FLY ASH MANAGEMENT: LEGAL REQUIREMENTS AND OTHER ISSUES

By

Ms Sanchita Jindal
Former Adviser – Scientist ‘G’
Ministry of Environment, Forests and Climate Change
Government of India
Indian Power and Fly Ash Scenario

• Indian power sector grown from an installed capacity of 1,713 MW in 1950’s to 3,49,288 MW as on 31st December, 2018.

• Planning Commission projected addition of about 120 GW of Coal based capacity during 2012-2022 i.e. double the existing capacity and by 2031, an addition of 600GW capacity.

• Power generation is about 75% of Thermal (coal, Gas & Oil based), about 10% of Hydro, about 2.38 % of Nuclear and about 13.5% of Renewable Energy Sources.

• Out of the thermal- about 70% is coal based.

• The National Electricity Plan of 2018 by GoI- the country does not need additional non-renewable power plants in the utility sector until 2027, with the commissioning of 50,025 MW coal-based power plants under construction and achieving 275,000 MW total installed renewable power capacity after retirement of nearly 48,000 MW old coal fired plants.
• India has 211 billion tones of Coal reserve.
• It is projected by 2032, we would be consuming more than 1800 million tone of Coal per annum.
• Indian Coal has ash content of 35-45%, sometimes even 50%.
• Nearly 197 million tonnes per annum coal ash is generated by the thermal power plants presently and by 2032 about 600 million tones per annum ash would be produced.
• The conventional disposal of ash is in slurry form which occupied nearly 40,000 Hectares of land and requires about 1040 million M3 of water annually.
• Downgrades the Pozzolanic property of fly ash.
• Fails to recognise the utility of bottom ash.
Projection of Fly Ash Generation

- Present (As on March, 2012)
- By the end of 12th Plan (2017)
- By the end of 13th plan (2022)
- By the end of 15th plan (2027)
- By the end of 17th plan (2032)

- Estimated Coal requirement (Million Tonnes/Annum)
- Flyash generation BAU (Million Tonnes/Annum)
Environmental Issues

- Air Pollution (Dust emission from ash pond)
- Water Pollution (Contamination of ground & surface water)
- Land degradation (Loosing top soil)
- Loosing precious land for Ash Ponds and Ash Mounds
Ash Ponds
FLY ASH UTILISATION

ALTERNATIVE METHODS OF DISPOSAL AND UTILISATION OF FLY ASH WAS FELT IMPERATIVE

HENCE

THE FLY ASH UTILISATION NOTIFICATION
FLY ASH UTILISATION NOTIFICATIONS

• Draft Notification containing certain directions for utilization of fly ash- 22\textsuperscript{nd} May, 1998.

• High Court Delhi Direction in CWP No. 2145/199 (Centre for Public Interest Litigation, Delhi versus Union of India to finalize the Draft Notification in 4 weeks for ensuring the use of specified quantity of ash -25\textsuperscript{th} August, 1999.

• Fly Ash Utilisation Notification- 14\textsuperscript{th} September, 1999.
Background

• Fly Ash First Amendment Draft Notification- 6\textsuperscript{th} November 2002

• Fly Ash First Amendment Notification- 27\textsuperscript{th} August, 2003
  – Revised Fly ash utilization targets for TPPs.
  – Mandate for brick kilns to use fly ash.

• Fly Ash Second draft Amendment Notification- 6\textsuperscript{th} November, 2008

• Fly Ash Second Amendment Notification- 3\textsuperscript{rd} November, 2009
  – Revised Fly ash utilization targets for TPPs.
  – Mandate for brick kiln to use fly ash withdrawn.

• Fly Ash Third Draft Amendment Notification- 25\textsuperscript{th} May, 2015

• Fly Ash Third Amendment Notification- 25\textsuperscript{th} January, 2016
OBJECTIVE OF FLY ASH NOTIFICATION

- Protect the Environment
- Conserve Top Soil - by restricting the excavation for brick manufacture
- Conserve Precious Land - Prevent the Dumping and Disposal of Fly Ash on Precious Land
- Resource Efficiency and Circular Economy - no waste - all wealth or resource - Utilise the Fly Ash rather than disposal - in manufacture of building materials and in construction activities
**Definition and Categorization of FLY ASH**

- Fly Ash means and includes all coal or lignite ashes generated at the thermal power plants such as Electrostatic Precipitator (ESP) ash, Bag Filter or dry ash, bottom ash, pond ash, and mound ash.

