SAARC Dissemination Workshop on Study Report:
“Assess the Present Situation, Gap in Capacity, Technology and Policy & Regulatory Instruments in Coal Sector in SAARC Member States”

Coal Mining in India:
Opportunities & Challenges
14.11.2017

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Ex-General Manager (Geology), Advisor (CMPDI)
INDIA
Presentation Outline

- India’s Present Energy Scenario
- Coal & Lignite Resources of India
- Augmentation of Coal Resource: A priority area
- Present Demand and Production of Coal & Lignite in India
- Future Energy Scenario in India
- Role of Coal in Future Energy Scenario in India
- Policy Initiatives of Government Driving Demand of Coal
- Allocation of Coal blocks to Private Sector and PSUs
- Acts, Rules, Regulations Governing Coal Sector
- Conclusion
India’s Energy Basket

- Coal: 55%
- Oil/Gas: 38%
- Others: 7%
Why Coal?

Coal has:

- Reliability of availability
- Favorable economics in utilization
- But not environment friendly, a big concern
Role of Coal in Present Energy Scenario in India

- As per Draft National Energy Policy by NITI Aayog, Govt of India, the share of coal in India’s commercial primary energy supply was 55% in 2015-16

- 76% of coal produced is consumed in power generation

- **Demand of Coal**: In 2015-16, the total supply of coal was 840 MT. Out of this 600 MT was supplied by Govt. Companies (CIL & SCCL), 40MT by Private companies and remaining 200MT were imported
## Grid Connected Installed Capacity of Electricity Generation in India (As on 30.09.2017)

<table>
<thead>
<tr>
<th>Source</th>
<th>Installed Capacity (GW)</th>
<th>% Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>193.43</td>
<td>58.7</td>
</tr>
<tr>
<td>Gas</td>
<td>25.18</td>
<td>7.6</td>
</tr>
<tr>
<td>Diesel</td>
<td>0.84</td>
<td>0.3</td>
</tr>
<tr>
<td>Wind Power</td>
<td>32.51</td>
<td>9.9</td>
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<tr>
<td>Solar Power</td>
<td>13.11</td>
<td>4.0</td>
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<tr>
<td>Biomass</td>
<td>8.30</td>
<td>2.5</td>
</tr>
<tr>
<td>Nuclear</td>
<td>6.78</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>329.30</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Coal & Lignite Resources of India
• India is endowed with substantial coal and lignite reserves with a coal and lignite resources of 315 BT and 44.7BT respectively as on 01.04.2017

• It has world’s 5th largest coal (including lignite) proved reserves with ~8% share (~95 billion tonnes). The Reserve to Production ratio (R/P ratio) is in excess of 100 years at the current production level. (As per the BP Statistical Review of World Energy, 2017)

• As per Indian system of coal reserves classification, India has proved / measured coal reserves of 143 BT and lignite reserves of 6.5 BT
Category-wise Resources of Coal in India
(as on 01.04.2017)

Total Resource: 315.15BT

- 143.06 BT (Proved 45%)
- 139.31 BT (Indicated 44%)
- 32.78 BT (Inferred 11%)
Depth-wise Resources of Coal in India
(as on 01.04.2017)

Total Resource: 315.15 BT

- 182.15 BT (0 to 300m 58%)
- 94.69 BT (300 to 600m 30%)
- 24.10 BT (600 to 1200m 8%)
- 14.21 BT (0 to 600m (for Jharia 4%))
Type-wise and category-wise break-up of geological coal resources (as per GSI, as on 01.04.2017)

