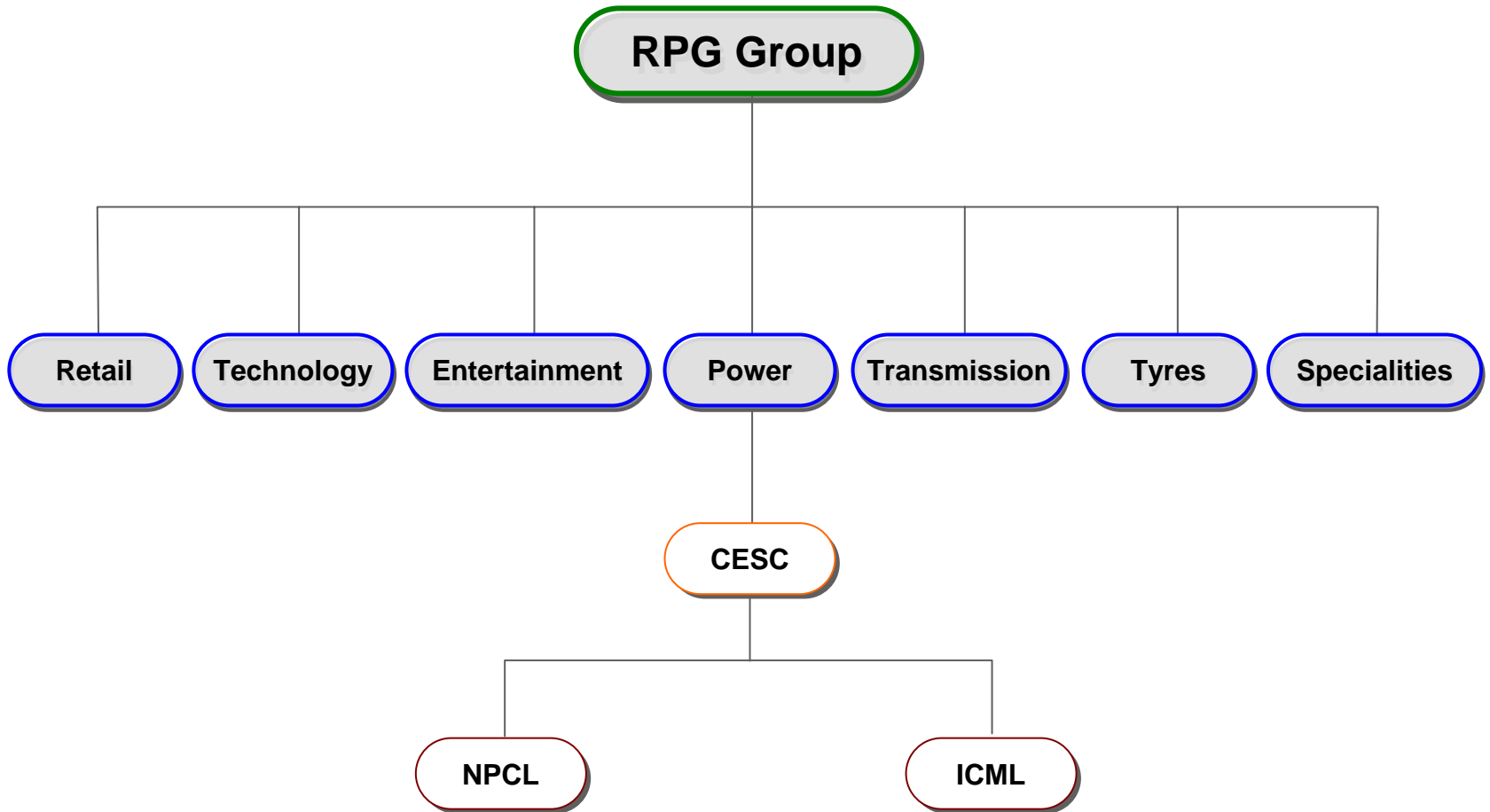

Utilising The Fuel Value Chain From Coal Mining To Power Generation

March 2007

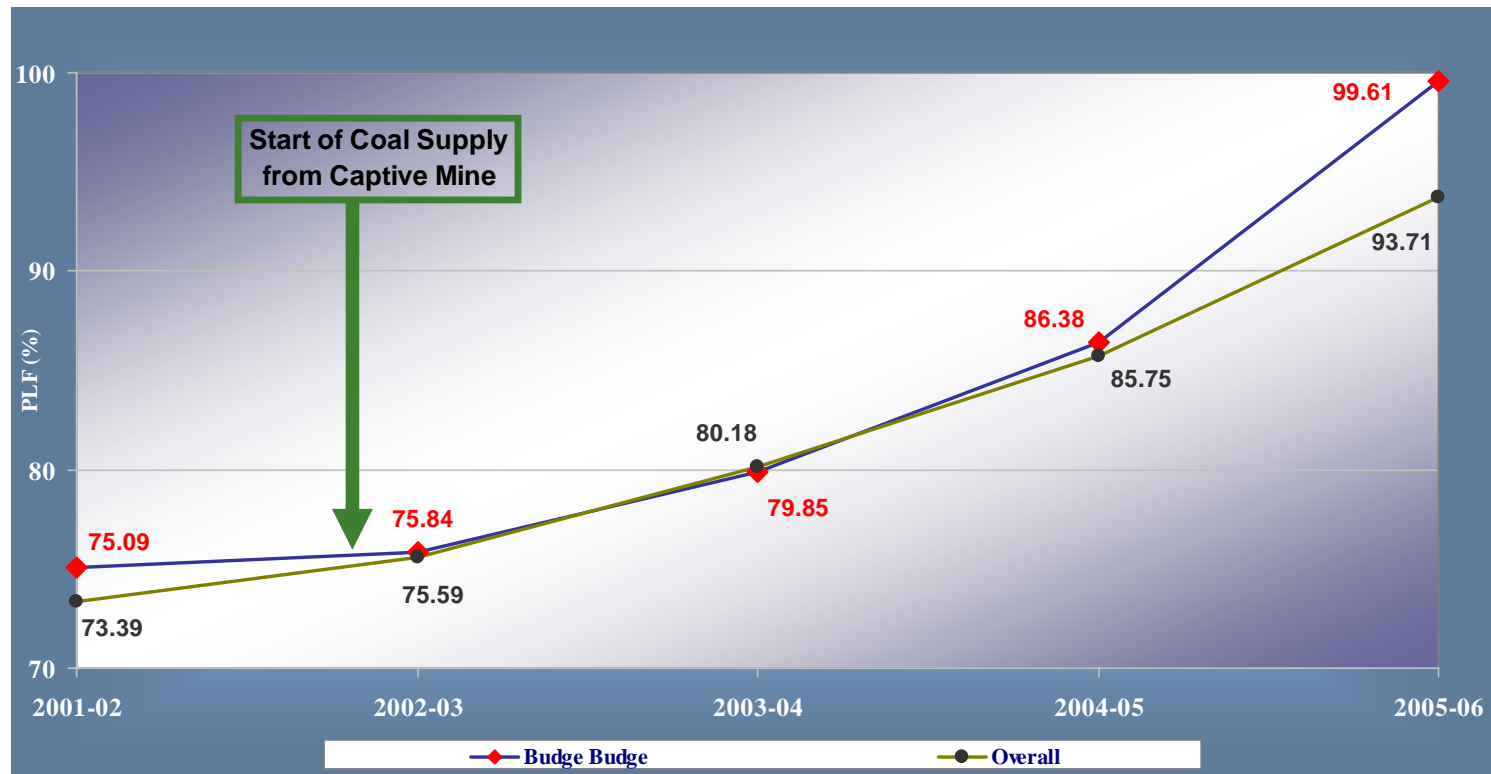


Backward Integration

- 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
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Generation Performance

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



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° 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

Seam	Ash %	VM %
B6	29-50	4-20
B5-4	32-44	6-26
B3	28-58	6-24
B2	24-60	6-32

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
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Constructing The Value Chain