- Fly ash was categorized as high volume low effect waste under Hazardous Wastes (Management, Handling & Transboundary, Movement) Rules, 2008 however, now excluded in HW Waste Rules of 2016.

- Chemically, fly ash mainly consists of oxides of silica, aluminum, Iron and calcium, besides trace of elements like arsenic, beryllium, boron, cadmium, chromium, chromium VI, cobalt, lead, manganese, mercury, molybdenum etc.
• No person shall within a radius of 300 Km (earlier 50 km & 100km) from thermal power plants, manufacture clay bricks, tiles or blocks without mixing at least 25% of fly ash with soil.

• Every Construction agency engaged in buildings within a radius of 300 km shall use only fly ash based products for construction- cement, concrete, fly ash bricks, tiles, blocks etc. in every construction project.

• This will be applicable to all Construction agencies of Central or State or Local Government and private or public sector.

• Annual Returns to be filed by the agency and design approving agency to SPCB.
• Minimum Fly Ash content for building materials or products to qualify as ‘fly ash based products’ are given. It ranges from 15-50%. IS specifications for these have also been mentioned.

• Regional Office of SPCB/PCCs to ensure this.

• In case of non-availability- stipulation shall be waived/relaxed by the State Government.

• TPPs to make a dispute settlement committee – GM of the plant, construction and fly ash bricks Manufacturing Industry Association or body to ensure unhindered loading and transport of Fly Ash.
FLY ASH NOTIFICATIONS

• Unresolved disputes to be addressed by State Level Monitoring Committee
• No construction of roads or flyover embankments with top soil in 300 km area
• Fly Ash shall be used for these as per IRC specifications No. 58 of 2001
• Soil required for top or side covers of embankments of roads shall be excavated from the same site. Voids shall be filled with fly ash.
• Reclamation or compaction of all low lying areas in 300 km shall be done by fly ash only.
• Stowing of mines and back filling of opencast mines in 50 km to be undertaken with minimum 25% of fly ash. DGMS to guide.
• Ministry of Coal to constitute an Expert Committee for back filling and stowing of mines.
• State Government is the enforcing and monitoring agency.
Responsibilities of TPPs

TPPs are free to sell fly ash provided-
- pond ash should be given free of charge on ‘as is where is’ basis
- at least 20% of dry ESP ash shall be made available free of charge on a priority basis to –
  manufacturers of Bricks, blocks and tiles, etc. Farmers, Central or State Road construction agencies & PWD , Agencies engaged in mine

However, TPPs having 100% utilisation are exempted from this provision.

• The free fly ash takers should use fly ash for the purpose it has been taken.

• TPPs to achieve the target of fly ash utilisation as follows-
  -TPPs established before the notification i.e. 3rd November 2009- 50% within one year, 60% within 2 yrs, 75% within 3 yrs, 90% within 4 yrs and 100% within 5 yrs.
  -New TPPs - 50 % in one yr, 70% in 2 yrs, 90% in three yrs and 100% in 4 yrs. Unutilized Fly ash to be carried forward.
Responsibilities of TPPs

- Plans for utilisation of fly ash were to be submitted by TPPs to CPCB, SPCBs and concerned Regional Office of MoEF, with in four months of the notification.
- Availability of land, electricity and water shall be facilitated by Govt. agencies, SEBs, NTPC and management of TPPs.
- Money from the sale of fly ash and products to be kept in separate fund for utilisation of infrastructure for fly ash utilisation till 100%.
- Annual implementation report to be submitted by 30th day of April to CPCB, SPCB and RO.
- Subject to Rules under E(P) Act, reclamation of sea by utilizing fly ash is permissible under the Notification.
- Emergency ash pond or fly ash storage area upto 50 ha for 500 MW may be provided. For other in the same proportion.
Responsibilities of TPPs

- Upload and Update details of fly ash stock of each type available with them on their web-site every month.