<table>
<thead>
<tr>
<th>Coal Type</th>
<th>Measured/Proved</th>
<th>Indicated</th>
<th>Inferred</th>
<th>Total</th>
<th>% share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime Coking</td>
<td>4614.35</td>
<td>698.71</td>
<td>0.00</td>
<td>5313.06</td>
<td>1.69</td>
</tr>
<tr>
<td>Medium Coking</td>
<td>13500.56</td>
<td>12132.65</td>
<td>1879.47</td>
<td>27512.68</td>
<td>8.73</td>
</tr>
<tr>
<td>Semi Coking</td>
<td>519.44</td>
<td>994.87</td>
<td>193.21</td>
<td>1707.52</td>
<td>0.54</td>
</tr>
<tr>
<td>Sub-Total of Coking</td>
<td>18634.35</td>
<td>13826.23</td>
<td>2072.68</td>
<td>34533.26</td>
<td>10.96</td>
</tr>
<tr>
<td>Non-Coking</td>
<td>123829.55</td>
<td>125385.72</td>
<td>29812.60</td>
<td>279027.87</td>
<td>88.54</td>
</tr>
<tr>
<td>Tertiary Coal</td>
<td>593.81</td>
<td>99.34</td>
<td>894.53</td>
<td>1587.68</td>
<td>0.50</td>
</tr>
<tr>
<td>Grand Total</td>
<td>143057.71</td>
<td>139311.29</td>
<td>32779.81</td>
<td>315148.81</td>
<td>100.00</td>
</tr>
<tr>
<td>% share</td>
<td>45.39</td>
<td>44.21</td>
<td>10.40</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>
## Summary of Coal Resources of India (as on 01.04.2017)

<table>
<thead>
<tr>
<th>Depth Range (m)</th>
<th>Coking</th>
<th>Non-Coking</th>
<th>High Sulphur</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prime</td>
<td>Medium</td>
<td>Semi coking</td>
<td>Superior (G1-G6)</td>
</tr>
<tr>
<td>0-300</td>
<td>0.00</td>
<td>11.58</td>
<td>0.47</td>
<td>21.70</td>
</tr>
<tr>
<td>0-600</td>
<td>4.04</td>
<td>4.07</td>
<td>0.00</td>
<td>0.20</td>
</tr>
<tr>
<td>300-600</td>
<td>0.00</td>
<td>6.42</td>
<td>0.76</td>
<td>12.75</td>
</tr>
<tr>
<td>600-1200</td>
<td>1.27</td>
<td>5.44</td>
<td>0.48</td>
<td>2.85</td>
</tr>
<tr>
<td>0-1200</td>
<td>5.31</td>
<td>27.51</td>
<td>1.71</td>
<td>37.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th>5501- &gt;7000 K Cal/Kg</th>
<th>2500- &gt;5500 K Cal/Kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime</td>
<td></td>
<td></td>
<td></td>
<td>13.44%</td>
<td>75.87%</td>
</tr>
<tr>
<td>Medium</td>
<td>4.04</td>
<td>4.07</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi coking</td>
<td>0.00</td>
<td>6.42</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superior (G1-G6)</td>
<td>0.00</td>
<td>6.42</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inferior (G7-G17)</td>
<td>0.00</td>
<td>6.42</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ungraded</td>
<td>0.00</td>
<td>6.42</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SL No</td>
<td>State</td>
<td>Coal Resource (BT)</td>
<td>% Share</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>----------------------</td>
<td>--------------------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Jharkhand</td>
<td>82.44</td>
<td>26.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Odisha</td>
<td>77.28</td>
<td>24.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Chhattisgarh</td>
<td>56.66</td>
<td>17.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>West Bengal</td>
<td>31.68</td>
<td>10.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Madhya Pradesh</td>
<td>27.67</td>
<td>8.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Telangana</td>
<td>21.46</td>
<td>6.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Maharashtra</td>
<td>12.26</td>
<td>3.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Andhra Pradesh</td>
<td>1.58</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Bihar</td>
<td>1.35</td>
<td>0.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Uttar Pradesh</td>
<td>1.06</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Meghalaya</td>
<td>0.58</td>
<td>0.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Assam</td>
<td>0.53</td>
<td>0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Nagaland</td>
<td>0.41</td>
<td>0.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Sikkim</td>
<td>0.10</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Arunachal Pradesh</td>
<td>0.09</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>315.15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lignite Resources of India as on 01.04.2017
Total: 44.69 BT

- Indicated: 26.01 BT (58%)
- Measured: 12.14 BT (27%)
- Inferred: 6.54 BT (15%)

Total: 44.69 BT
Lignite occurs mainly in three states in India Viz. Tamilnadu, Rajasthan & Gujarat. (99% of reserves).

