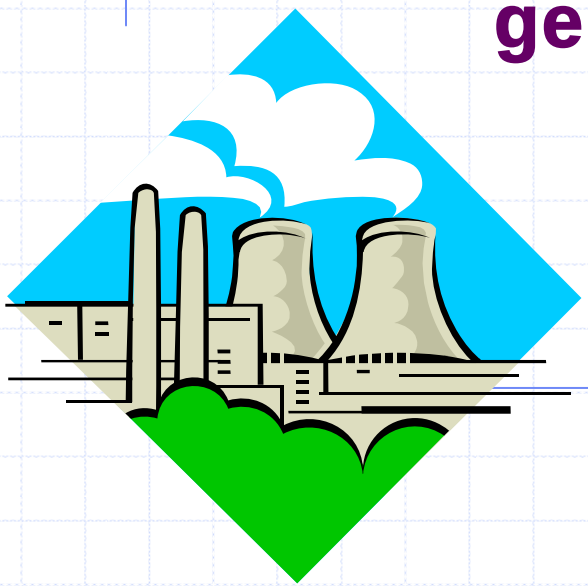
Welcome to Workshop on "Coal Beneficiation Technologies-2007"

Discussion on "Various technologies for generation of power from washery rejects. Cost of generation of such power"



by

N P Bhati

Managing Director

Spectrum COAL & POWER LIMITED

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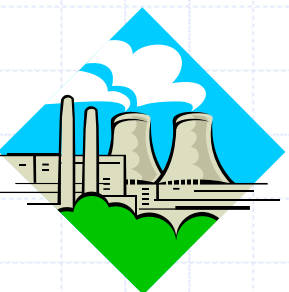
Coal Washing

- Coal Washing is technically called coal beneficiation. Coal washing, technically called coal beneficiation, is a process by which the quality of raw coal is improved by either reducing the extraneous matter that gets extracted along with the mined coal or the associated ash.

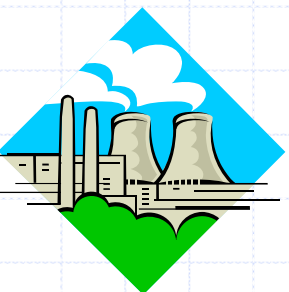
- Beneficiation of Coal generated about 20-25% of rejects having ash% of about 60% & above.



Indian Scenario

- In India 65 percent energy consumption due to coal fired power generation is dependent on noncoking coal as high ash coal in pulverised form.

- The total coal consumed for power generation accounts 50 % of the coal produced in India including middlings and sinks available from more than 17 Washeries.



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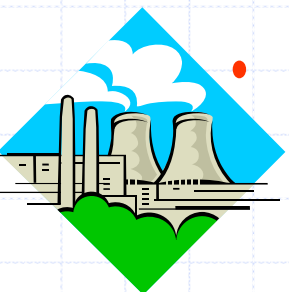
Waste to Watts

- Power can be generated from the byproduct of washery (Rejects) which is considered as waste
- Rejects can be utilised for power generation with/without blending of raw coal.
- Possible to attain boiler efficiency of 79% on 100% washery rejects.
- Burning of coal rejects reduces any handling and disposal issues