- To install dedicated dry ash silos having separate access roads so as to ease the delivery of fly ash.

- Cost of transportation of fly ash to any construction project or for manufacturing of fly ash based products or use as soil conditioner in agriculture in a **radius of hundred Kilometers** shall be born by the TPP.

- The cost of transportation beyond a radius of **hundred Kilometers** and up to **three hundred kilometers** shall be shared equally between the user and the TPP.
Responsibilities of TPPs

• The TPPs within a radius of **three hundred kilometers** shall bear the entire cost of transportation of fly ash to the site of road construction projects under Pradhan Mantri Gramin Sadak Yojna and asset creation programmes of the Government involving construction of buildings, road, dams and embankments.

• The TPPs to promote, adopt and set up (financial and infrastructure) fly ash based product manufacturing facilities within their premises or in the vicinity so as to reduce the transportation cost of fly ash.

• **TPPs in coastal districts shall support, assist or directly engage into construction of shore line protection measures.**
Responsibilities of Authorities

- PWDs and other Govt. agencies to include in their tender documents, schedule of approved materials and rates, building by-laws.
- Financial Institutions to include a clause.
- Monitoring Committee to be constituted by MoEF.
- State Govts. to constitute Monitoring Committees too in three months.
- Amend Building Bye Laws of cities > 1 million mandating use of Fly ash products
Responsibilities of Authorities

- The Concerned Authority to ensure mandatory use of Fly Ash based bricks/products in all Government Scheme/programmes e.g. MNREGA, SWACHH BHARAT, Urban and Rural Housing Scheme, where **built up area is more than 1000 sq feet** and in infrastructure construction including buildings in designated industrial Estates/ Parks/Special Economic Zone.

- The Ministry of Agriculture to promote Fly Ash utilization in Agriculture as soil conditioner.

- State Authorities to ensure MoU or any other arrangement between the TPPs and the construction agency or contractors for using fly ash or fly ash based products is made.

- To ensure that the contractor of road construction utilizes the fly ash in the road, the Authority concerned shall link the payment of contractor with the fly ash **supply certification of TPP**.
RELEVANT REPORTS, CIRCULARS AND GUIDELINES

- CPWD Circular no. 1237 dated 9th September, 2002- All Chief Engineers (Civil) to ensure that use of fly ash bricks is made mandatory at least 10% of the total use of Bricks used.

- Guidelines for Use of Fly Ash in Canal Lining- Fly Ash Resource Centre (FARC), Orissa State Pollution Control Board.


Ash Ponds in Orrissa
### UTILISATION OF FLY ASH

<table>
<thead>
<tr>
<th>Description</th>
<th>Year 2015-16</th>
<th>Year 2016-17</th>
<th>Year 2017-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nos. of Thermal Power Stations from which data was received</td>
<td>151</td>
<td>155</td>
<td>167</td>
</tr>
<tr>
<td>Installed capacity (MW)</td>
<td>145045</td>
<td>157377</td>
<td>177070</td>
</tr>
<tr>
<td>Coal consumed (Million tons)</td>
<td>536.64</td>
<td>509.46</td>
<td>624.88</td>
</tr>
<tr>
<td>Fly Ash Generation (Million tons)</td>
<td>176.74</td>
<td>169.25</td>
<td>196.44</td>
</tr>
<tr>
<td>Fly Ash Utilization (Million tons)</td>
<td>107.77</td>
<td>107.10</td>
<td>131.87</td>
</tr>
<tr>
<td>Percentage Utilization(%)</td>
<td>60.97</td>
<td>63.28</td>
<td>67.13</td>
</tr>
<tr>
<td>Percentage Average Ash Content (%)</td>
<td>32.94</td>
<td>33.22</td>
<td>31.44</td>
</tr>
</tbody>
</table>
UTILISATION OF FLY ASH

- Construction activities like making of fly ash based building products,
- Portland pozzolana cement
- Construction of roads/highways/ flyovers,
- Reclamation of low lying areas
- Back filling and stowing of mines
- Waste land development
- Construction of Roller Compacted concrete dams etc.
Modes of Utilisation