(As on 01-04-2017).

<table>
<thead>
<tr>
<th>State</th>
<th>Lignite Resources in Million Tonnes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tamilnadu</td>
<td>35782.38</td>
<td>80.0</td>
</tr>
<tr>
<td>Puducherry</td>
<td>416.61</td>
<td>0.93</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>5735.97</td>
<td>12.83</td>
</tr>
<tr>
<td>Gujarat</td>
<td>2722.05</td>
<td>6.09</td>
</tr>
<tr>
<td>J &amp; K</td>
<td>27.55</td>
<td>0.06</td>
</tr>
<tr>
<td>Others</td>
<td>13.58</td>
<td>0.009</td>
</tr>
<tr>
<td>TOTAL</td>
<td>44698.14</td>
<td></td>
</tr>
</tbody>
</table>
Status of Coal Exploration in India
MAJOR COALFIELDS OF INDIA

- NCL, SINGRAULI
- NEW DELHI
- PENCH-KANHAN TAWA VALLEY
- WARDHA
- GODAVARI VALLEY
- TALCHER
- IB VALLEY KORBA
- RANIGANJ North & South Kajipura
- EAST BOKARO AND WEST BOKARO
- JHARIA
- CIL Hq. Calcutta
- NEC
- ECL
- MCL
- SECL
- SCCL
- CCL
Coal basins in India

- There are 63 major coal basins (45 in Gondwana Formation and 19 in Tertiary Formation) as per National Coal Inventory by GSI.

- Major Gondwana basins are spread in Jharkhand, Odisha, Chhattisgarh, W. Bengal, Maharashtra, Madhya Pradesh & Telangana states.

- Tertiary coal deposits are found in the North Eastern States of Assam, Meghalaya, Arunachal Pradesh and Nagaland.
The coal mining industry dates back to the year 1774, during the time of Warren Hastings, when permission to work coal mines in Bengal was accorded.

The first Geological survey of the coalfield was made during 1845-1846 by Mr D. H. Williams.

NCDC started systematic detailed coal exploration from 1956 to augment coal production to meet the targeted coal demand.

After nationalisation of coal mines and formation of CIL in 1975, CMPDI started planned and scientific exploration activities as a part of 10 Year Perspective Coal Plan (Project Black Diamond).
Stages of Coal Exploration in India

Exploration for coal in the country is carried out by drilling boreholes to generate sub-surface data and broadly taken up in 3 stages. Resource is estimated as per ISP Norms, 1957.

- **Preliminary Exploration**: Geological surveys / Formational Mapping are undertaken to identify potential coal areas. *No estimation of resource.*

- **Regional / Promotional Exploration**: Spacing of boreholes 1 km apart to establish broad frame-work of the deposits. *Inferred/Indicated Reserve estimated* during this exploration. Confidence level 30% for Inferred and 70% for Indicated Reserves.

- **Detailed Exploration**: Spacing of boreholes in 400m grid pattern. Confidence level 90%. Proved Reserve estimated during detailed Exploration.
Augmentation of Coal Resource: A Priority Area
As coal production is increasing, resource is depleting at a faster rate.

As assessed by NITI Aayog the present levels of proven coal reserves of 143 BT may only be able to support an annual peak production of 1.2 to 1.3 BT till 2037, then gradually decline thereafter.

To maintain constant supply of coal, in coming years the enhancement of coal exploration at higher rate is essential.

As industry is foraying in clean coal technology like CBM, UCG, Surface Gasification for producing coal to methanol, coal to liquid, coal to poly-chemical, dimethyl ether, fertilizer etc, enhanced pace of exploration for proving of coal is very much required.

