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An Industrial Perspective on Energy RD and D

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3 Key UK Reference Reports

Thumbnail of ALSTOM

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- **One of the largest Energy and Infrastructure Suppliers in the world**
  - total ALSTOM 2000 revenue 25 billion euro, ~140000 people
  - Power Sector 2000 revenue 12 billion euro, ~50000 people with ~60% in Europe, 11% in UK
  - strong global operating base of power plant, 648 GW installed
  - wide product range of conventional and advanced power generation products and technologies

- **Lead representative for the sector in UK, Europe and worldwide**
  - active in UK Energy Foresight, chairing APGTF and ZEPG Group
  - advising HoC Select Committee on Energy
  - advising EC Energy RTD on Non Nuclear Energy
  - chairing EC Energy WG on Energy RTD Strategy for Europe

Working with UK Government to set future Energy Research agenda

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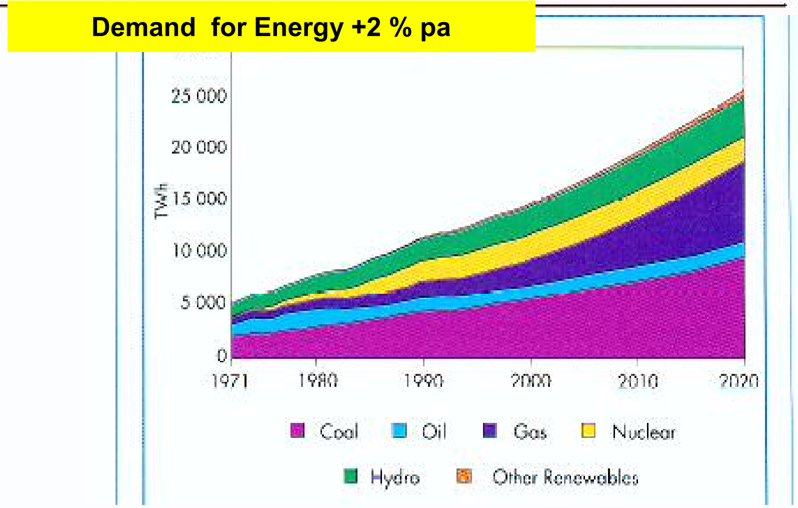
THE CURRENT BASELINE

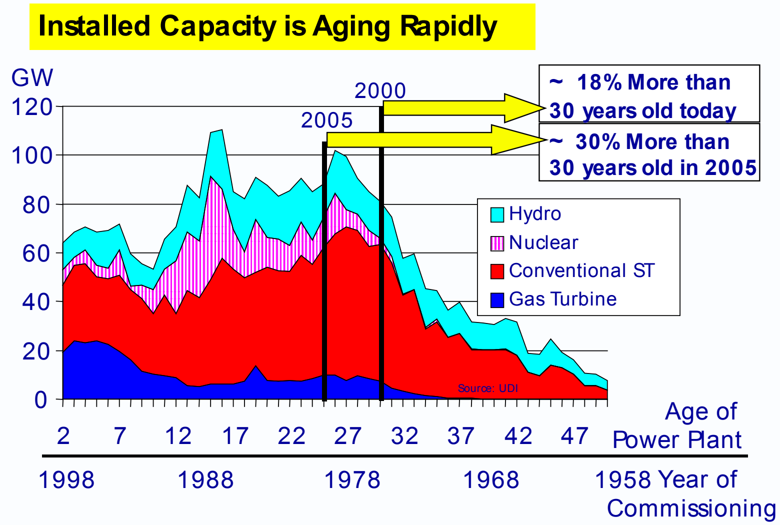
Where are we now - What are the issues

The Energy Market

- **Growing need for Energy and Electricity**
  - global markets with global players
  - continuing reliance on fossil fuels, especially likes of China and India
  - installed capacity ageing
  - fluctuating markets with short term down turn

- **Significant impact of increased liberalisation/re- and de-regulation/privatisation**
  - electricity becoming a `commodity` to trade; more open markets; lower CoE
  - new operators; new trading rules; future investment in risk adverse markets
  - real change in products/services, UK in the forefront

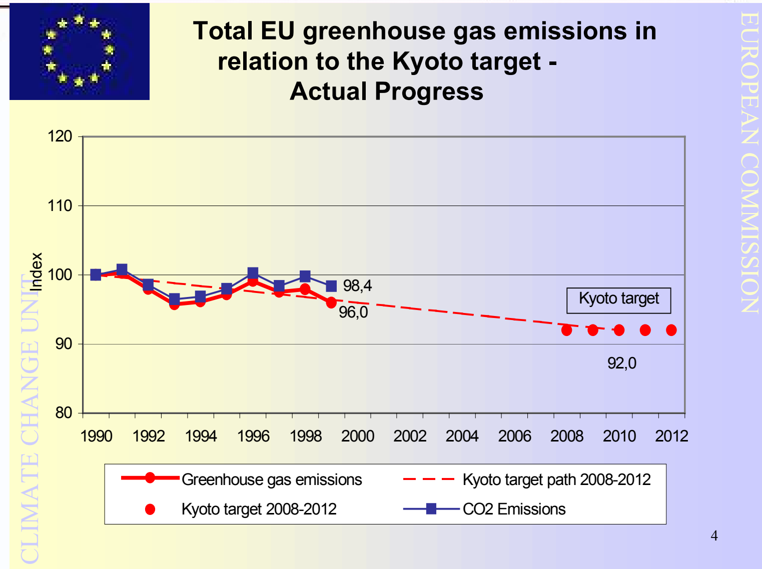




Highly complex changing energy market

Sustainability and the Environment

- **Increasing importance of environment as a market driver, emphasis on CO_2**
  - Kyoto and post Kyoto Targets (RCEP quoting need for 60% reductions by 2050)
  - tighter emission directives (eg EC LCPD)
  - National and international Emissions Trading starting up in UK and Europe



- **Drive for more REN and Energy Efficiency in UK and Europe**
  - REN Targets of 10% by 2010 and a desire for 20% by 2020 in UK
  - similar growth for UK CHP targeted, 10GW by 2010

Environment is a key driver but not the only one…needs to be addressed in the full context

Some Immediate Touchstones

Kyoto (~2010) and post-Kyoto (~2050) targets will need full range of solutions

Acceptability of Nuclear?