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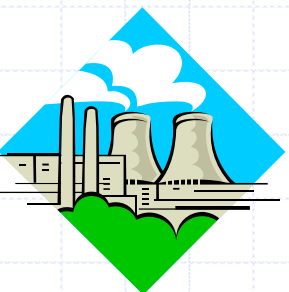
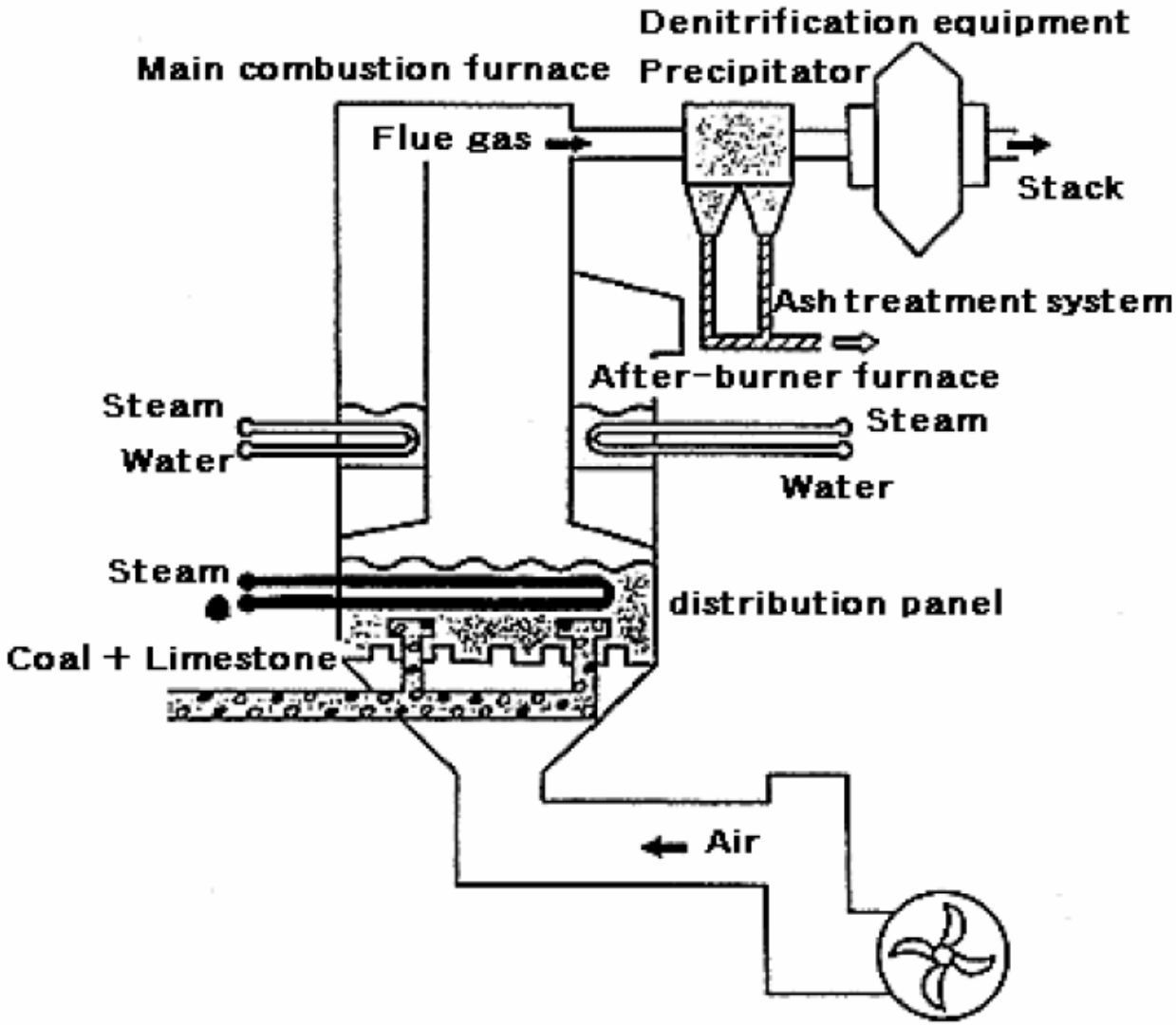
FBC Technology

- Atmospheric Fluidized Bed Combustion (AFBC)
- Pressurized Fluidized Bed Combustion (PFBC)
- Atmospheric Circulating Fluidized Bed Combustion (CFBC)
- Integrated Gasification Combined Cycle (IGCC)



AFBC


Denitrification equipment
Main combustion furnace
Precipitator
Flue gas
Stack
Ash treatment system
After-burner furnace
Steam
Water
Steam
Water
Steam
distribution panel
Coal + Limestone
Air