CMPDI, being nodal agency for detailed coal exploration in India, is geared up to take up the challenge.
Growth in Drilling by CMPDI & Its Contractual Agencies Since Inception

Total Meterage drilled by CMPDI Since 1973-74 till 2016-17
Total Meterage about 144 lakhs
The year-wise achievement and target for exploratory drilling set by MoC for CMPDI & its contractual agencies (in Lakh M)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Capacity/Achievement</th>
<th>Overall Growth over previous year %</th>
<th>Departmental Capacity/Achievement</th>
<th>Growth over previous year %</th>
<th>Outsource Drilling Capacity/Achievement</th>
<th>Growth over previous year %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012-13</td>
<td>5.63</td>
<td>13</td>
<td>2.76</td>
<td>1.1</td>
<td>2.87</td>
<td>27.6</td>
</tr>
<tr>
<td>2013-14</td>
<td>6.97</td>
<td>23.8</td>
<td>3.25</td>
<td>17.8</td>
<td>3.72</td>
<td>29.6</td>
</tr>
<tr>
<td>2014-15</td>
<td>8.28</td>
<td>18.8</td>
<td>3.56</td>
<td>9.5</td>
<td>4.72</td>
<td>26.9</td>
</tr>
<tr>
<td>2015-16</td>
<td>9.94</td>
<td>20.0</td>
<td>4.08</td>
<td>14.0</td>
<td>5.86</td>
<td>24.0</td>
</tr>
<tr>
<td>2016-17</td>
<td>11.26</td>
<td>13.0</td>
<td>4.41</td>
<td>8.0</td>
<td>6.85</td>
<td>17.0</td>
</tr>
<tr>
<td>2017-18</td>
<td>12.50</td>
<td>11.0</td>
<td>4.75</td>
<td>7.7</td>
<td>7.75</td>
<td>13.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>59.56</td>
<td>25.54</td>
<td>34.02</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

The proved / Measured coal reserves of India is 143.06 BT, Out of which, about 118.46 Bt (About 83%) of Proved reserves is mainly due to CMPDI’s efforts, About 2 to 3 Bt of reserve is upgraded to Proved category every year due to CMPDI’s efforts, During 2016-17 due to efforts of CMPDI 4.73 BT of coal resources have been proved
Opportunities for coal Exploration in India

![Bar chart showing coalfield area covered by exploration](chart.png)
Present Production and Demand of Coal & Lignite in India
Background

• Coal mining and coal-fired thermal power generation sectors together contribute about 12% to India’s Index of Industrial Production (IIP).

• Country’s logistics, sponge iron, aluminum industries and several other industries depend on the domestic coal industry.

• Economic activities in three eastern states (West Bengal, Jharkhand and Odisha) are significantly dependent on coal.

• Coal sector employs about 500,000 people directly and possibly, the same number indirectly.

• Importance not just in terms of an energy source but also for socio-economic role
Coal & Lignite Production in India

• India is the third largest coal producing company of the world after China and USA
• Coal India Ltd (CIL), a Central Public Sector Enterprise, is the single largest producer of coal in the world and accounts for about 84% of India’s total coal production
• With a modest production of 79 MT in the year of its inception in November 1975, CIL produced 554 MT of coal in FY 2016-17
• CIL is an apex body operating through wholly owned 7 coal subsidiaries and 1 Mine Planning Consultancy company (CMPDI) spread over 8 states in India
• The Singareni Collieries Company Ltd (SCCL), is another State of Telangana owned company, engaged in exploration and exploitation of Godavari Valley Coalfield of South India, which produced 61.34 MT of coal in FY 2016-17
• Coal in small quantities were also produced by TISCO, IISCO, DVC and others
Coal & Lignite Production in India

• Significant growth in domestic coal production in the last 10 years
• CIL’s coal production alone has increased by almost 100 MT from FY 2011-12, about 25% increase
• SCCL has also increased its production by 10 MT over same period showing about 20% growth
• The Lignite production has also increased by 6 MT over the same period showing a growth of about 14%
• The higher coal production by CIL during FY 2016 and FY 2017 resulted in decline in coal import by 6.3% and 5.8% over the previous year respectively
Coal and Lignite Production in India during 2007-2017

**Million Tonnes**

- **Coal Production**
  - 2007: 431
  - 2008: 457
  - 2009: 493
  - 2010: 532
  - 2011: 533
  - 2012: 540
  - 2013: 556
  - 2014: 566
  - 2015: 609
  - 2016: 639
  - 2017: 655

