CO-PROCESSING OF WASTE IN CEMENT PLANTS

STATUS AND OPTIONS TO PROMOTE CO-PROCESSING FOR WASTE MANAGEMENT

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“Co-processing” The use of suitable waste materials in manufacturing processes for the purpose of energy and/or resource recovery and resultant reduction in the use of conventional fuels and/or raw materials through substitution.
CO-PROCESSING OF WASTE IN CEMENT KILN AGREEMENT IN INTERNATIONAL CONVENTION

- Cement kiln co-processing technology is accepted by Basel convention for disposal of hazardous wastes
- The cement kiln co-processing technology is accepted by Montreal protocol for disposal of POPs. Cement kiln co-processing of POPs, hazardous and non hazardous wastes is practiced widely and successfully in many countries around the world
INITIATING POLICY REFORMS FOR SUSTAINABLE WASTE MANAGEMENT THROUGH CO-PROCESSING

Important Recommendations of Basel Convention Guidelines:

1. The waste management hierarchy needs to be respected.
2. Additional emissions and negative impacts on human health must be avoided.
3. The quality of the cement must remain unchanged.
4. Companies that co-process must be qualified with appropriate infrastructure.
   - Assure compliance with all laws and regulations
   - Have good environmental and safety compliance records
   - Have personnel, processes, and systems in place committed to protecting the environment, health, and safety
   - Safe and sound receiving, storage, processing and feeding of hazardous wastes
   - Systems for the provision and analysis of waste representative samples should be in place
INITIATING POLICY REFORMS FOR SUSTAINABLE WASTE MANAGEMENT THROUGH CO-PROCESSING

Important Recommendations of Basel Convention Guidelines:

5. For optimal performance, AFRs should be fed to the cement kiln through appropriate feed points, in adequate proportions and with proper waste quality and emission control systems.

6. Due to the heterogeneity of waste, pre-processing is required to produce a relatively uniform waste stream for co-processing in cement kilns. To be carried out in a purpose-made facility, which may be located outside or inside the cement plant.

Contd...
Alternative Fuels which can be used to increase thermal substitution rate (TSR) in cement industry (use of CV of waste as fuel in cement kiln)

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>Fuel</th>
<th>Calorific Value (kcal / kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>RDF from Municipal Solid Waste</td>
<td>2800-3800</td>
</tr>
<tr>
<td>2.</td>
<td>Used Tires</td>
<td>6700-7700</td>
</tr>
<tr>
<td>3.</td>
<td>Hazardous Waste</td>
<td>4000-9500</td>
</tr>
<tr>
<td>4.</td>
<td>Industrial Plastic Waste</td>
<td>4070-6620</td>
</tr>
<tr>
<td>5.</td>
<td>Biomass</td>
<td>2500-3800</td>
</tr>
<tr>
<td>6.</td>
<td>Slaughter House Waste</td>
<td>700-1400</td>
</tr>
<tr>
<td>7.</td>
<td>Poultry Litter</td>
<td>2700-3800</td>
</tr>
<tr>
<td>8.</td>
<td>Dried Sewage Sludge</td>
<td>1700-1900</td>
</tr>
</tbody>
</table>

Source: Holtech & CPCB
## Alternative Raw Materials which can be used as blending material

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Alternative Raw Material</th>
<th>Available Quantity in million tonnes per annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fly Ash (cement blending material)</td>
<td>200.0</td>
</tr>
<tr>
<td>2.</td>
<td>Blast Furnace Slag from Steel Industry</td>
<td>10.0</td>
</tr>
<tr>
<td>3.</td>
<td>Lime Sludge (Paper, Carbide, Sugar Industry Sludge)</td>
<td>4.5</td>
</tr>
<tr>
<td>4.</td>
<td>Red Mud from Aluminum Industry</td>
<td>3.75</td>
</tr>
<tr>
<td>5.</td>
<td>Foundry Sludge / Sand</td>
<td>-</td>
</tr>
<tr>
<td>6.</td>
<td>Chrome Sludge as mineraliser</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>Lead Zinc Slag</td>
<td>0.5</td>
</tr>
<tr>
<td>8.</td>
<td>Phosphate Chalk</td>
<td>-</td>
</tr>
</tbody>
</table>