### TABLE-XVIII

**MODES OF FLY ASH UTILIZATION DURING THE YEAR 2017-18**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Mode of utilization</th>
<th>Quantity of Fly Ash utilized in the mode of utilization (from Annexure-I)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cement</td>
<td>50,2909</td>
<td>25.60</td>
</tr>
<tr>
<td>2</td>
<td>Mine filling</td>
<td>12,5159</td>
<td>6.37</td>
</tr>
<tr>
<td>3</td>
<td>Bricks &amp; Tiles</td>
<td>12,6943</td>
<td>6.41</td>
</tr>
<tr>
<td>4</td>
<td>Reclamation of low lying area</td>
<td>20,5779</td>
<td>10.48</td>
</tr>
<tr>
<td>5</td>
<td>Ash Dyke Raising</td>
<td>13,2500</td>
<td>6.90</td>
</tr>
<tr>
<td>6</td>
<td>Roads &amp; Flyovers</td>
<td>6,6763</td>
<td>3.40</td>
</tr>
<tr>
<td>7</td>
<td>Agriculture</td>
<td>0.5732</td>
<td>0.29</td>
</tr>
<tr>
<td>8</td>
<td>Concrete</td>
<td>1,2974</td>
<td>0.66</td>
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<tr>
<td>9</td>
<td>Hydro Power Sector</td>
<td>0.0077</td>
<td>0.004</td>
</tr>
<tr>
<td>10</td>
<td>Others</td>
<td>8,6857</td>
<td>4.42</td>
</tr>
<tr>
<td>11</td>
<td>Unutilized Fly Ash</td>
<td>64,5747</td>
<td>32.87</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>196,4410</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

The pie diagram showing the modes of utilization of fly ash during the Year 2017-18 is given in Figure-1 below:
New Areas of Utilisation

- Railways Embankments
- Pre-stressed Railways Concrete Sleepers
- Ash based Bituminous Roads
- Flux bonded Bricks/Tiles
- HDPE Products
- Ready mix concrete plants
- Geo-Polymers
- Extraction of Minerals and micro nutrients
New Innovative usage in Future

- Fly Ash in Nano Concrete Aggregates
- Production of Artificial Sand
- Gypsum fly ash plaster
- Recovery of Value added mineral products
- Zeolites
- Geo-polymers pavement using 100% fly ash
- Mechanical Activation/reduction of Size
- Fly Ash Geo-Polymer Concrete with micro Silica and Steel Fiber
Issues with Fly Ash Utilisation

• Construction agencies **not utilising** fly ash/ fly ash based products.

• Amend Building Bye laws, Civil Engineering, Architecture/ Structural Engg. Modules to promote Fly Ash Utilization.

• **Time line** for 100 % Fly Ash Utilisation for certain TPP had expired on 31**st** December 2017.

• Annual Reports from TPPs –Not Submitted. Web-sites not updated.

• State Level Monitoring Committee -Not provided.
Issues with Fly Ash Utilisation

- Amount from sale of fly ash by TPPs is to be kept in separate accounts and used for promotion of fly ash use until 100% targets are achieved. No Information is available in this regard.

- Non availability of special Rail wagons/bulkers or covered trucks transportation of ash to avoid fugitive emissions are not available. – To be made mandatory.

- Promote Fly Ash utilization in Agriculture- with specifications.
• Pond Ash may be removed from definition of fly ash.
• Minutes of meetings of Central, State and Plant Level Monitoring Committee to be uploaded on the web-site.
• Fly ash based products manufactures to be declared as Green Industry.
• Tax rebate for fly ash bricks.
• MOU between TPP and Principal Construction agency instead of contractor.
• Plants with less 90% Utilization to install their own Fly Ash Brick manufacturing plant.
Suggestion

- Mobile app where daily generation, place of generation, takers in the vicinity and type of material etc... given.
- Kind of Stock Exchange for Fly Ash.

THANK YOU

Sanchita Jindal
sansomj@gmail.com
sansom_2859@yahoo.co.in