- **Lignite Production**
  - 2007: 31
  - 2008: 34
  - 2009: 32
  - 2010: 34
  - 2011: 38
  - 2012: 42
  - 2013: 46
  - 2014: 44
  - 2015: 48
  - 2016: 44
  - 2017: 48
Production of Coal by Coal India Ltd (2014 to 2017)

<table>
<thead>
<tr>
<th>Year</th>
<th>Million Tonne</th>
<th>Non-Coking</th>
<th>Coking</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>414</td>
<td>462</td>
<td>48</td>
<td>470</td>
</tr>
<tr>
<td>2015</td>
<td>443</td>
<td>51</td>
<td>54</td>
<td>508</td>
</tr>
<tr>
<td>2016</td>
<td>494</td>
<td>54</td>
<td>55</td>
<td>554</td>
</tr>
<tr>
<td>2017</td>
<td>485</td>
<td>55</td>
<td>55</td>
<td>554</td>
</tr>
</tbody>
</table>
Coal Import in India during 2012 to 2017

Million Tonne

2012 2013 2014 2015 2016 2017
Growth in Demand of Coal & Lignite

• The total demand of coal in India during FY 2017 was 894 MT

• The demand has grown at a CAGR of about 5.5% over the last five years though lower in last 2 years

• Lignite accounts for 5% of the total demand
Growth in Coal Demand in India

(in Million Tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Demand (Million Tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>663</td>
</tr>
<tr>
<td>2013</td>
<td>761</td>
</tr>
<tr>
<td>2014</td>
<td>779</td>
</tr>
<tr>
<td>2015</td>
<td>867</td>
</tr>
<tr>
<td>2016</td>
<td>874</td>
</tr>
<tr>
<td>2017</td>
<td>894</td>
</tr>
</tbody>
</table>
Sector wise Demand of Coal in India in FY2016

- Power, 76%
- Steel & Sponge Iron, 3%
- CPP, 5%
- Cement, 1%
- Others, 15%
Future Energy Scenario in India
India has ratified the Paris Climate Treaty and committed to reduce carbon footprint. Commitments by India:

- To produce 40% of its installed electricity capacity by 2030 from non-fossil fuels.
- To shift significantly from coal-based power generation to renewable energy sources.
- To produce 175 GW of electricity from renewable source.
- 100 GW from solar, 60 GW from wind, 10 GW from biomass and 5 GW from small hydropower by 2022.
- Reduce its carbon emission intensity - emission per unit of GDP - by 33-35% from 2005 levels over 15 years.
Future Energy Scenario in India

- The Indian Electricity Sector is presently going through a major transformation.
- The Energy and Resources Institute (TERI) has recently conducted a study (February, 2017) for projected share of various sectors in electricity generation in different energy-mix scenario up to 2029-30

- The study is based on electricity demand till 2030 considering a number of factors including rate of economic growth, household connectivity, energy efficiency etc.
- The electricity demand is likely to increase from
  - 1115 billion units (BU) in 2015-16 to:
    - 1692 BU in 2022
    - 2509 BU in 2027
    - 3175 BU in 2030
Role of Coal in Future Energy Scenario in India
Role of Coal in Future Energy Scenario in India

- As per NITI Aayog, the present coal based power generation capacity of 193.43 GW is likely to go up to 330-440 GW by 2040.

- **Future Demand of Coal:** To sustain a electricity generation capacity of 330-441GW by 2040, coal requirement projected to be around 1.1BT to 1.4BT till 2037.

- The requirement of coal for above will first met by domestic supply.

- Coal India Ltd has to achieve 1BT of coal production by 2019.
The Energy and Resources Institute (TERI) has projected two Energy Mix scenarios: i) a “High Renewables Scenario (HRES)” and ii) a “Low Renewables Scenario (LRES)“ for demand & supply of electricity.

