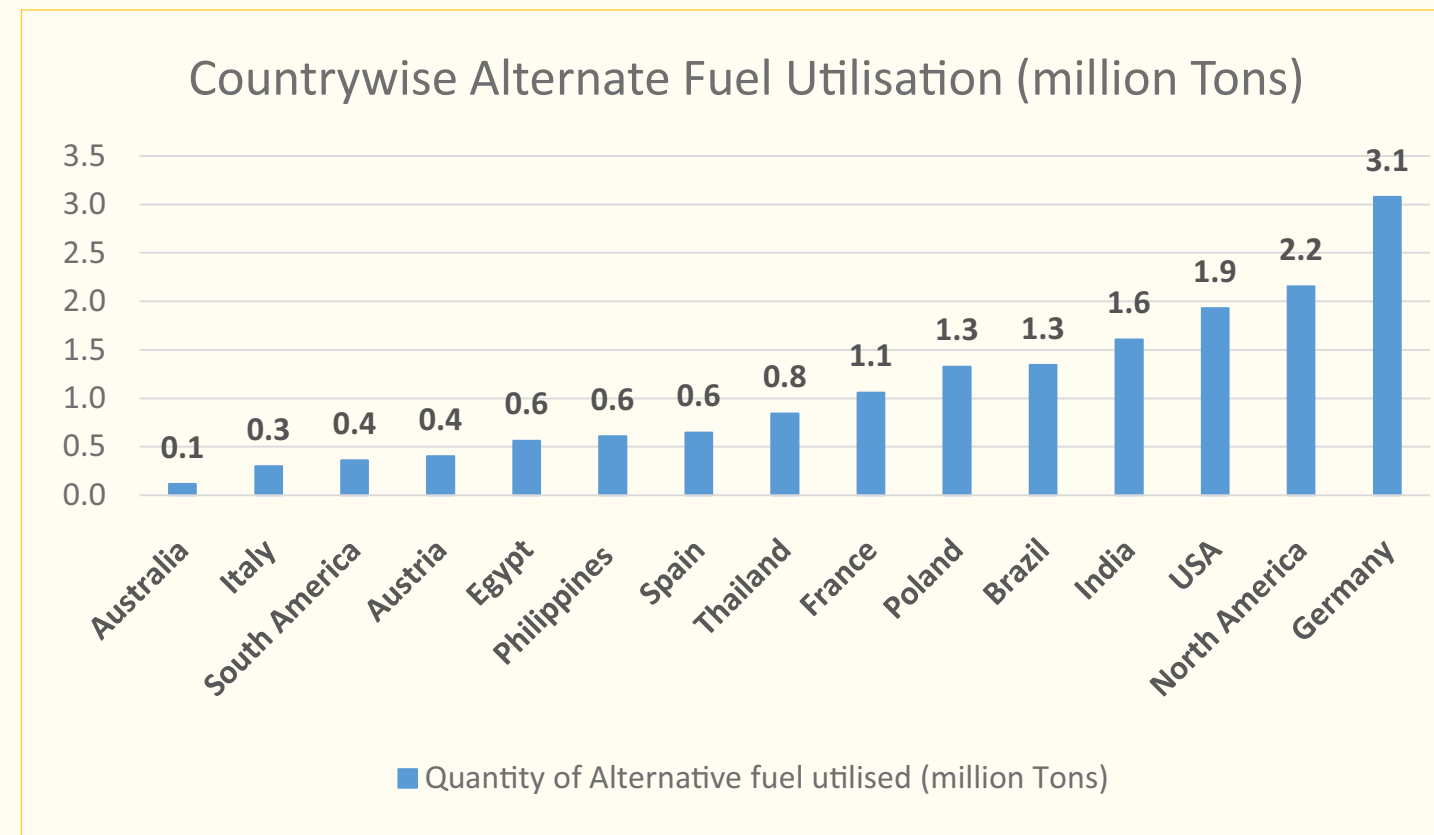
It has been proven beyond any doubt that, in a cement kiln, the organic constituents of fuel are completely destroyed and the inorganic constituents combine with the raw materials and exit as part of the cement clinker without generating solid residues, thus providing the best solution for waste management.

