Clean Fossil Power – UK Boilermaker's Perspective

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Mitsui Babcock Energy Limited

- Designs, Constructs, Services and Decommissions Thermal and Nuclear Steam Generating and Petrochemical Plants
- Operates internationally, often in Alliance with Owners, Operators, Other Contractors
- Over 110 years old based in UK, owned by Mitsui Engineering & Shipbuilding Ltd of Japan since 1995
- 4,000 Employees, £300M Annual Revenue
- Now has 30% Revenue from New Build and 70% from After Sales Services
- Profitable

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Cleaner Fossil Power Business

- Leader in NO_x reduction equipment worldwide
- Supplied world's largest FGD plant to Drax
- Leader in R&D for clean coal technologies
- Participant in EU ISB2000 and Thermie 700 projects
- Leaders in Safety Technologies for fossil, nuclear and petrochemical
- Leaders in Quality, Health, Safety & Environment performance

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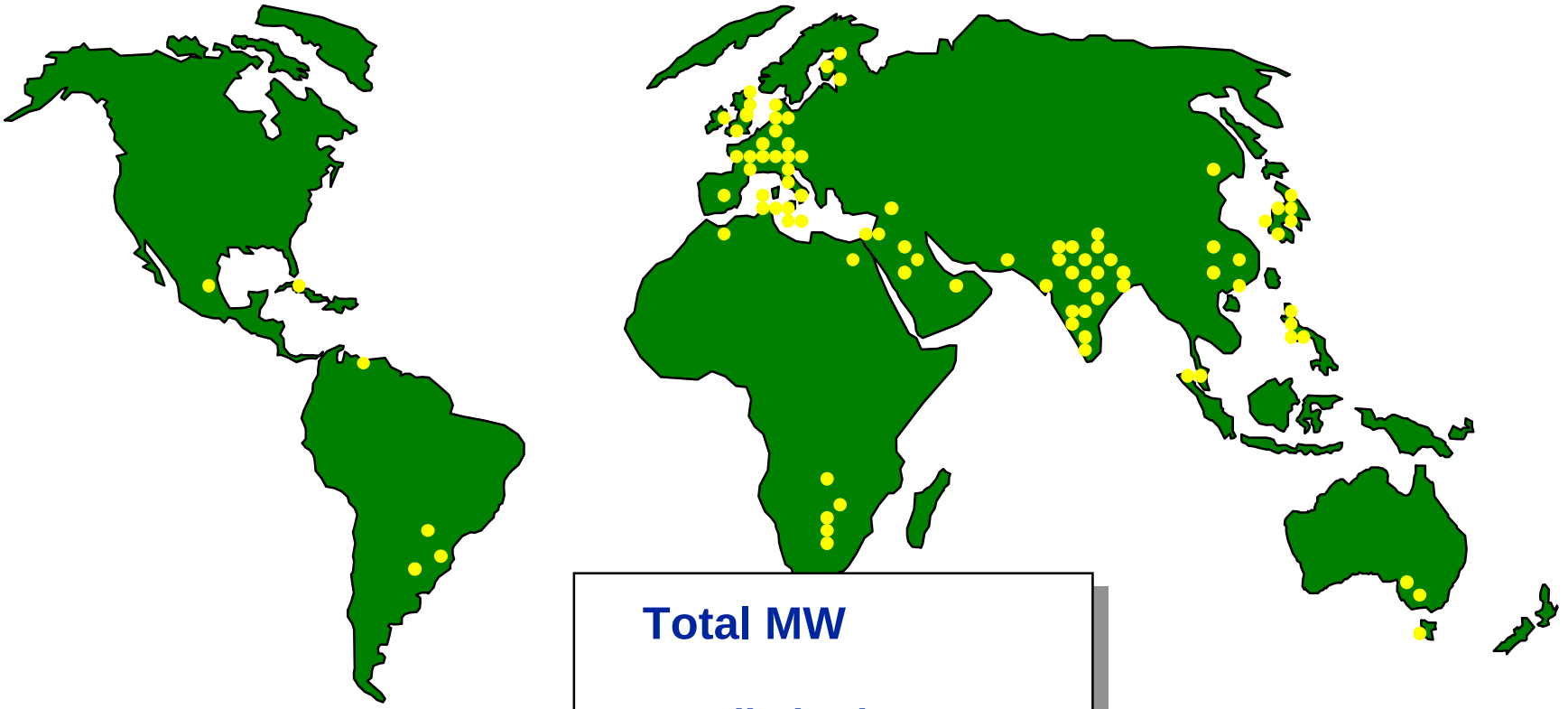
Worldwide Distribution of Mitsui Babcock Power Plant



Total MW

Fossil Fired	102,320
Nuclear	4,190
Total	106,510

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Clean Coal in a Global Context

- **Important to see Coal-fired Power Generation in Europe as part of a wider global scene**
  - UK burns only 2% of the coal used for power generation worldwide
- **Clean Coal Technologies are necessary globally if emissions reductions to be achieved**
- **If the appropriate cleaner technologies are demonstrated in Europe then we can export them**
- **Home market and exports lead to quality skilled employment**

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Coal in the UK- Energy White Paper 2003

- 36% of UK power generation is from coal (28GW currently installed)
- Most of the CO_2 reductions envisaged by Government are through replacement of coal- fired generation by renewables or gas
- Drivers will be the increased costs of LCPD and EU CO_2 cap and trade
- Amount of coal fired generation will reduce……perhaps significantly (20-40%)
- 60-80% will need to be replaced ……eventually

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Future of Coal –UK White Paper

- Advantages of coal for long term security and grid control are recognised
- Must be cleaner, now in terms of CO_2 as well as SO_x, NO_x and particulates
- Government committed to develop a detailed implementation plan for carbon capture and storage/EOR in the North Sea

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Clean Coal Technologies – multitrack approach

Options

- **Efficiency improvement (more MW/Tonne CO_2)**
  - also Biomass cofiring
- **CO_2 capture and sequestration**

Technologies

- **Pulverised coal firing**
- **Coal gasification**

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Pulverised Coal or Gasification?

