APGTF Forum
DTI London
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COAL ISSUES

Les King

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Why R&D related to Coal Generation?

- Coal needed for Security of Supply
  - indigenous supplies
  - can be stockpiled
  - enormous reserves worldwide in stable countries
- Coal will continue to be the main fuel for power generation world-wide (UK <2%), hence CO_2 cuts will only be achieved globally by retrofit of CMT's
- UK Power generation equipment industry has an excellent track record in exports of turbines, boilers, burners, fans, pumps, airheaters, sootblowers, coal and ash handling equipment etc. and can contribute to the government objectives through exports
- Opportunity in North Sea for carbon dioxide sequestration associated with enhanced oil recovery. Sequestration can reduce CO_2 emissions by 95%.

- Clean electricity at prices comparable with renewables and nuclear

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Technologies for Cleaner Coal Power Generation

Advanced Supercritical Boiler/Turbine

Integrated Gasification Combined Cycle

- **Efficiencies 45%**
- **CO_2 reduction 15-20%**
- **Both suitable for New Build and Retrofit**

Carbon Dioxide Capture and Sequestration

- **Reduced efficiency may be balanced by value of CO_2 for Enhanced Oil Recovery (EOR)**
- **Window of opportunity as UKCS fields are depleted**

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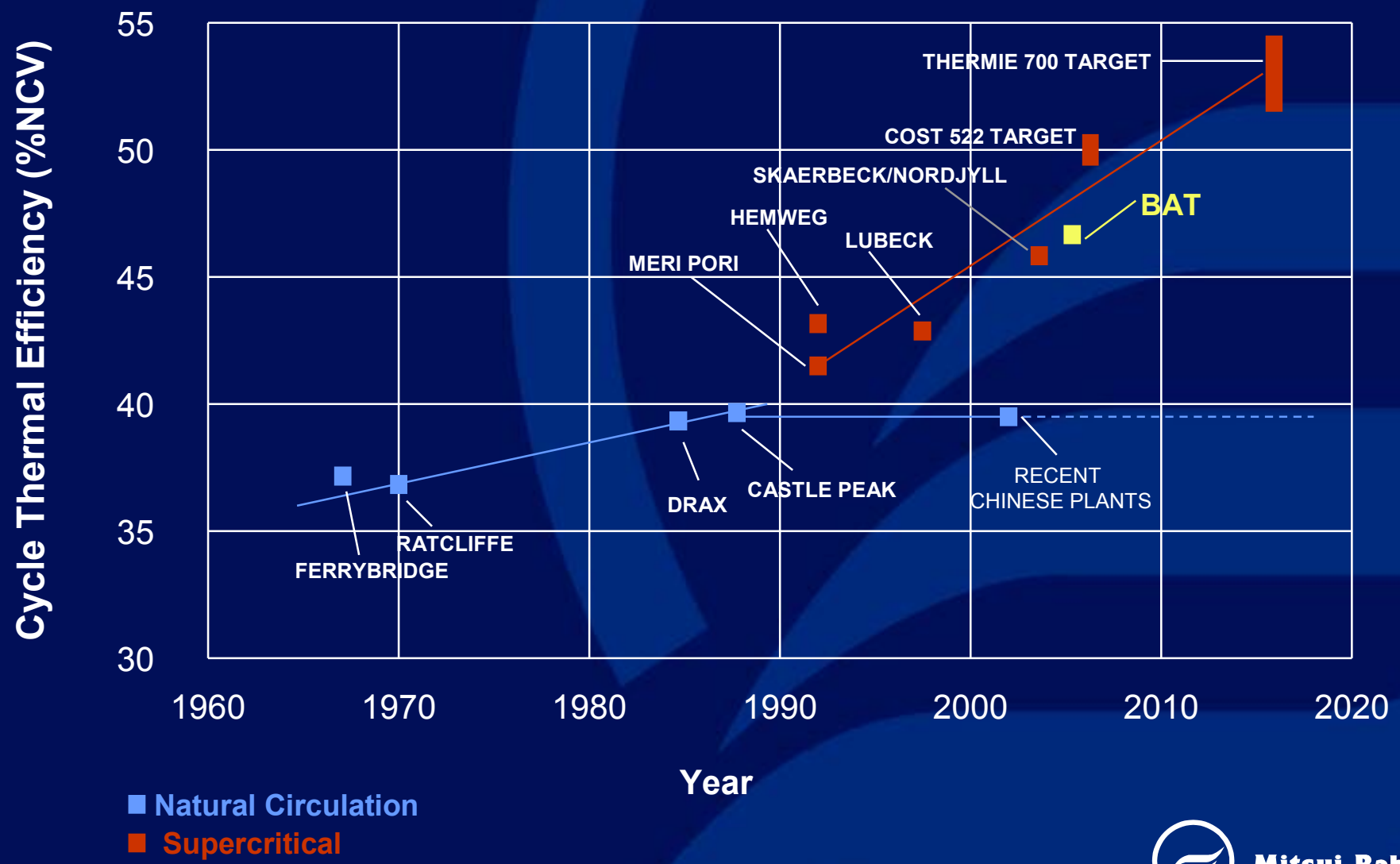
Development of Thermal Efficiency in Coal Power Plants