*Source: Holtech*
POTENTIAL AVAILABILITY OF WASTE FOR CO-PROCESSING IN INDIA

**A. Fuel**

<table>
<thead>
<tr>
<th>Waste Type</th>
<th>Availability (MTA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Waste</td>
<td>0.65</td>
</tr>
<tr>
<td>Biomass</td>
<td>150</td>
</tr>
<tr>
<td>Used Tyre</td>
<td>0.83</td>
</tr>
<tr>
<td>Industrial Plastic Waste</td>
<td>0.20</td>
</tr>
<tr>
<td>RDF from MSW</td>
<td>6.88</td>
</tr>
</tbody>
</table>

**B. Alternate Raw Material**

<table>
<thead>
<tr>
<th>Material</th>
<th>Availability (MTA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flyash</td>
<td>200</td>
</tr>
<tr>
<td>Blast Furnace Slag</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: CPCB & Holtec
GENERAL PRINCIPLE FOR CO-PROCESSING

The important general principles in co-processing are:

1. Additional emissions and negative impacts on human health must be avoided.
2. The quality of the clinker/cement must remain unchanged.
3. Companies that co-process must be qualified:
   • Assure compliance with all laws and regulations
   • Have good environmental and safety compliance records
   • Have personnel, processes, and systems in place committed to protecting the environment, health, and safety
   • Be capable of controlling inputs to the production process

Contd...
Requirements for undertaking co-processing are

1. Best available technology for air pollution prevention and control with continuous emission monitoring
2. Exit gas conditioning/cooling and temperature less than 200C in control devices to prevent dioxin formation.
3. Adequate emergency and safety equipment and procedures, and regular training
4. Safe and sound receiving, storage, processing and feeding of hazardous wastes
5. The operator of the co-processing plant should develop a waste evaluation procedure to assess health and safety of workers and public, plant emissions, operations and product quality, variables that should be considered when selecting waste include:

   (a) Kiln operation
   (b) Emissions
   (c) Clinker, cement and final product quality
AVAILABLE HAZARDOUS WASTE WHICH CAN BE USED AS PARTIAL FUEL IN CEMENT KILN

- Organic residue from Pharmaceuticals and Pesticide industry
- Spent solvent
- Sludge from petrochemical / oil refinery
- Slaughter House Waste
- Waste Oil
- Paint sludge
- Effluent Treatment Plant Sludge
- Spent Pot Lining from Aluminum Industry
- Spent Carbon
List of White-papers prepared by Regulatory Forum consisting of Member Secretaries of 5 SPCBs under the Chairmanship of MS, GSPCB


2. Preparation of technical guidelines for setting up environmentally sound pre-processing facilities to prepare homogenous waste mixes suitable for co-processing in cement kilns.

3. Developing emission standards for co-processing alternate fuel and raw (AFR) material in cement kilns including hazardous wastes.

4. Increasing the use of fly ash generated by coal based power plants and refuse-derived fuels (RDF) in cement plants.

5. Developing guidelines for the transport and storage of hazardous waste
Most Promising Alternate Fuels

- RDF from municipal solid waste [MSW]
- Used tyres
- Hazardous waste
- Industrial plastic waste
- Biomass
### RDF from MSW

<table>
<thead>
<tr>
<th>Total Availability (million tpy)</th>
<th>Percentage of total Availability considered</th>
<th>Availability for co-processing (million tpy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.88</td>
<td>20</td>
<td>1.37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average NCV (kcal/kg)</th>
<th>Moisture (%)</th>
<th>Chlorine (%)</th>
<th>Ash (%)</th>
<th>Sulphur (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,500</td>
<td>20-25</td>
<td>&lt;1</td>
<td>&lt;25</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential TSR %</th>
<th>CO$_2$ mitigation (in million tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2</td>
<td>1.7</td>
</tr>
</tbody>
</table>
Barriers

Technical Barriers
- Poor quality MSW due to high recycling
- Presence of high moisture, chlorine and heavy metals in RDF, limiting TSR
- Customization of technology for MSW to cement grade RDF conversion units

Financial Barriers
- High investment cost for setting up pre-processing unit
- High collection and transportation cost of MSW

Policy and Regulatory Barriers
- Non-availability of clean, transparent and detailed information on MSW availability in Public domain
- No clear policy that encourages conversion of MSW to RDF and its co-processing in Cement Plants as preferred alternative
Recommended Action Plan

- Setting up a demonstration project in a public private partnership mode that addresses all the pillars of sustainability namely technical, institutional and financial.

