

Tata Group Introduction

One of India's *Largest* Conglomerates

India's *Best Known* and Most Respected Business House

Main Companies in *7 Business Sectors*

Largest Employer in the Private Sector

Aggregate revenues of US\$17.8b (2004-'05)

Revenues Equivalent to *2.8% of India's GDP*

International Income 50% of Group Revenue



CLEAN COAL TECHNOLOGIES

Tata Power has approached establishment of Clean Coal Technologies via following approaches :

- Efficiency & Heat Rate Improvement.
- Emission Side Controls.
- Fuel Side Control
- Technologies based on alternative fuels derived from coal.
- Challenges Ahead

EFFICIENCY & HEAT RATE IMPROVEMENT

- Selection of Units with higher steam parameters.

Tata Power is engaged in introduction of Supercritical Technology for its 4000 MW Mundra Ultra Mega Project using inlet steam at 242 Bar pressure and MST/RHT of 565/593°C with thermal efficiency of 41% plus.

Use of HARP Cycle wherein maximum utilisation of energy from extraction steam will be attained to maximise inlet feed water temperature for Boiler (around 295°C).

EFFICIENCY & HEAT RATE IMPROVEMENT contd

- Extensive CFD (Computational Fluid Dynamics) analysis has been made part of Technical Specifications for recent large units to reduce internal losses.
- Use of variable speed drives has been extensively made for large existing and new proposed thermal units.
- All existing and planned new thermal units have been provided with Pneumatic System for transportation of dry ash as it is found more energy efficient.



EFFICIENCY & HEAT RATE IMPROVEMENT contd

- TPC is exploring future replacement of conventional sea water cooled power plant condensers by Desalination Plants using waste reject heat as it would contribute immensely to Energy Conservation in Power Plants and establish the process of water from waste.
- TPC seeks cooperation in developing Techno-economically feasible applications for Air Cooled Condensers at sites where cooling water is in scarce supply.