<table>
<thead>
<tr>
<th></th>
<th>GENERATION (BU)</th>
<th>INSTALLED CAPACITY (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High RE Scenario</td>
<td>Low RE Scenario</td>
</tr>
<tr>
<td>RE (W+S)</td>
<td>274 678 1102</td>
<td>186 379 511</td>
</tr>
<tr>
<td>Non RE (Excluding Coal)</td>
<td>236 303 310</td>
<td>236 303 310</td>
</tr>
<tr>
<td>Coal</td>
<td>1182 1528 1763</td>
<td>1270 1827 2354</td>
</tr>
<tr>
<td>Total</td>
<td>1692 2509 3175</td>
<td>1692 2509 3175</td>
</tr>
<tr>
<td>% of Coal</td>
<td>69.8 60.9 55.5</td>
<td>75.0 72.8 74.1</td>
</tr>
</tbody>
</table>

Role of Coal in Future Energy Scenario in India
TERI has projected future requirement of coal in the two Energy Mix scenarios for generation of electricity.

<table>
<thead>
<tr>
<th>Requirement of Coal (MT) for Power Generation</th>
<th>High RE Scenario</th>
<th>Low RE Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015-16</td>
<td>21-22</td>
<td>21-22</td>
</tr>
<tr>
<td></td>
<td>26-27</td>
<td>26-27</td>
</tr>
<tr>
<td></td>
<td>29-30</td>
<td>29-30</td>
</tr>
<tr>
<td>446</td>
<td>688</td>
<td>739</td>
</tr>
<tr>
<td>915</td>
<td>890</td>
<td>1000</td>
</tr>
<tr>
<td>890</td>
<td>739</td>
<td>14000</td>
</tr>
</tbody>
</table>
Policy Initiatives of Government Driving Demand of Coal
Policy Initiatives of Government Driving Demand of Coal

- Government of India has undertaken many policy decisions which, directly or indirectly may increase demand of coal.

- **Rural Electrification:**
  - A large proportion of rural population in India is deprived of regular supply of electricity. The Government of India launched *Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY), to provide power supply to rural India*
  - The scheme is aimed at ensuring 100% village electrification by 2019
  - As on August 2017, Government has been able to electrify 14,251 villages (77% of the un-electrified villages)

- **Make in India Initiative:**
  - Industrial sector accounts for about 16% of GDP in India and is the largest consumer of electricity and accounts for about 42% of the total demand
  - Under Make in India Initiative, the government has set the target to raise the share of manufacturing in GDP from the current 16% to 25% by 2025. Based on the realization of the policy, the electricity demand in India can grow faster.
Policy Initiatives of Government Driving Demand of Coal

- **National Electric Mobility Mission Plan 2020:**
  - The scheme envisages a population of 6-7 million electric vehicles in India by the year 2020, from a present level of just over 4 lakhs electric two wheelers and few thousand electric cars on Indian roads. *It may reach 250 million electric vehicles by 2030*
  - Electric Vehicles is expected to generate additional about 160 BU of power demand by 2030.

- **Adoption of Clean Coal Technology**
  - Advancement in gasification technology (Surface and Underground) has opened new avenues for utilization of coal
  - Recently Ministry of Coal has identified 10 regionally explored blocks for the purpose of surface gasification/coal based fertilizers/coal to methanol /coal to liquids/ coal to poly-chemicals, etc.
Synthesis Products of Syngas

- Coal

Clean Syngas

- Raw H₂
- H₂ to CO
  - 1:2:1
  - H₂ to CO
  - 2:1
  - H₂ to CO
  - 3:1

Pressure Swing Adsorption

Ammonia Synthesis

Urea Synthesis

Fischer Tropsch

LPG
Naphtha
Diesel

DME & Gasoline Synthesis

DME
Gasoline

Alcohol Synthesis

Methanol, CH₃OH
Ethanol, C₂H₅OH

Methanation

SNG, CH₄
Alternate Use of Coal – Coal Gasification (Surface)

Net Imports of Major Chemicals, petrochemicals and Urea in India during 2016-17:

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Compound</th>
<th>Net import Quantity</th>
<th>Net import Value (Rs. Crs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Methanol</td>
<td>1.6 Million tonne</td>
<td>2900</td>
</tr>
<tr>
<td>2</td>
<td>Acetic acid</td>
<td>0.8 Million tonne</td>
<td>1877</td>
</tr>
<tr>
<td>3</td>
<td>Ethylene</td>
<td>8100 te</td>
<td>571</td>
</tr>
<tr>
<td>4</td>
<td>Urea</td>
<td>5.5 Million tonne</td>
<td>6770</td>
</tr>
</tbody>
</table>

Methanol’s wide applications:

- Primarily used in making various chemicals. Nearly 40% of Methanol is used to produce formaldehyde and then into *product diverse as plastics, plywood, paints, explosives and textiles*.