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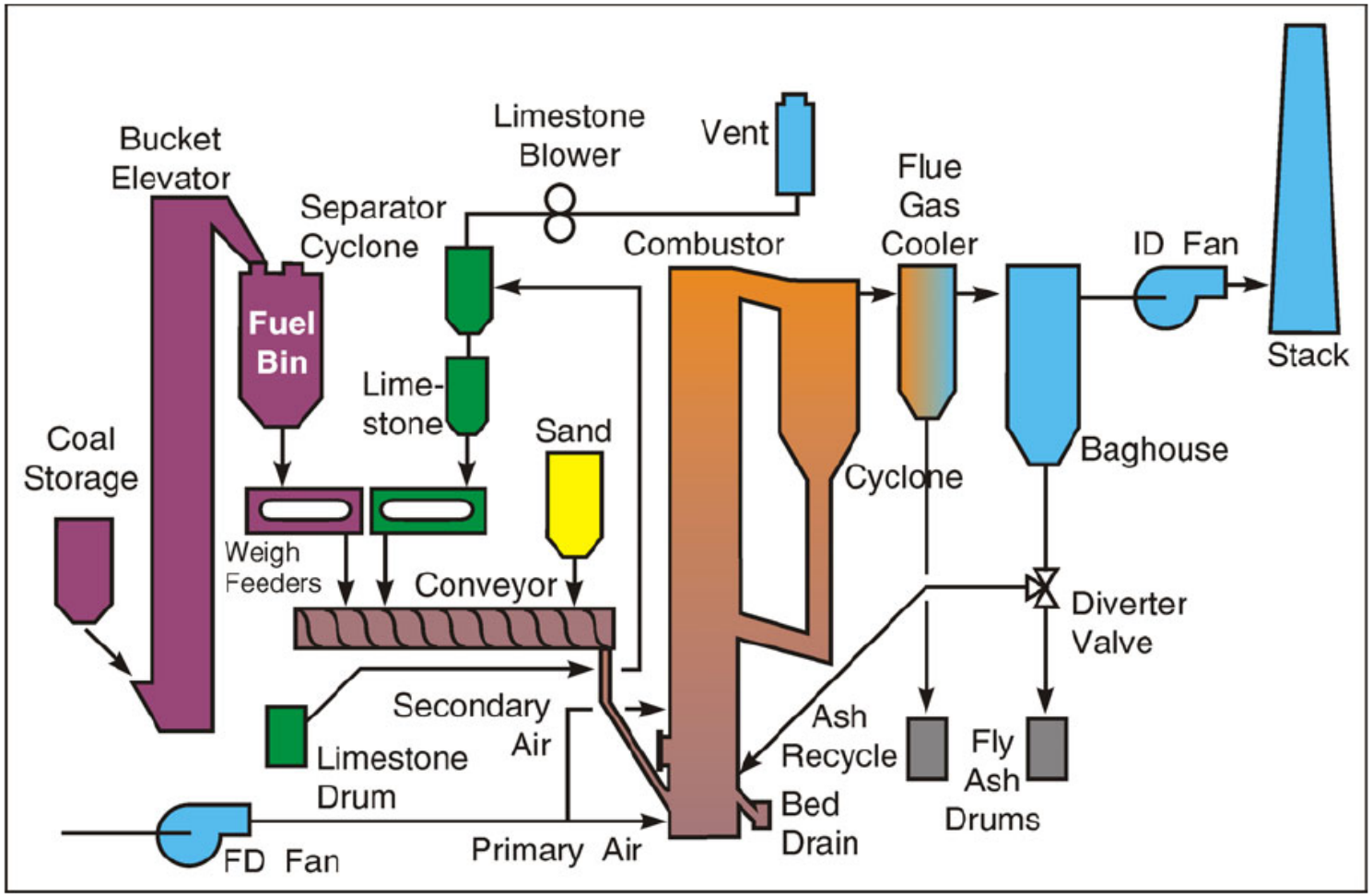
CFBC Flowchart



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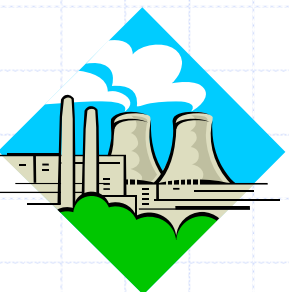
CFBC Technology

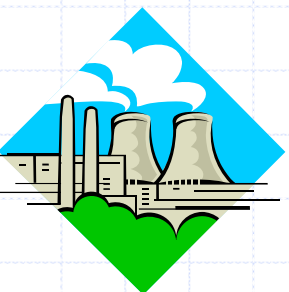
CFBC Technology : Environment friendly, More efficient, Suitable for wide spectrum of fuels & Cost effective

Among the new clean coal technologies, "Circulating Fluidising Bed" is one of the most promising ones. The use of this technology has been proven by the success of the number of large CFB units operating worldwide over last one decade.



CFBC Technology

Superior technical and excellent environmental performance without using complicated flue gas treatment facilities and possibility of use of inferior quality fuels is the driving force for its rapid development. CFBC boilers are simple to operate & maintain as they are sufficiently close to conventional boilers.