- RDF co-processing inclusion by MNRE under their waste to energy scheme.

- RDF use for co-processing to be acknowledged as a CSR activity, which would unlock finances for this action that will have major societal benefits by partly solving the menace of MSW.
# Used Tyres

<table>
<thead>
<tr>
<th>Total Availability (million tpy)</th>
<th>Percentage of total Availability considered</th>
<th>Availability for co-processing (million tpy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.83</td>
<td>50</td>
<td>0.40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average NCV (kcal/kg)</th>
<th>Moisture (%)</th>
<th>Chlorine (%)</th>
<th>Ash (%)</th>
<th>Sulphur (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,500</td>
<td>&lt;1</td>
<td>0.1</td>
<td>&lt;3</td>
<td>&lt;1.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential TSR %</th>
<th>CO₂ mitigation [in million tonnes]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.22</td>
<td>1.2</td>
</tr>
</tbody>
</table>
Barriers

Technical Barriers
- Possibility of coating formation at kiln inlet due to high sulphur content
- Poor availability near cement plants

Financial Barriers
- High Price due to other uses, high transportation and collection cost
- High financial risk of setting up co-processing system due to uncertainty of availability at targeted price

Policy and Regulatory Barriers
- Lack of information on used tyre inventory, district & sector wise break-up of waste in public domain
- No clear policy that prefers co-processing of tyres to other modes of disposal
- Cumbersome import permit process
- Requirement of emission trials by MoEF for ever new source of imported tyres
Recommended Action Plan

- Recommend ban on current practices of disposing used tyres that create huge environment pollution
- Recommend free import of tyre chips and rubber waste for co-processing
## Hazardous Waste

<table>
<thead>
<tr>
<th>Total Availability (million tpy)</th>
<th>Percentage of total Availability considered</th>
<th>Availability for co-processing (million tpy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.54</td>
<td>75</td>
<td>0.40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average NCV (kcal/kg)</th>
<th>Moisture (%)</th>
<th>Chlorine (%)</th>
<th>Ash (%)</th>
<th>Sulphur (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,000</td>
<td>5-20</td>
<td>&lt; 1.5</td>
<td>&lt; 5 (liquid)</td>
<td>&lt; 1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 20 (solid)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential TSR %</th>
<th>CO$_2$ mitigation [in million tonnes]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4</td>
<td>0.72</td>
</tr>
</tbody>
</table>
Barriers

Technical Barriers

- Non uniform quality due to varying sources
- Presence of high moisture and Chlorine
- Lack of pre-processing facilities
- Limited technical knowledge and skilled manpower

Financial Barriers

- Time consuming and expensive trial runs needed for each new stream
- High capital cost for setting pre-processing platforms
- Huge competition for HW, impacting gate fee
Barriers

Policy and Regulatory Barriers

- Unclear emission norms, cement industry required to demonstrate no change in emissions before and after HW use
- Incinerator standards to be followed for co-processing as there are no specific emission standards for cement kilns
- Interstate transfer of HW is restricted by some state PCB’s
- Non availability of clear and transparent information on sources of HW, details on state wise / sector wise generation of wastes in public domain
- Outdated Classification of HW
- Preference to TSDF’s
Recommended Action Plan

- Developing emission standards for Cement Industry using HW
- Recommend exemption of emission trials for selected categories of HW
- Suggest steps to increase availability of HW for co-processing by including some part of land-fillable HW
- Develop guidelines for HW pre-processing units for cement industry
- Facilitate availability of HW Inventory data base on software platform in all relevant states
- Suggest amendments to existing HW rules to include co-processing of HW in Cement plants as a 4th option of HW disposal
- For HW Pre processing units for cement Industry, central/ state subsidy be encouraged based on viability gap funding
## Industrial Plastic Waste