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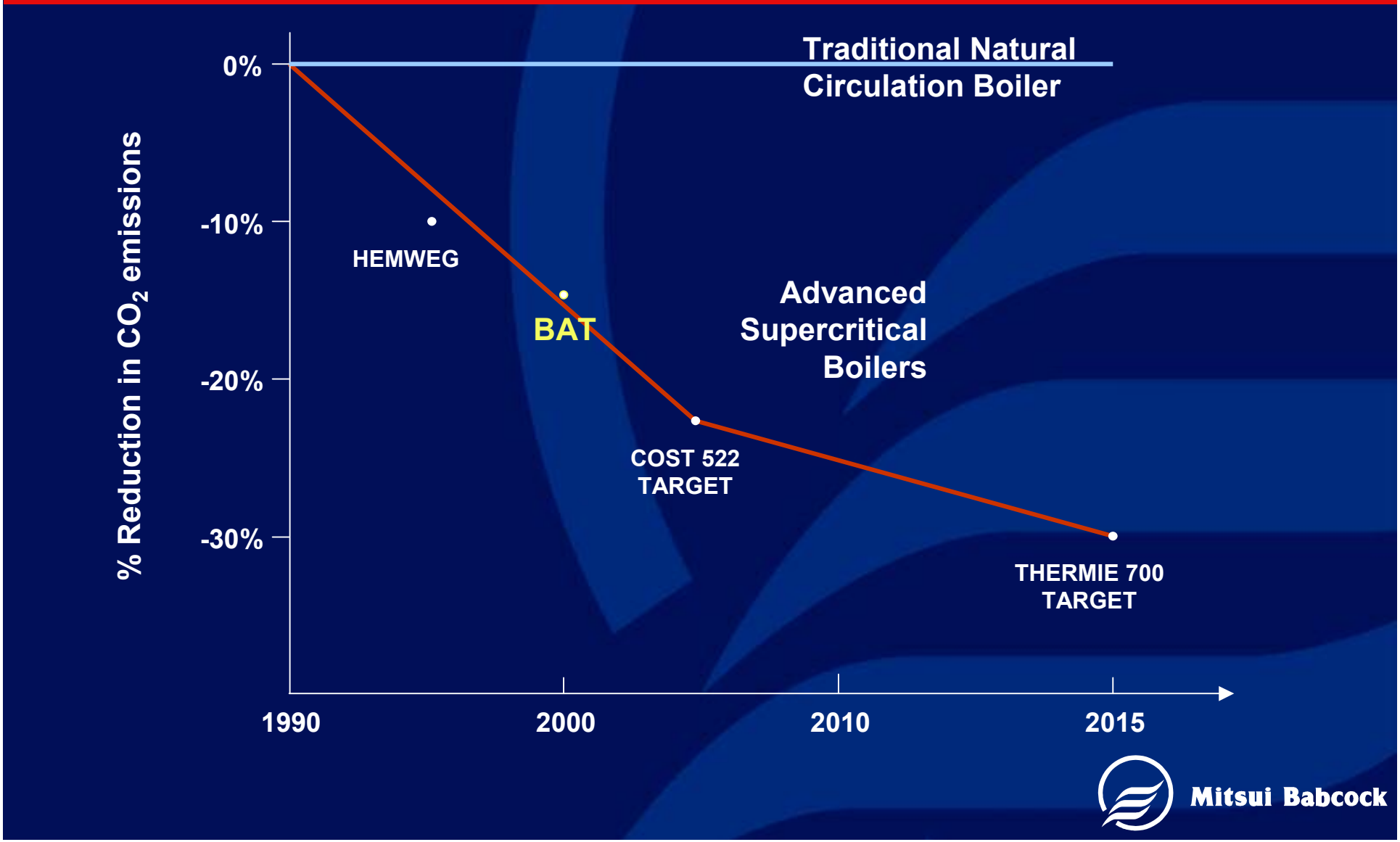
Reduced $C0_2$ from Advanced Supercritical PF Coal F Power Stations