Model Rejects based Power Plant

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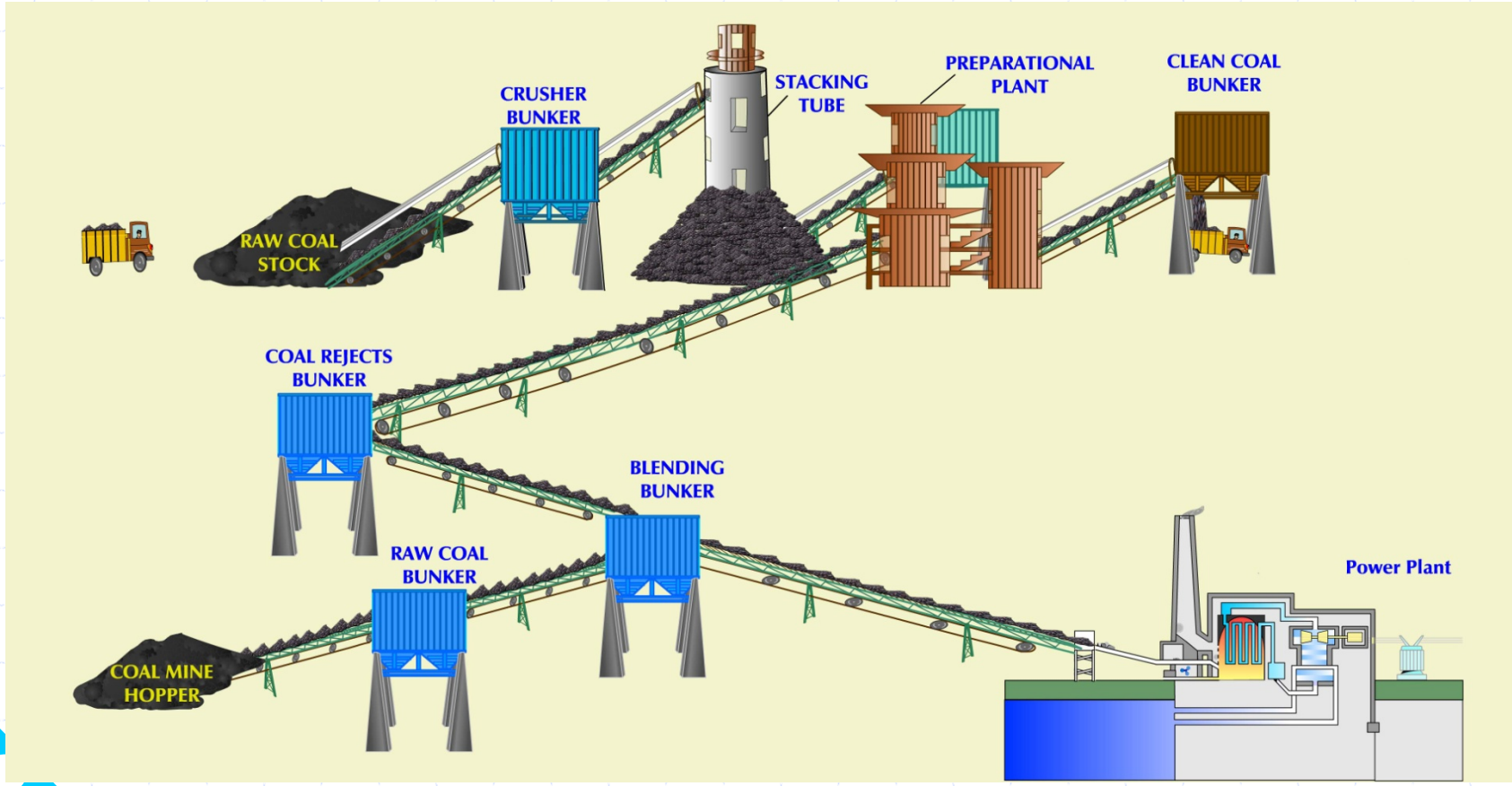

Advantages of Fluidised Bed Combustion Boilers

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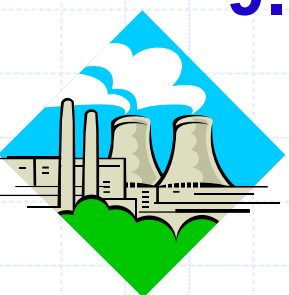
1. High Efficiency
2. Reduction in Boiler Size
3. Fuel Flexibility
4. Ability to Burn Low Grade Fuel
5. Ability to Burn Fines
6. Pollution Control
7. Low Corrosion and Erosion
8. Easier Ash Removal – No Clinker Formation
9. Less Excess Air – Higher CO_2 in Flue Gas



Advantages of Fluidised Bed Combustion Boilers

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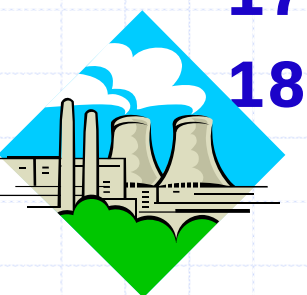
10. Simple Operation, Quick Start-Up
11. Fast Response to Load Fluctuations
12. No Slagging in the Furnace-No Soot Blowing
13. Provisions of Automatic Coal and Ash Handling System
14. Provision of Automatic Ignition System
15. High Reliability
16. Reduced Maintenance
17. Quick Responses to Changing Demand
18. High Efficiency of Power Generation