<table>
<thead>
<tr>
<th>Total Availability (million tpy)</th>
<th>Percentage of total Availability considered</th>
<th>Availability for co-processing (million tpy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>50</td>
<td>0.10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average NCV (kcal/kg)</th>
<th>Moisture (%)</th>
<th>Chlorine (%)</th>
<th>Ash (%)</th>
<th>Sulphur (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,000</td>
<td>20-25</td>
<td>0.5-1</td>
<td>5-15</td>
<td>0.5-1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential TSR %</th>
<th>CO$_2$ mitigation [in million tonnes]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4</td>
<td>0.2</td>
</tr>
</tbody>
</table>
Barriers

**Technical Barriers**
- High moisture content and impurities
- Lack of pre-processing facilities for Industrial Plastic waste

**Financial Barriers**
- Lower charges motivating industry for land filling
- High transportation cost as cement plants are far off
- Availability inconsistent to justify installation of co-processing facility

**Policy and Regulatory Barriers**
- Unclear Policy at Central and state level about the need for environmental permits for co-processing
- Non uniform policy at state level regarding classification of plastic waste as hazardous or non-hazardous
Recommended Action Plan

- Replicate Gujarat model of encouraging plastic waste co-processing in cement plants in other states of India
- Normalization of policy with regard to categorization of plastic waste that facilitates its transportation across states
# Surplus Biomass

<table>
<thead>
<tr>
<th>Total Availability (million tpy)</th>
<th>Percentage of total Availability considered</th>
<th>Availability for co-processing (million tpy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average NCV (kcal/kg)</th>
<th>Moisture (%)</th>
<th>Chlorine (%)</th>
<th>Ash (%)</th>
<th>Sulphur (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000</td>
<td>5-20</td>
<td>-</td>
<td>2-22</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential TSR %</th>
<th>CO₂ mitigation [in million tonnes]</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>17.6</td>
</tr>
</tbody>
</table>
Barriers

Technical Barriers
- Low bulk density, bailing required for straws
- Used in boilers, furnaces, brick kilns making availability difficult for cement plants
- Requirement of shredders/chippers for size reduction
- High Potassium and Sodium in some crop residues may cause kiln operational issues

Financial Barriers
- High costs of handling, bailing & transportation over long distances
- Uncertainty of regular availability of biomass makes investment decision on co-processing system difficult.
- Requirement of huge land area for cultivating energy crops

Policy and Regulatory Barriers
- Restricted usage of biomass only for power generation by some states, encouragement of biomass based power plants by state nodal agencies
- Practice of burning rice straw to clear fields, ban on such practices not enforced rigorously
Recommended Action Plan

- Represent to MNRE for including biomass co-processing in cement industry in their action agenda for utilizing surplus biomass as green fuel

- Captive/ neighborhood energy crop plantation should be carried out by the cement industry as CSR activity
USE OF WASTE FOR CO-PROCESSING IN INDIA
(RECOMMENDED REGULATORY REFORMS)
PROPOSED AMENDMENT IN HAZARDOUS WASTE MANAGEMENT RULES TO BOOST UP CO-PROCESSING OF WASTE IN CEMENT PLANT

1. In Chapter I, Section 3, Definitions, the following may be included:

(e) “Co-processing” The use of suitable waste materials in manufacturing processes for the purpose of energy and/or resource recovery and resultant reduction in the use of conventional fuels and/or raw materials through substitution.

2. In Chapter I, Section 3, Definitions, the present clause (e) may be modified as under:

(f) “disposal” means any operation which does not lead to recycling, or reuse and includes physicochemical, biological treatment, incineration, co-processing and disposal in land fill.

Contd...
3. With the above two amendments a co-processor (e.g.) a cement kiln owner becomes “operator of disposal facility” under clause ‘r’ of Section 3.

4. Consequent to points 1 and 2 above, Chapter-II Section 4(4) of the Rules may be amended as under:

“The occupier or any other person acting on his behalf who intends to get his hazardous waste treated and disposed of by the operator of a Treatment, Storage and Disposal Facility (TSDF) or Co-Processing Facility shall give to the operator of a facility, such information as may be determined by the State Pollution Control Board”.

5. Section 11, Chapter III of the Rules may be amended as under:

The utilization of Hazardous Wastes as supplementary resource or for energy recovery, such as or after pre-processing shall be carried out by the units only after obtaining approval from the concerned State Pollution Control Board or Pollution Control Committee. SPCBs / PCCs shall grant this approval after giving due consideration to the waste management hierarchy.
6. Consequent to the above, Section 19(1), Chapter VI may be amended as under to include co-processor at par with TSDF operator in respect of Packaging and labeling of HW.