- pf is better accepted by market place
- Similar efficiencies
- Advanced supercritical pf better suited to replacement and export market
- Gasification better suited to hydrogen production in the longer term
- Both can be retrofitted for CO_2 capture

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Pulverised Coal Firing

- **Replace existing boiler/turbine technology at existing stations with Advanced Supercritical technology**
  - Economic options with massive export opportunities
  - Less expensive per tonne of CO_2 saved than Renewables
- **Demonstrate CO_2 capture**
  - Longer term more expensive option

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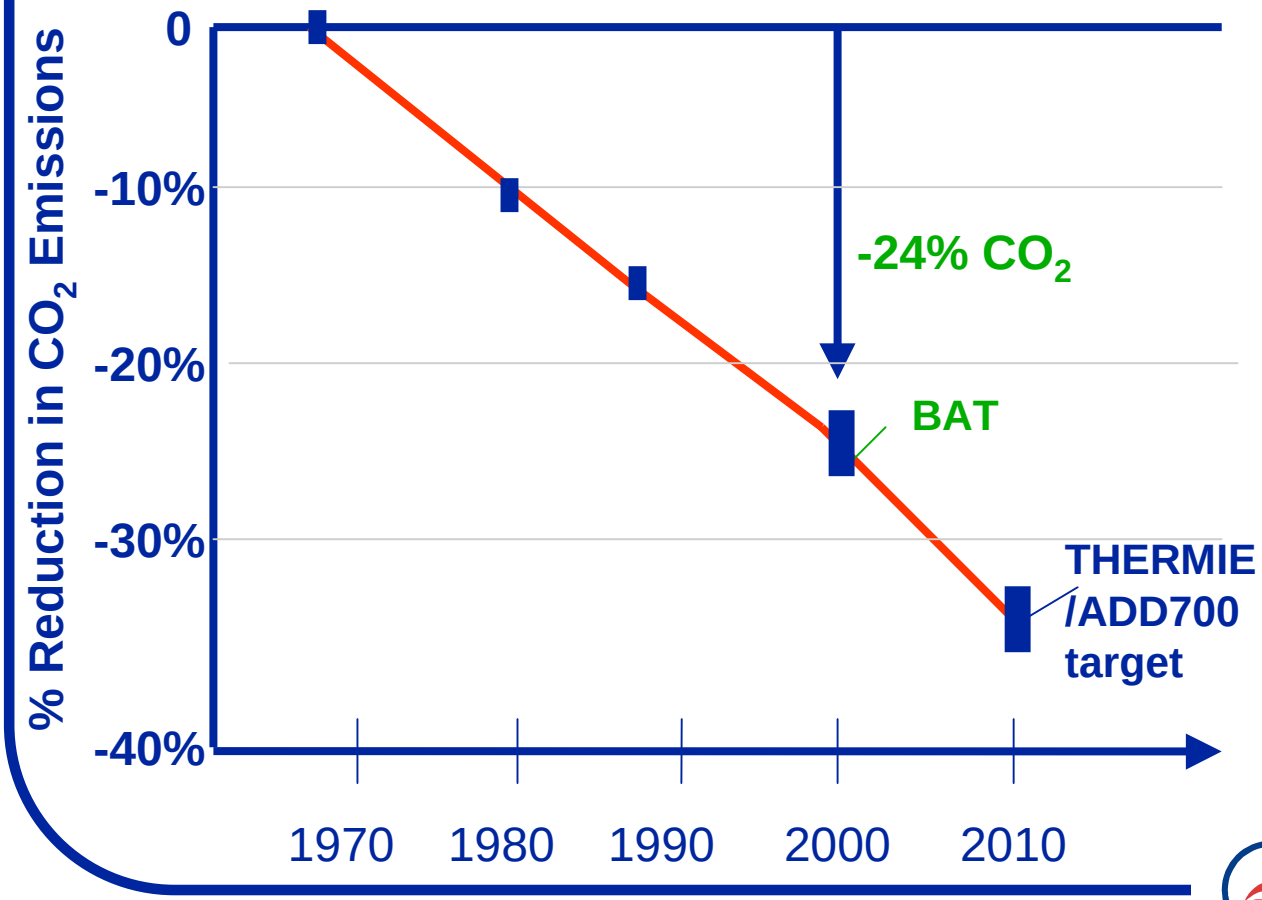
Advanced Supercritical Boiler/Turbine

-Reduction in Carbon Dioxide Emissions



Old NC plant	35%
Modern NC plant	38%
Older SC plant	42%
BAT SC plant	46%
Future SC plant	50-55%

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Co-Use of Biomass and Coal

- Range of technologies
- 20% could be co-fired in pf coal units
- Relatively inexpensive,retains advantages of central power plant for security of supplies
- Useful capacity for CO_2 reductions but only as quickly as fuel can be found

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Pulverised Coal Firing – support actions needed

- **Continue Clean Coal R&D (national and EU)**
- **Support continuation of ADD700 project**
- **FP6 support of current CO_2 C+S proposals**
- **EU Demonstration projects for CO_2 reduction**
  - Re-introduce former Thermie instruments
  - Systems and full scale plants
- **Level playing field of support/subsidy for all CO_2 saving methods**
- **Clarity of Carbon trading mechanisms**

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Conclusions

- Important role for coal in future for reliability of supplies
- Must be cleaner
- Technologies exist for cost effective CO_2 reduction
- EU and national Governments need to support their introduction

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