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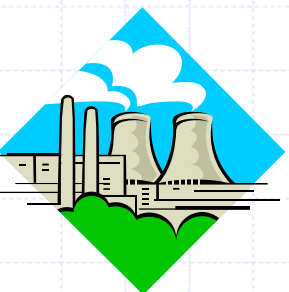
Overall Impact of Power generation cost on Cost of washed coal



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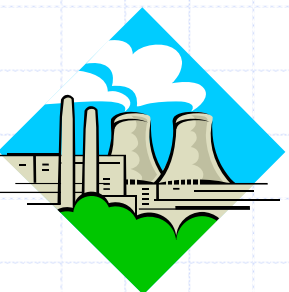
Advantages of washed coal

- Reduction in emissions of particular matter.
- Railways will carry thermal coal with less ash
- Reduced transportation costs
- Reduced capital costs of the power station
- Reduced O&M costs at the power station
- Increased plant availability and resultant higher plant load factor (PLF)
- All of the above will result in lower cost of generation of the power plant



Case Study using washed coal in thermal power plant

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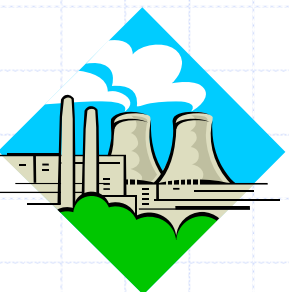
- Improvement in Plant Utilisation Factor (PLF) from 73% to 96%.
- Reduction in specific coal consumption from 0.777 kg/KWH to 0.533 kg/KWH.
- Reduction in auxiliary power consumption (For the unit it was reduced by 1.5%)
- Improvement in boiler efficiency by 2%.
- Smooth functioning of coal handling plant & Reduction in smoke and dust emission.
- Cost of running maintenance and spares were reduced.
- Cost of generation decreased



Cost benefit alone on transportation – Case Study

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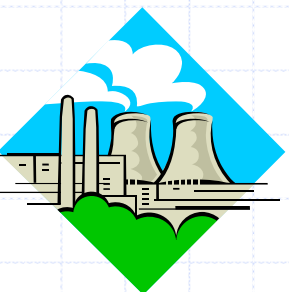
Assumed Raw Coal Linkage per month (Tons)	10,000
Cost of Raw Coal/ Ton	600
Total Cost of Raw Coal	6,000,000
Cost of transportation /Ton	1,230
Total Cost of Transportation	12,300,000
Cost to customer using raw coal	18,300,000
Cost to the Power House using Clean coal	
Total Cost of Raw Coal	6,428,571
Total Cost of Clean Coal Transportation	10,542,857
Total Cost of Washing @Rs 100/Ton	1,071,429
Total Cost	18,042,857
Total Saving per month	257,143

GCV of Raw Coal	3600
GCV of Clean Coal	4200
Equivalent Raw Coal	10,714
Equivalent Clean Coal @ 80% yield	8,571
Appox Cost of Raw Coal (Rs)	600
Appox Cost of Transportation per ton (Rs) for 1500 km	1,230



Quality Requirement Of Rejects For FBC/CFBC Power Plants

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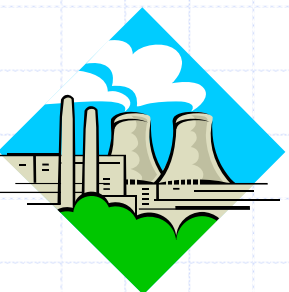
- GCV of rejects required for efficient burning in FBC/CFBC plants should be in the range of 1360 –2000 kcal/kg. Washery rejects from Orissa & Jharkhand have been tested & found suitable for such plants

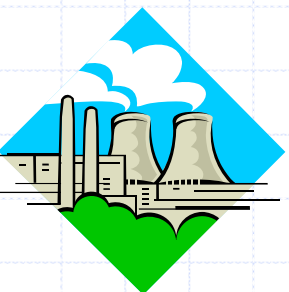
- Power Plant will utilise 0.5 MT/yr rejects in blend with 0.13 MT/yr raw coal.



Likely Cost Of Generation

- Cost of generation from these plants varies from Rs. 2.5 to Rs. 3.5 per kWh due to operation of these plants in isolation mode at low PLF.

- The generation cost will reduce & will be comparable with other thermal power plant with bigger unit of FBC based plant as proposed above



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Thank You!