The occupier or operator of the Treatment Storage And Disposal Facility or Co-Processing facility or recycler shall ensure that the hazardous waste are packaged, labeled and transported, based on the composition in a manner suitable for safe handling, storage and transport as per the guidelines issued by the Central Pollution Control Board from time to time.
PROPOSED EMISSION STANDARD FOR CO-PROCESSING OF ALTERNATE FUEL INCLUDING HAZARDOUS WASTE IN CEMENT KILN

- The RF after detailed discussion recommended the emission standard for co-processing of alternate fuel including hazardous waste in cement kiln which is given below.

Contd...
**PROPOSED EMISSION STANDARDS FOR CEMENT PLANTS CO-PROCESSING ALTERNATE FUEL/RAW MATERIAL (AFR) INCLUDING HAZARDOUS WASTE**

**EFFECTIVE FROM 01.08.2015**

Units at 760mm Hg, dry air, 10 percent oxygen, **273 K**

<table>
<thead>
<tr>
<th>Parameter, Unit</th>
<th>Not to exceed</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Particulate Matter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mg/Nm³</td>
<td>50</td>
<td>A,B</td>
</tr>
<tr>
<td>kg/t of clinker</td>
<td>0.125</td>
<td></td>
</tr>
<tr>
<td>2. Sulphur-di-oxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mg/Nm³</td>
<td>100</td>
<td>A,C</td>
</tr>
<tr>
<td>relaxable upto 1000* mg/Nm³ by concerned SPCB in special cases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Oxides of Nitrogen, expressed as NO2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mg/Nm³</td>
<td>new - 600</td>
<td>A,C,D</td>
</tr>
<tr>
<td></td>
<td>Existing – 800</td>
<td></td>
</tr>
</tbody>
</table>

* CPCB recommend 1000 mg/Nm³
<table>
<thead>
<tr>
<th>Parameter, Unit</th>
<th>Not to exceed</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Metals</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>mg/Nm³</td>
<td>Mercury and its compounds – 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cadmium and Thallium and their compounds – 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sb+As+Pb+Co+Cr+Cu+Mn+Ni+V – 0.5</td>
<td></td>
</tr>
<tr>
<td>5. Acid Gases</td>
<td></td>
<td>A,B</td>
</tr>
<tr>
<td>mg/Nm³</td>
<td>Hydrogen Chloride - 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hydrogen Fluoride - 1</td>
<td></td>
</tr>
<tr>
<td>6. Dioxins and Furans</td>
<td>ng ITEQ/m³ - 0.1</td>
<td>B</td>
</tr>
</tbody>
</table>

**Notes:**

A: Continuous monitor is required to be installed. Momentary emission levels will not be considered for conformity check instead not exceeding 72 hours shall be considered as the averaging period.

B: Method of analysis as prescribed in Methods and Standards operating practices of Emission Testing in Hazardous Waste incinerators, LATS, CPCB, September, 2007.

C: Method of analysis as prescribed in Emission Regulation Part-III, published by CPCB

D: New – Cement Plants Commissioned after 01.08.2015
Existing – Cement Plants Commissioned before 01.08.2015.

Contd...
• It is recommended that the proposed standard may be notified under EP Act, 1986 by MoEF. This may also be notified under Section 17 (1)(g) of Air Act, 1981 by SPCBs / PCCs.
• It is also suggested by RF that SPCBs / PCCs may also give permission for co-processing of alternate fuel other than hazardous waste in cement kiln under Air Act subject to compliance of following:
  i. The cement industry meets emission standards for co-processing of alternate fuel and hazardous waste in cement kiln
  ii. The cement plant install all continuous emission monitoring system.
  iii. The cement industry ensure quality of clinker and cement strictly as per BIS norms.

