Coal-Based Thermal Power Generation in India
Prospects and Challenges

By

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Presentation Structure

- Indian Power sector – An overview
- Thermal Generation Capacity
- Coal Based Generation
- Prospects of Coal-based Thermal Generation
- Challenges in Project Development
Indian Power sector – 3rd largest in Asia after China & Japan

- Installed Capacity: 1,61,351 MW (As on 31 May 2010)

- Energy Generation: ~735 Billion Units

Sector to grow by 9 to 10% for sustained growth of economy
Overview

- Per Capita Consumption: 735/kWh – about 1/4\textsuperscript{th} of the world average

- Despite substantial growth, power shortages are faced at All India level:
  - 13.3\% peak shortages
  - 10.1\% energy shortages

- Aims at “\textit{Power for All}” by the year 2012
  - Per Capita Consumption: 1000 kWh
  - Demand to be fully met
## Geological Resources of Coal

<table>
<thead>
<tr>
<th>State</th>
<th>Proved</th>
<th>Indicated</th>
<th>Inferred</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>9194</td>
<td>6748</td>
<td>2985</td>
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<tr>
<td>Arunachal Pradesh</td>
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<td>Assam</td>
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<td>Bihar</td>
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<td>Chhattisgarh</td>
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<td>101</td>
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<td>Uttar Pradesh</td>
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<td>196</td>
<td>0</td>
<td>1062</td>
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<td>West Bengal</td>
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<td>11603</td>
<td>5071</td>
<td>28327</td>
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<td><strong>Total</strong></td>
<td>105820</td>
<td>123470</td>
<td>37920</td>
<td>267210</td>
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</table>
Demand-Supply of Coal for Indian Power Sector

• Demand-supply of coal for the power sector during 2010-11 and 2011-12:

• Domestic coal demand-supply gap in 2010-11 will be 52 MT and 103 MT in 2011-12

• Pertinently the industry demand is 440 MT against the availability of 388 MT

• Domestic production in 2011-12 is projected at 414 MT, while the demand is 517 MT

• To bridge the projected demand-supply gap, power utilities are targeted to import 35 MT coal in 2010-11, in addition to 12 MT required by imported coal based power plants

• Requirement of imported-coal during 2011-12 would be 69 MT

• Imported-coal based power plants will necessitate 21 MT of coal import during 2011-12
# Thermal Generation Capacity

Total Installed Capacity in India is **161GW**, of which Thermal (Coal, Gas, Diesel) contributes 64%, as compared to RES (10%).

<table>
<thead>
<tr>
<th>Source</th>
<th>Installed Capacity</th>
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<tr>
<td>Coal</td>
<td>85193 MW</td>
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<tr>
<td>Gas</td>
<td>17056 MW</td>
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<tr>
<td>Diesel</td>
<td>1200 MW</td>
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<tr>
<td>Nuclear</td>
<td>4560 MW</td>
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<tr>
<td>Hydro</td>
<td>36913 MW</td>
</tr>
<tr>
<td>Res</td>
<td>16429 MW</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>161351 MW</strong></td>
</tr>
</tbody>
</table>

as on 31st March, 2009
Thermal Generation Capacity

- Total Thermal generation capacity (including Gas and Diesel): 103450 MW
- Predominantly Coal based capacity: 85193 MW (as on 31.05.2010)
- More than 62% capacity is coal-based
Indian Power Sector

Thermal Generation Capacity

- In previous plan periods, the capacity addition program was not up to mark

- Achievement in 8th, 9th and 10th plan period was about 50% of the target set

- In 11th Plan, a capacity addition target of 78700 MW has been set, Out of this, about 41,000 MW+ is likely target from coal-based generation

- Till 31 March 2010, about 22300 MW have already been commissioned, more than 50,000 MW to be added in last 2 years of 11th plan –huge challenge

A well-thought out strategy to be evolved to achieve the target!
Thermal Generation Capacity

- To meet the growing demand and shortages encountered in various regions, large generation capacity is required to be added.
- Coal being the predominant fuel available within the country, a large portion of generation would have to be coal-based.
- Large amount of coal would have to be imported to meet the growing demand of power sector (Integrated Energy Policy).

