First-Run: a proposal to use market based incentives for green and clean power generation in India

Sunita Narain, Director General
On behalf of all colleagues in the Sustainable industrialization team of CSE
CSE’s politics on coal-based power plants

We believe countries like India

- Will need access to affordable energy to meet the needs of all
- That energy poverty is unacceptable
- That we need equity on actions to combat climate change
- Therefore, coal-based power plants are a reality for us; but we will work to reduce dependence so that we can meet the challenges of clean air and climate change
- Need to focus on ensuring that coal-based TPPs are as ‘clean’ as possible.
- This is our agenda; our politics for change
Coal Power Plants

**major contributor to air pollution**

**AIR POLLUTION:** Power sector share in all industrial sector emissions
- 45% of SO\(_2\) emissions
- 30% of NO\(_x\) emissions
- 80% of Hg emissions

**WATER USE:** 24 BCM - about half of India’s total domestic needs

**WASTE:** Fly Ash is the second largest waste stream; major contributor to fugitive emissions in cities
Major GHG contributor

- One-third of total GHG; 50% of fuel-related CO$_2$ emissions, nearly 1.1 Gt from TPPs.

- Specific CO$_2$ emissions (983 g/kWh) 22 per cent higher than the world’s lowest specific CO$_2$ emissions.

- Scope exists to reduce
CSE finding – 22% GHG emission reduction possible by 2030

- Need advanced TPP technologies in India to replace aging plants; new capacity – ultra, advanced, IGCC technologies
- Renovate to fire biomass or wastes/retire old plants – 48 GW
- Biomass co-firing in all coal-plants at-least 10%
- Review and rework PAT for rapid transformation
Fly ash challenge is massive

- Fly ash – after two decades of regulations, still remain unmanaged
- Major ash dyke breach incidents and unsafe disposal of ash reported from many regions
- Over 70% increase in coal consumption and fly ash generation since 2009-10

<table>
<thead>
<tr>
<th>Year</th>
<th>Coal consumption (million tonnes)</th>
<th>Fly ash generation (million tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009–10</td>
<td>367</td>
<td>124</td>
</tr>
<tr>
<td>2018–19</td>
<td>628</td>
<td>217</td>
</tr>
</tbody>
</table>

- Gap between fly ash generation and utilization every year, indicate piling up of unused ash
- ~40% remains unutilized every year
- Legacy ash is roughly 1.65 billion tonnes
- Massive challenge
Fly ash: adding to air pollution crisis

- Delhi pollution inventory showed that fly ash contributes greatly to local/regional air pollution
- Need enforcement of full utilization of fly ash direction (100%)
- Need strategies like fly ash depots for ash utilization; roadmap for full usage
- CSE doing rating/assessment of plants and fly ash to find incentives/disincentive
Clean TPP roadmap: Non-compliance

- Report analysed data till October 2019

- Found 70% of coal-fired power stations may not meet environmental norms by 2022 - five years after their extended deadline
Current Status – slight improvement, but still grim

- CSE publishes interim reports – maintains web portal
- Current Status:
  - Particulate matter: Two-thirds would meet norms
  - SO2: 65% will not meet the new emission norms by 2022 (67,260 MW has awarded tenders/meeting norms)
  - Oxides of Nitrogen: May meet based on revision/data weak
  - Water, mercury – no data
(Non) Compliance with sulphur dioxide norms

- **12,383 MW (6%)**
  - Total Complying

- **65,100 MW (31%)**
  - Tender awarded

- **55,937 MW (27%)**
  - Tender floated

- **59,322 MW (29%)**
  - Feasibility study

- **7,450 MW (4%)**
  - No plan

- **6,192 MW (3%)**
  - Not known

Source: Central Electricity Authority, October 2020 and Centre for Science and Environment
Non-compliance is combined with age of plants: retirement is tough

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity in MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>2,870</td>
</tr>
<tr>
<td>2017</td>
<td>3,211</td>
</tr>
<tr>
<td>2018</td>
<td>1,989</td>
</tr>
<tr>
<td>2019</td>
<td>900</td>
</tr>
<tr>
<td>2020</td>
<td>1,768</td>
</tr>
<tr>
<td>Total</td>
<td>10,738</td>
</tr>
<tr>
<td>CEA 2015</td>
<td>34,000</td>
</tr>
</tbody>
</table>

- Investments to meet norms into old capacity – not an effective strategy
- GHG emissions high
- **Time for innovation**
  - biomass co-firing
  - conversion for renewable
  - Waste to energy
Time for multi-prolonged strategy

