**Environmental footprint**

**Water:** 70 per cent of the total freshwater withdrawal by industrial sector

**Coal:** Over 70 per cent of the total coal consumed

**Pollution:** Of the total industrial sector:
- 60 per cent of PM emissions
- 45-50 per cent of SO\(_2\) emissions
- 30 per cent of NO\(_x\) emissions
- More than 80 per cent of mercury emissions
Mismatch between regulation and environmental footprint

<table>
<thead>
<tr>
<th></th>
<th>China</th>
<th>China (polluted regions)</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM (mg/Nm$^3$)</td>
<td>30</td>
<td>20</td>
<td>150-350 (50 for some)</td>
</tr>
<tr>
<td>SO$_2$ (mg/Nm$^3$)</td>
<td>100</td>
<td>50</td>
<td>None</td>
</tr>
<tr>
<td>NO$_x$ (mg/Nm$^3$)</td>
<td>100</td>
<td>100</td>
<td>None</td>
</tr>
<tr>
<td>Hg (mg/m$^3$)</td>
<td>0.03</td>
<td>0.03</td>
<td>None</td>
</tr>
</tbody>
</table>
### Most efficient stock least efficiently utilized

<table>
<thead>
<tr>
<th>Rank (score)</th>
<th>Plant</th>
<th>Gross Efficiency (%)</th>
<th>PLF (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 (36%)</td>
<td>Tata - Mundra</td>
<td>38.1</td>
<td>74</td>
</tr>
<tr>
<td>12 (28%)</td>
<td>NTPC - Sipat</td>
<td>36.5</td>
<td>68.3</td>
</tr>
<tr>
<td>15 (26%)</td>
<td>Adani - Mundra</td>
<td>31.5</td>
<td>52.4</td>
</tr>
</tbody>
</table>

Should we be building more power plants or incentivizing existing to produce more and efficiently?
Costs and regulation

✓ Higher pollution standards will increase power tariff is not a tenable argument. Cost of pollution control is only about 10% of the operating and capital costs

✓ Our present regulatory institutions don’t have the ability or the tools to enforce standards.

✓ Regulation is not sufficient; incentives and promotions are also required.
Coal power will increase

- Electricity demand to double by 2022.
- Even in 2022 per capita consumption in India to remain less than half of the global average.
- Coal projected to meet most of demand increase.
Resource needs - coal

- Increase in transportation infrastructure
- 2-3 times increase in coal beneficiation capacity to use very poor quality coal

Coal requirement projections for power generation

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity (million tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>585</td>
</tr>
<tr>
<td>2016-17</td>
<td>936</td>
</tr>
<tr>
<td>2021-22</td>
<td>1219</td>
</tr>
</tbody>
</table>
Resource needs – water & land

Land requirement (based on EC granted till Feb, 2015): 2.85 lakh ha (0.75 lakh ha for plants + 2.1 lakh ha for coal mines, including 46,719 ha forest land)
Pollution load, if unchecked

Massive increase in clusters

Pollution Load (in million tonnes)

- **Sox**: 5.5 (2011-12), 13.1 (2021-22)
- **Nox**: 3.3 (2011-12), 7.8 (2021-22)
- **PM**: 0.7 (2011-12), 1.5 (2021-22)
Fly ash

- Presently, more than a billion tonne of ash lying unused in ash ponds across the country.
- Ash generation to double by 2022
Way forward: set norms

- Set strict standards for PM, SOx, NOx and Hg
- Norms for water use should be incorporated in clearances. Air cooling technology in water scarce regions
- Increase water tariff to promote recycling and reuse
- Massive amount of surplus land with government companies; policy to utilize surplus land
Way forward: Ash Handling

• Most plants will not meet Ash use targets due to inadequate supporting policies to increase use;

• Policies and regulations to change
  – Promotion, standards for utilisation and then strict implementation of policies on ash use in infrastructure, bricks, cement industry etc.
  – Loopholes that allow dumping, yet consider it utilization (for eg. in low lying areas) need to be addressed;
  – Standards and guidelines for use of ash for mine filling
  – Flexible regulation to take into consideration plant location
Ash Handling: promote and enforce
Way forward: Technology and efficiency

- Old inefficient plants that are heavily polluting should be retired or modernized at an accelerated pace; Environmental clearance process should incentivize this.
- New capacities should be only supercritical/ultracritical.
- Inclusion of environmental costs/compliance in Merit Order Dispatch; we should ensure that most efficient stock is utilised the most and polluting plants are not called first because they are cheaper.
Way forward: Improved assessment and regulatory tool

- Capacity concentration is few areas
  - Regional carrying capacity assessment and tighter norms for critically polluted areas
- 55 GW of coastal capacity expected to come up
  - Potential impacts on marine biodiversity need to be investigated
- Pollution monitoring and control by regulators are weak; need capacity and tools
  - Protocol and infrastructure for online monitoring
  - Institutional strengthening and use of multiple tool to enforce norms
Way forward

• We need to do all the above and more
• Most importantly, we need to discuss the role of coal in our future energy plans.