- Other Chemical derivatives of methanol are Dimethyl-ether (DME) and Acetic acid. DME can be blended with LPG and used as replacement for transportation Diesel fuel. *DME is a substitute to LPG & LNG.* VOLVO & BEML are selling trucks using DME.

- Excellent diesel fuel substitute with a Cetane number of 55-60 (45-55 for regular diesel) and very clean burning. Methanol is an ingredient for producing *Olefins for petrochemicals, etc.*
### Expected Market demand of Coal for Chemicals in India

In Million tonnes

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Methanol</td>
<td>6-14</td>
<td>8-19</td>
<td>11-25</td>
</tr>
<tr>
<td>2</td>
<td>Di Methyl Ether</td>
<td>44-48</td>
<td>56-62</td>
<td>72-80</td>
</tr>
<tr>
<td>3</td>
<td>Urea</td>
<td>8-10</td>
<td>9-11</td>
<td>10-12</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>58-73</strong></td>
<td><strong>79-92</strong></td>
<td><strong>93-117</strong></td>
</tr>
</tbody>
</table>

- The country has 37.5 Bt of superior grade non-coking coal (Grades G1 to G6), whereas the inferior grade (Grades G7 to G17) non-coking coal is about 212 Bt.
Coal Washing in India

- In 2014, MoEF&CC issued notification barring power plants located 500Km away from coal mines from using coal of ash content > 34%
- It aims at to minimize the environmental damage caused by transport of ash and also the subsequent problem of ash/ slag handling at power plants,
- The ash content of the coal typically supplied to power plants is in the range of 40% to 50%.
- For coal mines with higher than 34% ash content coal that are supplying to power plants beyond 500 km, it becomes necessary to wash coal before dispatch
Coal Washing in India

Non-Coking Coal Washeries in CIL

• Presently 3 Non-Coking coal washeries in CIL are operational with a washing capacity of 13.5MT

• Action has already been taken to set up 9 more Non-coking coal washeries in CIL with a total capacity of 75.5 MT

• Apart from above, 14 more non-coking coal washeries / Deshaling Plants are proposed to be set up by CIL in different coalfields with a total capacity of about 205MT

• Non-Coking Coal Washeries in Private Sector

• Apart from above there are good number of Non-coking coal washeries by Private sector are also in operation
Coal Washing in India

Coking Coal Washeries in CIL
• Presently 11 Coking coal washeries in CIL are operational with a washing capacity of 20.58 MT
• Action has already been taken to set up 6 more coking coal washeries in CIL with a total capacity of 18.6 MT
• Apart from above, 7 more coking coal washeries are proposed to be set up by CIL with a total capacity of about 22.75 MT

Coking Coal Washeries in Private Sector
• TISCO is also operating few coking coal washeries for their linked plants
Allocation of Coal blocks to Private Sector and PSUs
Allocation of Coal blocks to Private Sector and PSUs

• The Coal Mines (Nationalization) Act, 1973 nationalized all the private coal mines in India, barring few mines of TISCO & IISCO and were transferred to Coal India Ltd.

• Later, to boost private investment and enhance coal production, amendment was made in CMN Act, 1973 and 218 coal blocks were allocated by Ministry of Coal, Govt of India to private sector and other State and Central PSUs for captive use between 1993 and 2012.

• The Hon’ble Supreme Court of India vide its Order dated 24th September 2014 cancelled allocation of 204 coal blocks, listed at Schedule-1 of the judgment.