- **GLOBALLY ACCEPTED, COST-EFFECTIVE STRATEGY**
  - Abundant biomass available
  - Reduce CO$_2$ footprints as well other pollutants
  - Requires minimum modification and investment
  - TPPs has the capability to manage or build the supply chains constraint of biomass which is difficult to small biomass users.
  - Avoiding significant economic risk by limiting the investment in new coal plants
  - Local employment generation through pellet or briquette manufacturing & Additional income to the farmers
CSE proposal on First Run

• Why?
• Deterrence is not possible in ‘conventional’ ways for this sector
• Power plants cannot be shut down
• Penalties are too insignificant, especially when compared to fixed charges
• Need strategy for compliance
Deterrence is ineffective

<table>
<thead>
<tr>
<th>Unit Size in MW</th>
<th>Fixed cost collected in a year, Rs Cr</th>
<th>Penalty imposed a year by CPCB, Rs Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>298</td>
<td>1.5</td>
</tr>
<tr>
<td>250</td>
<td>149</td>
<td>0.75</td>
</tr>
<tr>
<td>210</td>
<td>125</td>
<td>0.63</td>
</tr>
</tbody>
</table>

- **Fixed charges for old power station**: Rs 100-300 Crore per annum even when not in operation
- **CPCB penalty formula**: ~Rs 50 lakhs - 1 Cr per annum for one pollutant depending on the unit size
- Closure an option: rarely used by PCBs because of nature of ‘essential’ sector
First-run proposal

- **CSE proposal**: Incentivise plants which meet the norms, penalise the laggards.
- Based on the status of compliance with FGD norms, CSE categorised plants: **Red, Orange, and Yellow**
  - Red category – No plans
  - Orange category – In preliminary stages – prefeasibility study, tender floating stage
  - Yellow category – Awarded tenders, likely to meet norms: **Run this category on priority**
CEA’s data on FGD status: make this the basis for categorizing plants: Red; Orange, yellow

<table>
<thead>
<tr>
<th>Category</th>
<th>Capacity (MW)</th>
<th>Percentage of total plants</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliant</td>
<td>12,383</td>
<td>6</td>
<td>Yellow</td>
</tr>
<tr>
<td>Feasibility study</td>
<td>59,322</td>
<td>29</td>
<td>Orange</td>
</tr>
<tr>
<td>Tenders floated</td>
<td>55,937</td>
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<td>31</td>
<td>Yellow</td>
</tr>
<tr>
<td>No plans</td>
<td>7,450</td>
<td>4</td>
<td>Red</td>
</tr>
<tr>
<td>Status not known</td>
<td>6,192</td>
<td>3</td>
<td>Red</td>
</tr>
</tbody>
</table>

Source: Central Electricity Authority October, 2020 and Centre for Science and Environment
# First-run proposal: run clean plants on full load

<table>
<thead>
<tr>
<th>Category</th>
<th>Capacity*</th>
<th>Brief</th>
<th>Fixed charges payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Must-run</td>
<td>86,400 MW</td>
<td>RENEWABLE</td>
<td>Run on full load</td>
</tr>
<tr>
<td>Yellow category (First-run)</td>
<td>57,624 MW</td>
<td>COAL TPP LIKELY TO MEET TARGET</td>
<td>Run on full load, reimburse fully</td>
</tr>
<tr>
<td>Orange category</td>
<td>140,940 MW</td>
<td>COAL TPP LIKELY TO MISS TARGET</td>
<td>Sale if surplus after YELLOW. Reimburse fixed cost at 50%</td>
</tr>
<tr>
<td>Red category (no plan)</td>
<td>7,450 MW</td>
<td>COAL TPP WILL DEFINITELY MISS TARGET</td>
<td>No sale; no reimbursement of fixed charges</td>
</tr>
</tbody>
</table>

Source: *Central Electricity Authority September, 2020 and Centre for Science and Environment*
First-run proposal: Impact

- Total peak load demand: 1200-1500 Billion Units (BU)/year assuming at high level
- **Green and Yellow Power** will generate some 500-600 BU/year
- Deficit of 600-900 BU, which will be supplied if needed by the **orange category**; which will also be penalised because of loss of fixed charges – will go lower on merit order and lose on fixed charges
- Red category will then be required to either shape up/shut down (re-work them for cleaner power with agro-residue etc)
Pollution crisis: Towards solutions

• Air pollution is a health emergency: combustion is key pollution source
• RE better than natural gas power plant
• NG power plant better than coal TPP
• Clean Coal TPP better than thousands of DG sets or coal burnt in thousands of boilers

We hope to work together for our right to clean air; **blue skies and clear lungs**