

# Coal-Based Thermal Power Generation in India Prospects and Challenges



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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

# Overview

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- Indian Power sector – 3<sup>rd</sup> 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



## INDIAN POWER SECTOR

# Overview

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- Per Capita Consumption: 735/kWh – about 1/4<sup>th</sup> 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 **“Power for All”** by the year 2012
  - Per Capita Consumption: 1000 kWh
  - Demand to be fully met



# India - Coal Reserves

(in Million Tonnes)

State	Geological Resources of Coal			
	Proved	Indicated	Inferred	Total
Andhra Pradesh	9194	6748	2985	18927
Arunachal Pradesh	31	40	19	90
Assam	348	36	3	387
Bihar	0	0	160	160
Chhattisgarh	10910	29192	4381	44483
Jharkhand	39480	30894	6338	76712
Madhya Pradesh	8041	10295	2645	20981
Maharashtra	5255	2907	1992	10154
Meghalaya	89	17	471	577
Nagaland	9	0	13	22
Orissa	19944	31484	13799	65227
Sikkim	0	58	43	101
Uttar Pradesh	866	196	0	1062
West Bengal	11653	11603	5071	28327
<b>Total</b>	<b>105820</b>	<b>123470</b>	<b>37920</b>	<b>267210</b>

# Demand-Supply of Coal for Indian Power Sector

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- 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%)

	Installed Capacity
Coal	85193MW
Gas	17056 MW
Diesel	1200 MW
Nuclear	4560 MW
Hydro	36913 MW
Res	16429 MW
<b>TOTAL</b>	<b>161351 MW</b>



## INDIAN POWER SECTOR

# Thermal Generation Capacity

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- 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 8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup> plan period was about 50% of the target set
- In 11<sup>th</sup> 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 11<sup>th</sup> 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

# 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



## INDIAN POWER SECTOR

# 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



# Prospects of Coal-based thermal (3)

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



# 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)



# 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.....

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- 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

Power has a 'Ripple Effect'  
on the economy!



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Thank you!