- 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
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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
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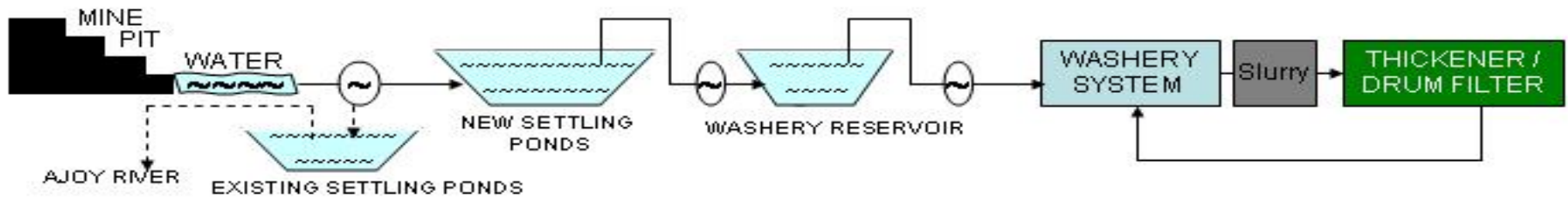
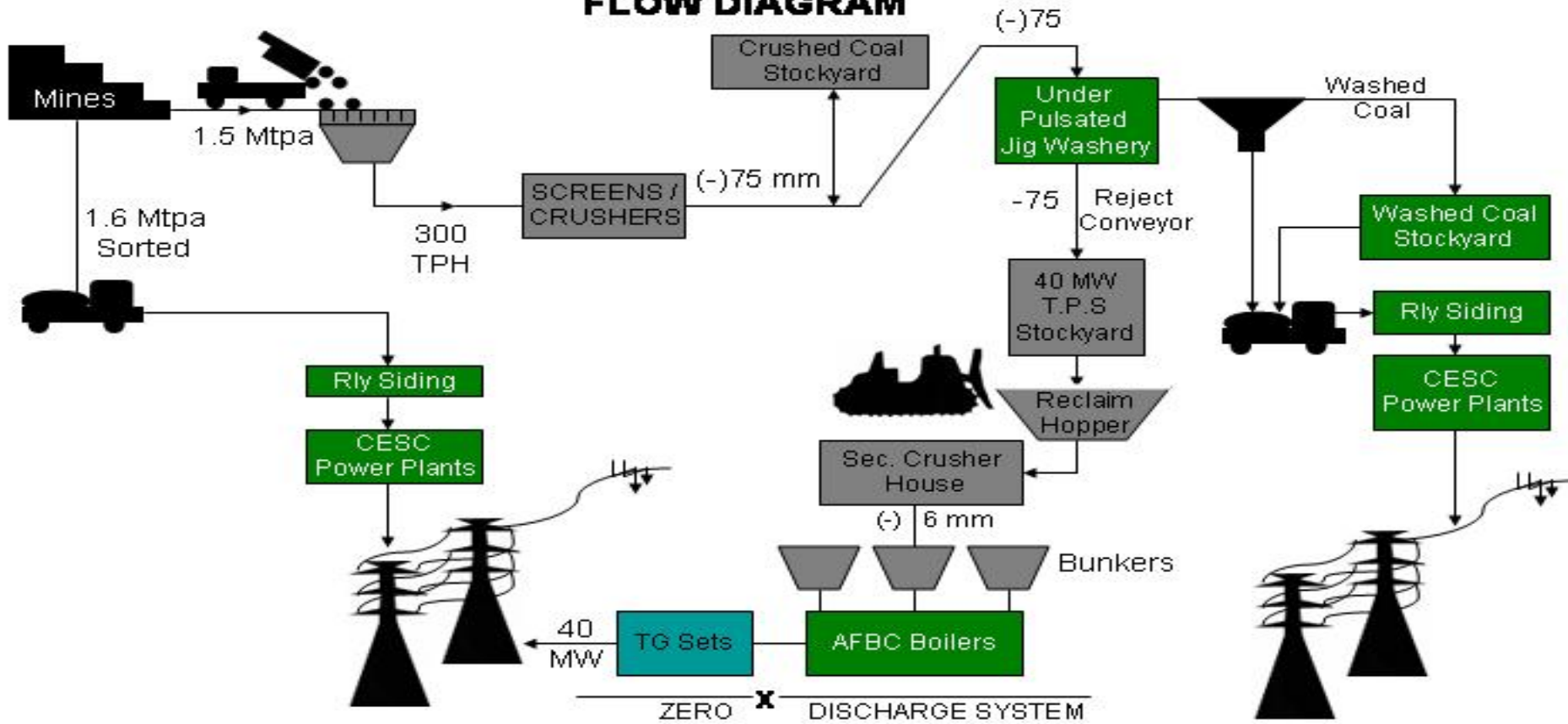
Power Plant Design

- 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
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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*
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FLOW DIAGRAM



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
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Thank You