The use of alternate fuels and raw materials reduces carbon emissions that result from using fossil fuels and, therefore, the overall environmental impact of cement manufacturing. The Indian cement industry has been steadily progressing in AFR substitution over the years.

## Economics of RDF plants

One of the major wastes that has excellent potential to be utilised in cement plants is MSW. But the raw form cannot be utilised directly due to heterogeneous nature; it should be processed for converting it into fuel, namely RDF.

Estimates projected that for setting up a 500 TPD MSW mechanical biological treatment, which would produce 150 TPD of RDF and 50 TPD of compost would cost approximately INR 30 - 35 crores. A simple system for feeding 100 TPD RDF in cement plant would cost around INR 15 - 20 crores.



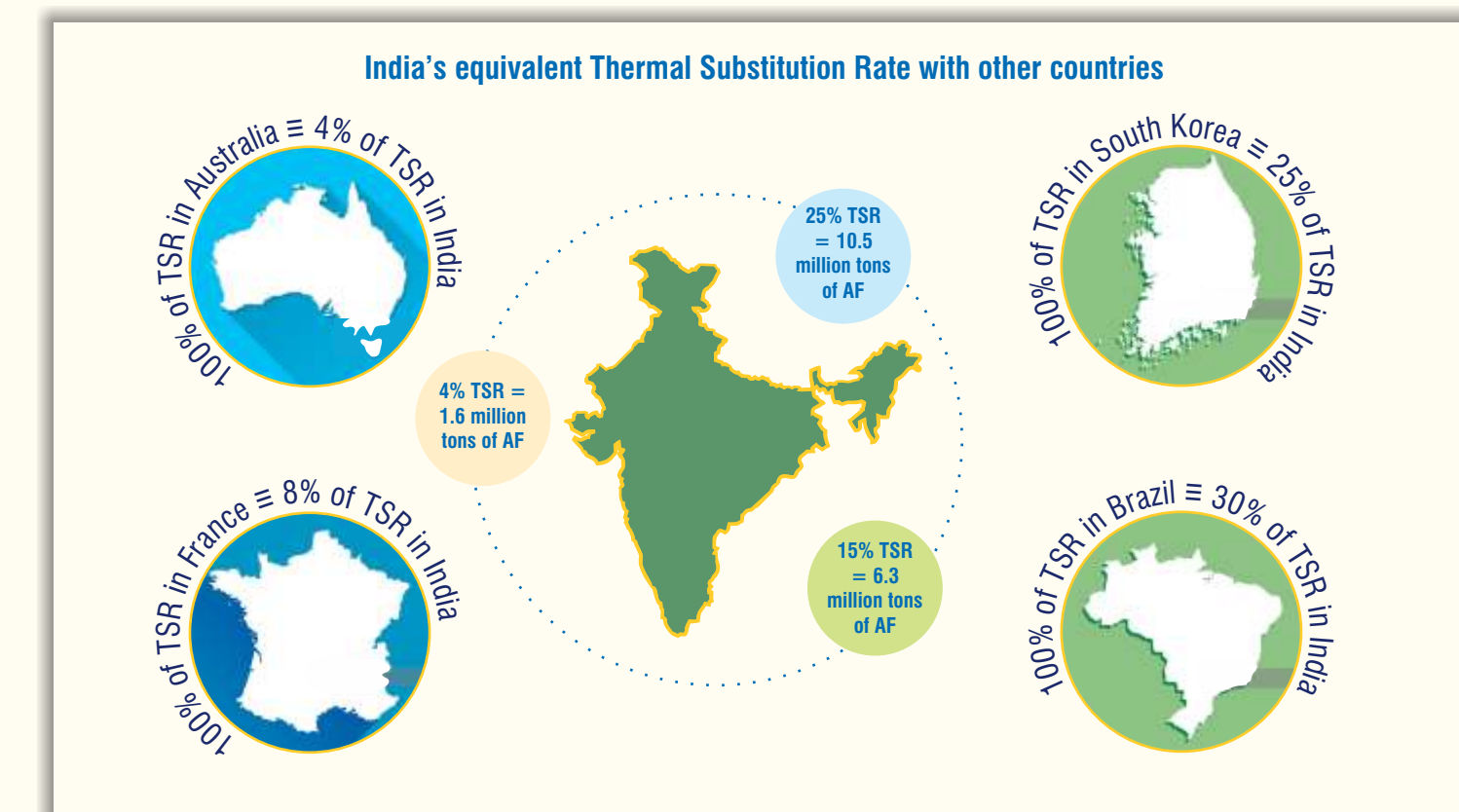
## Market Drivers

The cost of fuel is continuously increasing, which severely affects the operating margins of the cement manufacturers. With increasing demand for cement, AFR usage becomes a key to reduce fossil fuel & raw material consumption.