Contd...
iv. Exit gas conditioning/cooling and temperature less than 200°C in control devices to prevent dioxin formation.

v. Adequate emergency and safety equipment and procedures and regular training

vi. Safe and sound receiving, storage, processing and feeding of hazardous wastes and installation of odour / VOC control system.
Use of above waste as partial fuel in cement kiln can be dealt under Air Act, 1981 by SPCB / PCC under following section of Air Act:

- Section 17(1)(g)
- Section 19(3)
- Section 19(5)

Once these wastes are notified by respective State Government as “approved fuel” under Air Act based upon recommendation of SPCBs / PCCs, consent to operate can be granted under Air Act by SPCB / PCC to cement plants to use above waste as fuel subject to “they meet the emission standard for co-processing as proposed.”
CO-PROCESSING OF RDF FROM MSW IN CEMENT PLANT

- If RDF from MSW is notified by SPCB / PCC as approved fuel under Air Act then CTO for use of this fuel as cement kiln can be given under Air Act.
- Alternatively under MSW rules under EP Act, MoEF may consider to include RDF from MSW as fuel in cement kiln, as a disposal option of MSW management
Present generation of fly ash is about 190-200 MTA from coal based power station and it is going to increase rapidly as more coal based power station are being setup in India.

Under BIS code, fly ash upto 35% are permitted to be used to manufacture “fly ash pozzolona cement”. BIS may consider to increase this limit to 40% for some special category uses of cement.

MoEF under Fly Ash Management Rules, 2009 include the use of fly ash to make fly ash pozzolona cement as a disposal option.

Under EIA 2006/2009 Rules, cement grinding unit making fly ash pozzolona cement are required to obtain EC. As fly ash cement grinding unit are environmentally friendly units, RF recommended that the requirement of taking EC under EIA 2006 / 2009 may be waived by MoEF.

Under EIA 2006 while granting EC to thermal power plant, MoEF may consider to put one condition to TPP to send fly ash to cement grinding unit for making fly ash pozzolona cement as much as possible.
CO-PROCESSING BLAST FURNACE SLAG GENERATED FROM INTEGRATED STEEL PLANTS

- Presently in India, more than 10 MTA blast furnace slag are generated from steel industry. Blast furnace slag after granulation can be used for making slag cement.

- Under EIA 2006 while granting EC to steel industry, MoEF may give condition that “All BF slag should be granulated and used for making slag cement”.

RECOMMENDATION AND WAY FORWARD TO BOOST-UP COPROCESSING

- Co-processing of various type of waste to be promoted.
- Inventory of Haz Waste available for Co-processing to be updated.
- RDF from MSW to be used as partial fuel in cement kiln. This may be included as a part of CSR programme to manage the MSW disposal problem.
- Fly ash (ESP ash) should be used to produce fly ash pozzolona cement. Thermal power plant / cement plants should setup cement grinding unit near thermal power plant.
- Blast furnace slag from steel industry should be granulated and used for cement making.
- Steel melting shop (SMS) slag should be used for cement making after iron removal.
- Coke oven sludge / distillation residue / mixed waste solvent, spent carbon etc. should be used as partial fuel in cement kiln.
- Oily sludge from oil refinery / petrochemical industry should be used for co-processing in cement plant.
- Spent pot lining from aluminium industry should be used as partial fuel in cement kiln.
- Plastic waste should be recycled and also can be used for road making and co-processing in cement plant.
- Distillery units for spent wash management should adopt concentration cum incineration and power generation for disposal of waste.
- Chemical gypsum to be used for cement production.
Way Forward

1. Follow-up with MOEF for amendment of hazardous waste rule 2009 as per RF recommendation

2. Finalization of emission standard for co-processing and follow-up with MoEF for notification under E(P) Act, 1986

3. Follow-up with MOEF/SPCB for setting of preprocessing plants to promote co-processing of waste.

4. Follow-up with respective state Govt for consideration of RDF as approved fuel for use as fuel in cement kiln.

5. Setting of RDF plant by large industries under new CSR policy for proper MSW management.
Way Forward

6. Follow-up with MOEF for proposed amendment in EIA 2006 to promote fly ash utilization

7. Coordinate with power/cement plant to promote fly ash utilization –through Task Force of CPCB on TPP

8. R&D work for SMS slag utilization in cement plant –through Task force of CPCB on Steel plant

9. Calibration of CEMS in cement kiln and data reporting at website of respective cement plant

10. Organize national and regional workshop to promote co-processing of waste in cement plants.
THANKS ALOT.