Coal would remain the fuel of choice in future.
**INDIAN POWER SECTOR**

**Prospects of Coal-based thermal (1)**

- As is obvious, lots of emphasis is on Coal-based thermal

- Some recent power market developments are also quite encouraging

- A vibrant power market is in operation with number of options available to buyers & sellers:
  - Long Term PPA
  - Short term Direct Bi-lateral,
  - PX

- A regime of market –determined tariff shaping up in place of cost-based regime
Prospects of Coal-based thermal (2)

- IPPs are showing renewed interest after success of the power market
- Open Access Applications for > 75000MW generation capacity filed by IPPs,
- More than US$ 9 -10 Billion investment committed by the private investors– additional US$ 11 Billion expected (at 50% success rate)
- Financial closure of projects on the strength of PPAs
- A large number projects out of the above likely to be based on coal:
  - Domestic – coal block
  - Imported coal
Indian Power Sector

Prospects of Coal-based thermal (3)

- A Number of Ultra Mega Power Projects are under construction/planned
  - Mundra
  - Sasan
  - Krishnapatnam

- Many are coastal plants planned on imported fuel

- Competitive Biddings have been quite successful - Tariffs offered seem to be quite attractive
Prospects of Coal-based thermal (4)

- Higher tariff realized by surplus states in the short term power market and persistent shortages have encouraged resource-rich states to set up generation capacity.

- Coal resource-rich States such as Chattishgarh, Jharkhand, Orissa, are planning to become “Power Hub” in the coming years: both by public & private.

- States in the coastal region plan to set up coal-based thermal power based on imported coal.

- Neighbouring countries Bangladesh, Sri Lanka and Nepal are tying up coal-based thermal power.
INDIAN POWER SECTOR

Challenges in Project Development (1)

- Financing of projects:

As per National Electricity Plan:

- A total investment of US$ 100 Billion is required in generation by 11th plan
- Government / PSUs funding capability is limited- It cannot be done through the budgetary support alone
- Private Investments are essential and need to be roped in
- Huge Equity and Debt funding are required
- FIs insist on PPA for providing debt (either through intermediary or directly)
INDIAN POWER SECTOR

Challenges in project development (2)

- Coal Linkage/ Coal Block
  - About 50% - 60% of the requirement is met through linkages, rest to be arranged separately –import, e-auction
  - Slow land acquisition for coal block
  - Huge risks –difficult to offer a definitive tariff under Case-I bidding due to uncertainty

- Land Acquisition for projects:
  - Local vested interests oppose-delay
  - Price hikes by private land owners

- Environment Clearance for projects
  - Becoming more stringent

Government support essential in both land acquisition and speedy environment clearance.
Challenges in project development (3)

- **Inadequate manufacturing capacity**
  - Results in delay in placement of order and tie-up for technology, main plant and Balance of plant

- **Shortage of skilled manpower** for erection and commissioning – visa issues for skilled manpower in case of imported plants

- **Competitive – Bidding Route Only**
  - As per EA 2003, MoU route is also available

- **Regulatory Uncertainty**
  - Price capping moves deter private investment
Way Ahead.....

• Coal-based thermal power in India has a positive outlook – opportunities in region as well

• Power market is transforming the sector
  ➢ Competition/ Efficiency Gains/ Investment

• Domestic Coal production has to be substantially enhanced – private sector to supplement public sector / Long term import tie-ups/ ownership in foreign mines

• Fuel quality to be enhanced through coal washeries

• Large scale adoption of Super critical technology, enhanced manufacturing capacity and focus on capacity building/skilled manpower development
Thank you!