The Government of India has committed to reduce emissions intensity of its GDP by 33 to 35 per cent by 2030 from 2005 level. Cement industry, being one of the major contributors to the Indian economy, can play a vital role in supporting the nation in its low carbon pathway. The potential to reduce emissions from cement is significant, since a **1% increase in thermal substitution rate (TSR) will result in reduction of 2-3 Kg CO<sub>2</sub> reduction/ Ton of cement.**

India's cement sector, being one of the 8 core energy intensive sectors, is a part of PAT scheme (Perform, Achieve, Trade), launched under the National Mission to Enhance Energy Efficiency (NMEEE). The cement industry has been one of the major contributors to energy reductions in PAT Cycle 1, having surpassed its targets by more than 80%. Considering that latest technologies for energy reduction including WHRS, grinding systems, etc., are being widely adopted, **one of the main levers to achieve PAT targets in the future is increasing AFR substitution in cement kilns.**

Waste management is a growing concern for India. The Government of India is attempting to tackle this challenge through a number of activities and programs, including the Clean India Mission. Cement industries can play a key role in promoting better waste management practices & create a win-win situation by working with urban local bodies on waste segregation and management of municipal solid waste (MSW) through coprocessing in cement kilns.



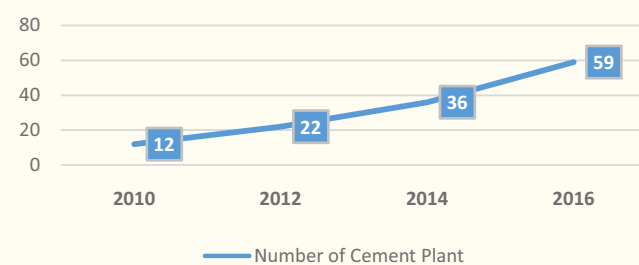
## Key findings

- ❖ AFR Thermal Substitution Rate increased from 0.6% in 2010 to 4% in 2016
- ❖ Number of cement plants using AFR has increased from 12 plants in 2010 to 59 plants in 2016
- ❖ 4% Thermal Substitution Rate accounts to 1.6 million tons of Alternate Fuel usage in Indian Cement Industry
- ❖ Current level of AF substitution saves 1.1 million tons of coal per annum which is equivalent to 0.5 million toe
- ❖ Top 3 AF Thermal Substitution Rate of Indian cement plants are 26%, 22% and 21%
- ❖ Coal cost saving on account of 4% TSR will be 3420 million INR

## Guidelines for Pre-Processing and Co-Processing of Hazardous and Other Wastes in Cement Plant, released by Central Pollution Control Board (CPCB) on July 7, 2017

- Substantial fractions of industrial, commercial, domestic and other wastes contain materials that have the potential for use as an alternative raw material or as a supplementary fuel for energy recovery.
- SPCBs can issue approval without CPCB : This guidelines will facilitate SPCBs/PCCs to grant authorisation for utilization of different kinds of wastes, including Hazardous & other wastes and will reduce processing time
- Trial runs not needed: Trial runs for co-processing of hazardous wastes would not be necessary except for few specific wastes such as Persistent Organic Compounds (PoPs), PCBs, obsolete and date expired pesticides, Ozone Depleting Substances etc.
- SOP for pre-processing and co-processing defined : Standard operating procedures (SOPs) for complete co-processing cycle : Starting from Generator (Handling and transporting waste material) to User (Up to utilisation, quality testing and emission monitoring) were indicated
- Inter-state transfer simplified : Facilitate movement of waste across different states & procedures to be followed for same highlighted in the document

Number of Indian Cement Plants using Alternate Fuel



Thermal Substitution Rate in Indian Cement Plants