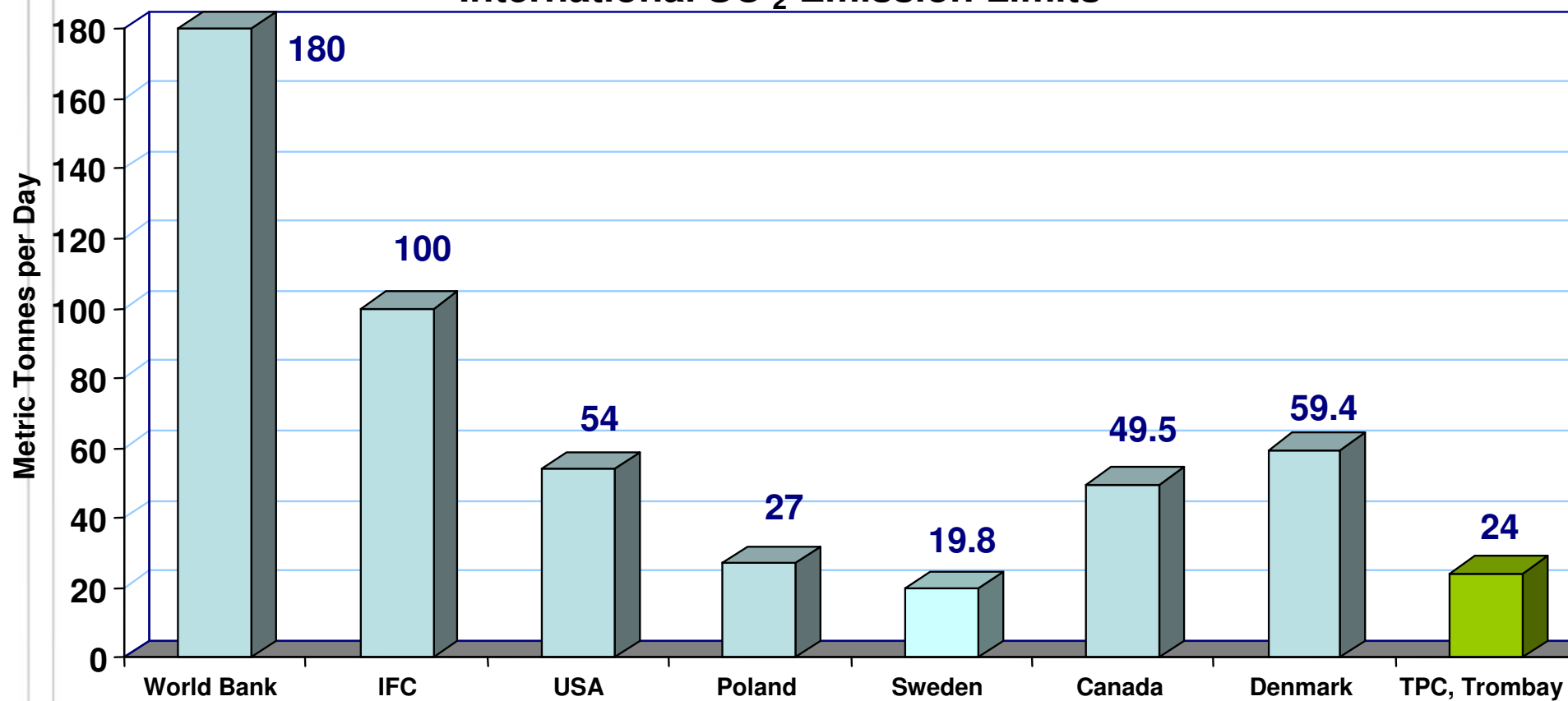
EMISSION SIDE CONTROLS

- TPC was the first Power Station in the country to introduce Flue Gas Desulphurisation Unit for its 500 MW coal fired unit in Mumbai as part of sulphur dioxide emission controls using sea water scrubbing technology in 1989, 1994 and presently implementing on its 250 MW unit at Trombay. The technology has demonstrated Scrubber efficiencies of more than 92%.
- TPC has achieved particulate removal efficiencies of 99.5% in its existing Electrostatic Precipitators and targeted higher figure of 99.8% in its new plants.

EMISSION SIDE CONTROLS contd

- TPC has taken initiatives in utilisation of dry fly ash for Construction and Cement Industry. This is a greening effort that contributes to reduction in pollution to marine outfalls and CO₂ emissions.
- Conversion of Wet Boiler bottom ash system to Dry System is more energy efficient and environment friendly. TPC is keenly exploring application of this technology to its new plants wherever its use is found consistent with coal quality and seeks cooperation in this area.
- All of TPC units have made adequate provisions in their Burner designs and Boiler Controls to meet prevailing norms on NO_x emissions.

International SO₂ Emission Limits



Source : Price Waterhouse Coopers Report for TPC's Fuel Strategy at Trombay

FUEL SIDE CONTROLS

- TPC was the first utility to introduce high quality (low ash low sulphur) sub Bituminous Indonesian Coal in its 500 MW Boiler at Trombay in India. (Using continuously for last 8 years, with PLF >85% & availability >95%). (This is in a Boiler designed for high ash Indian coals).
- The use of this concept has been further extended to TPC's coastal based Ultra Mega and Mega Power Plants.

ALTERNATIVE FUEL BASED TECHNOLOGIES DERIVED FROM COAL MINES

- Tata Power has taken initiatives in Govt. of India's plans for privatising Coal Bed Methane Blocks along with other consortium partners. CBM extracted from Coal Mines is an alternative fuel and has immense potential to produce power at relatively much higher efficiencies and reduce green house emissions.
- TPC is looking for future cooperation in following new technologies. Integrated Coal Gasification Technology for improved efficiency in Coal Technologies.



ALTERNATIVE FUEL BASED TECHNOLOGIES DERIVED FROM COAL MINES

Coal to Oil conversion to obtain better value added products to serve the entire Energy Sector.

Coal beneficiation technologies essentially to improve coal yield than presently available with higher ash reduction.

Challenges Ahead in Coal from Indian Perspective

- Imported coals (from Indonesia) have high Moisture (23 to 40%) and high Volatile Matter (45%), lower self ignition, low /High HGI
- Sub bituminous coal as opposed to Indian coal being bituminous coal or Lignite
- Low Ash fusion temperatures, low difference between the stages of ash fusion temperatures (IDT, Hemispherical, Spherical & flow) resulting in heavy slagging.
- Presence of high Iron oxide (>20%) in ash
- Long flame, Heavy slagging & hence high FGET.