• The Coal Mines (Special Provisions) Act, 2015: The Government of India promulgated Coal Mines (Special Provisions) Act, 2015 in March 2015 for allocation of these cancelled 204 blocks through competitive bidding auction/allotment process.
Allocation of Coal Blocks under Coal Mines (Special Provisions) Act, 2015

• Since 2015, 84 coal blocks out of the 204 cancelled blocks have been allocated so far as per the provisions of the Coal Mines (Special Provisions) Act, 2015
  • 31 coal blocks/Mines allocated through auction to Private Sector Companies for specified end-use
  • 45 coal blocks allotted to PSUs for specified end-use
  • 8 coal blocks allotted to PSUs for Sale of Coal

• It is expected that in coming years coal production from these blocks may be 450-500 MTPA

• Coal Mines Allocation Rules, 2017: Vide Gazette Notification dated 13.07.2017, Ministry of Coal has notified “Coal Blocks Allocation Rules, 2017”, under which allocation of coal areas will be made through auction or allotment to Govt. Companies. This Rule will not be applicable for 204 coal blocks listed in Schedule-1 of Supreme Court Judgment

• Under this Rule, Ministry of Coal may auction coal concessions for Sale of coal to Private companies.
Challenges ahead in enhancement of Coal production
Challenges ahead in enhancement of Coal production

• **Scale of Mining Operation:** The coal mining in India is still operating largely on small scale with limited mechanization / scale of equipment.
  - About 50% of CIL’s coal production (279 MT) in FY 2017 came from 15 Opencast Mines
  - Balance 274 MT coal production came from remaining 452 Mines
  - Similarly, in SCCL, about 83% (50 MT) of coal production comes from 14 mines, balance 11 MT comes from remaining 48 mines
  - Number of small underground mines dominates in both CIL and SCCL with very small production capacity (< 1MTPA)
  - The small scale mining constrained the extent of mechanization
  - Growth in coal production in CIL could only be achieved by large capacity open cast mines

• **Adverse Geo-Mining Conditions:** Geologically, Indian coalfields are structurally complex with numerous faults, intrusion of dykes and sills which make it difficult to plan mass production from underground mines

• **Adverse Stripping Ratio:** With every passing year, stripping ratio in India is worsening leading to increased cost of production
Acts, Rules, Regulations Governing Coal Sector
Acts, Rules, Regulations governing Coal Sector


- Coal sector is also regulated by other Acts which govern the ancillary aspects of coal mining including environment protection, labour, land acquisition, payment of compensation etc.

- The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, (RFCTLARR) 2013:

- This Act aims to ensure fair compensation to landowner. It has caused >200% increment in cost of land acquisition and >90% increment in cost of rehabilitation, thus rendering cost of production high.
Acts, Rules, Regulations Governing Coal Sector

• Regulations pertaining to environment protection

• Before operation/ during the operation of a mine, a mine owner is required to obtain various environment related approvals such as

  • Environmental Clearance from MoEF&CC
  • Forest Clearance from MoEF&CC
  • Ground water clearance from MoEF&CC and Central Ground Water Board
  • Consent to Establish from State Pollution Control Board
  • Permission to draw water from State Water resource Department

• The Forest (Conservation) Act, 1980.

  • As per this Act, every change in forest land to a land for non-forest use is to be compensated by the user agency for the purpose of compensatory afforestation by calculating its Net Present Value (NPV)

  • Currently, the rate is in the range of Rs. 4.38 – 10.43 lakh per hectare. This rate has been proposed to be revised to Rs 9.87 – 55.55 lakh per hectare.

  • These revised rates would impose substantial financial burden on the coal projects and could possibly render some projects financially unviable.
Conclusion

• Coal is the and will remain backbone of energy supply scenario in the foreseeable future
• The Ministry of Coal has drawn an ambitious program for Exploration to enhance the coal inventory of the country.
• Studies indicate that there will be enhanced demand of coal in the futuristic energy scenario
• Coal mining sector of the country is gearing itself to meet such demand
• The Govt has also opened up the coal mining sector for private operators which may bridge the gap between demand and supply
• The coal mining in the country is carried out under a strict regulatory control in all spheres which includes technical, administrative and environmental aspects
• Since the mining operation is undertaken at a large scale which involves R&R aspects. The Govt has recently made Rules regarding payment of compensations so that the local population is adequately compensated
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