Utilising The Fuel Value Chain From Coal Mining To Power Generation

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Backward Integration

- CESC a 100 year old power utility engaged in generation and distribution in Greater Kolkata (area 567 sq. km)

- Has 4 coal-fired stations of aggregate capacity 975 MW, T&D network of 14,000 ckt. km and a customer base of 2 mn

- One of the first private developers to undertake captive coal mining under the extant government policy to support power generation activity

- Current annual production 2.5 mtpa, leading to significant improvement in generation performance
Generation Performance

- Overall PLF up from 73% in 2001-02 to 94% in 2005-06

Start of Coal Supply from Captive Mine
Anatomy Of Captive Mine

- Difficult mine alignment with long history of illegal mining
- Complex geological setting with 17 faults, heat-affected zones and steep seams of $18^0$ dip
- 4 major seams that are highly inter-banded
- Requires selective mining with backhoe operation to segregate thin inter-bands of shale and improve ash content to 41-42% average

<table>
<thead>
<tr>
<th>Seam</th>
<th>Ash %</th>
<th>VM %</th>
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<tbody>
<tr>
<td>B6</td>
<td>29-50</td>
<td>4-20</td>
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<tr>
<td>B5-4</td>
<td>32-44</td>
<td>6-26</td>
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<td>B3</td>
<td>28-58</td>
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<td>B2</td>
<td>24-60</td>
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Missing Pieces

- Generation of coal rejects of high ash shale with residual heat value @ 0.2 mtpa – disposal necessary to avoid potential threats to law and order, fire hazards and public safety.

- ROM coal with average ash of 41-42% after sorting not fully meeting environmental considerations for power generation – blending with imported coal necessary to reduce ash content.

- Freight economics adverse because of road / rail transportation of coal with high ash – losing proposition compounded by penal rates for overloading in railway wagons.
Beneficiation of coal planned to reduce ash content to 34% as per MoEF guidelines – 300 TPH washery with 1.6 mtpa throughput under installation at mine site

Under-pulsated coarse coal Batac Jig technology to guarantee 95% organic efficiency – zero-discharge plant to avoid environmental pollution

Direct impact in reducing power generation cost in Kolkata after balancing import component – overarching effect to facilitate electricity reforms

Washery to generate rejects of 0.4 mtpa – disposal plan necessary for environmental hygiene
Extending The Value Chain

- Shale and washery rejects to amount to 0.5 mtpa with ash content of 60-65% and GCV of 2000 kCal/kg

- Potent fuel with residual heat value – eminently suited to Fluidised Bed Combustion (FBC) technology but not to Pulverised Fuel (PF) boilers

- Potential of annual electricity generation of 333 MU from 0.5 mt of rejects at specific fuel consumption of 1.5 kg/kWh – enough to support a 40-50 MW power plant

- Benefit of additional revenue from rejects sale – to improve washery profitability
Power Plant Design

- 40 MW turbo-generator with 2-20 MW capacity Atmospheric FBC boilers being installed

- 178 acres land acquired outside mine lease area to accommodate washery and power plant in adjacent sites

- Consumptive water to be pumped from river bed 5 km away

- Reduced Nox & Sox generation due to low furnace temperature of 950°C

- Usual environmental measures – high efficiency ESP for particulate emission control, closed cycle cooling for zero discharge, waste water management
Ash Utilisation

- Multi-faceted use for 100% utilisation

- In mine area –
  - Backfilling of pits
  - Fire quenching in spots vulnerable to spontaneous ignition of coal

- External to mine –
  - Serving neighbouring cement and brickfield industries
  - Facilitating land and area development
  - Backfilling of abandoned quarries as a measure of public safety
Backward To Forward Integration

- Power evacuation through 16 km long, 132 kV, 80 MVA, D/C line to connect to STU network

- Classic case of reaching out to the competitive power market under open access regime legislated by Electricity Act 2003

- PPA signed with intermediary as single window agency to lift the full output and offer to multiple buyers

- Future plan to add a second 40 MW plant to further the case for forward integration and enhance power market play
Thank You