Advanced Supercritical Boiler/Turbine

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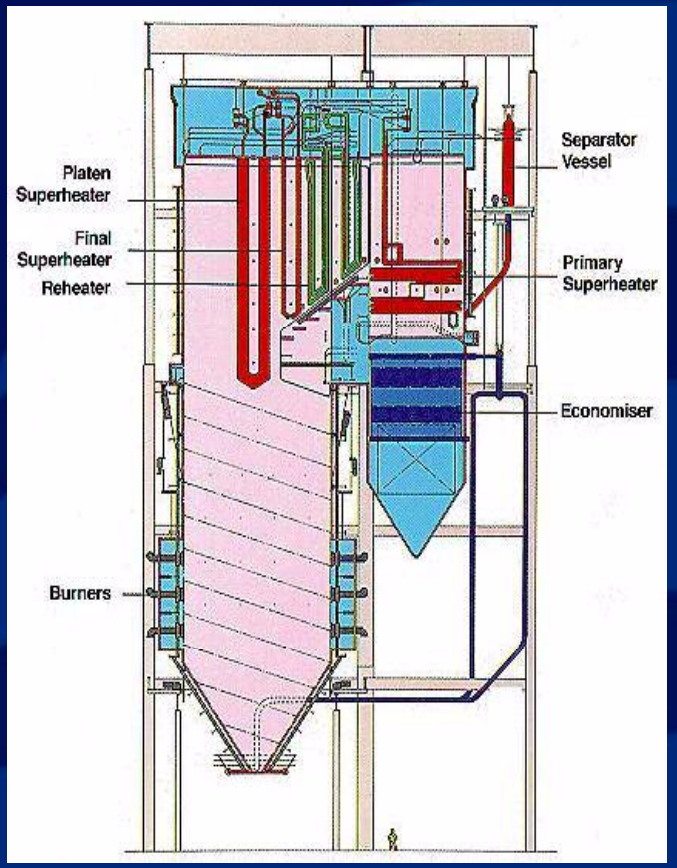
Advanced Supercritical
Boiler



- Two-pass TPC design
- 300 bar, 600^{0}C, 620^{0}C Reheat
- Wall-fired
- State of the art commercial materials
- Requires turbine modifications
- Requires replacement of steam piping
- Fits within existing steelwork and buildings

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Benefits of Advanced Supercritical Retrofit

- Maintains coal option (important for fuel security and load following flexibility)
- Extends useful life (and employment) at existing power plants.
- Simplifies planning issues and minimises cost by reuse of infrastructure
- Provides a showcase for UK Retrofit and New Build Clean Coal Technologies suitable for Export
- Saves 1 Million Tonne of CO_2 per year (1 unit at Longannet)
- Could be applied to 30 similar units in UK (/500MW)
- Cost of Electricity (COE) less than Renewables or Nuclear
- Compatible with EU Framework programmes (ADD700 and CO_2 capture)

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APGTF Recommendations for R&D – Coal (Advanced Supercritical)

- The APGTF believes that there is a case for Government support for the demonstration of validation of emission reduction components and retrofit supercritical technology on an existing sub-critical pulverised coal plant
- It is important to continue to develop supercritical coal plant to 700degC steam conditions, often referred to as ultra supercritical, which will have an efficiency of 50-55%

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APGTF Recommendations for R&D – Coal (contd.)

- In the medium term, IGCC offers a route to higher efficiencies and the production of hydrogen, possibly with co-utilisation of biomass and waste

- Subject to satisfactory outcome of the present studies the government should initiate further work on CO_2 capture and sequestration:

  - R&D to improve capture efficiency and economics
  - Costed design studies on capture and sequestration
  - Demonstration of capture and sequestration from a coal-fired power plant

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Innovation – Clean Coal Technology

- Research and Development alone not sufficient
- Research, Development and Demonstration is required to bring new technologies to commercialisation
- Research, Development and Demonstration programmes should be industry-led with strong collaboration between utilities, industry and universities
- Priority is demonstration of technologies for retrofit to existing plant. Benefits for exports and environment

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