Developing countries (eg China) have to be engaged if GCC is really to be tackled

REN will become significant in the energy mix only in time (post2020)?

Security of Supply implications

Continuing reliance on fossil fuels for decades yet

Mitigation of CO_2 requires clean use of fossil

- improved efficiency

- fuel switch

- CO2 capture/sequestration

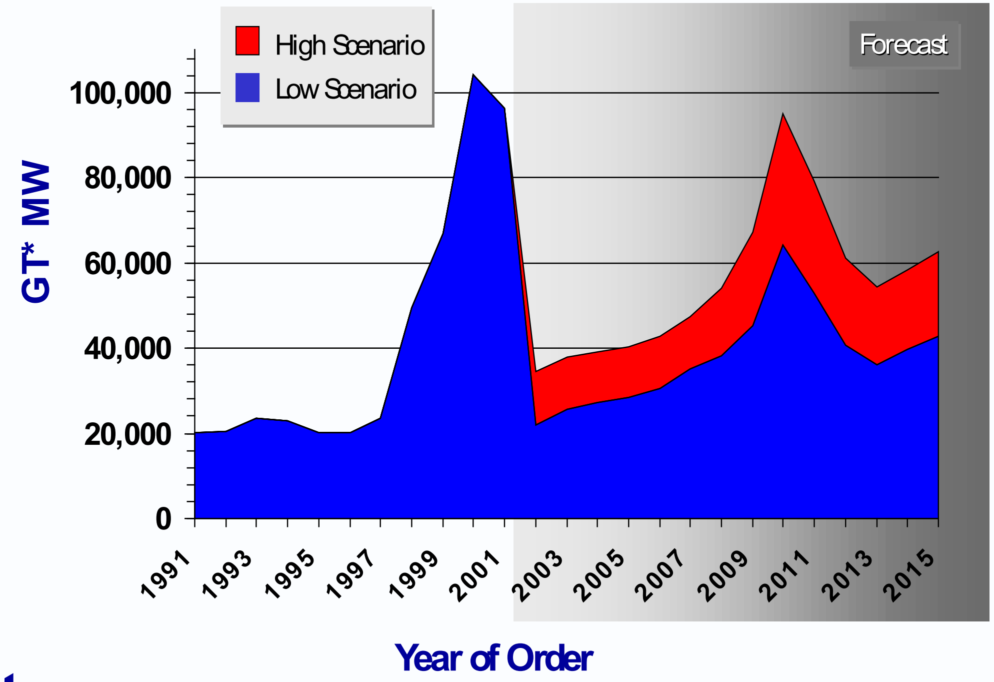
A major transitional issue will be clean use of fossil fuels

SITUATION AND THE IMPACT TO DATE

What are the problems…challenges

Global Position

- **Difficult market in the short term**
  - significant downturn especially in US
  - fierce competition with pressure on margins just when onus increasingly on equipment suppliers to set future agenda, implying greater RTDD investment



- **Highly competitive market**
  - risk adverse culture with more focus on financial return
  - cost effectiveness (£/kW and £/kWhr) continues to be key
  - reliability, availability, maintainability and operability (RAMO) emphasis

Energy market increasingly hard to understand and predict

UK Position

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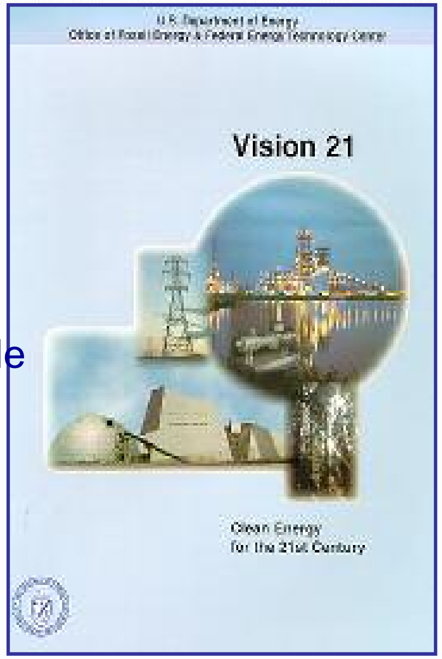
- **Effectiveness of UK Policy Measures to date**
  - Lack of stability, too many changes in policy over last decade
  - Impact of NETA
  - Inconsistency between targets and measures
    - CHP Industry difficulties - now being addressed to a degree ….. but is it enough?
    - Cost of Electricity being driven down to exclusion of all other issues …... no incentive to invest
    - Site Consent difficulty for new plant, especially REN … stopping new plant
    - Biomass Focus of 20MW ….. in effect excludes UK Gas Turbine business

UK initiatives have led to difficulties in the market

Competition Issues

- **Competition led by US**
  - large US DOE programmes with prototype/product development as well as RTD
  - broad based leading to Zero Emission Plant
  - strong thrust on Fossil as well as REN
    - Clean Coal Plant Improvement : ~3000m US$ over next decade
    - Advanced Turbine System ~800m US$ 1990-2002
    - Vision21 established for future ZEPG from fossil fuels out to 2015.



- **Contrast to Europe**
  - REN continue to dominate EC Research Framework Programmes
  - more emphasis on research rather than deployment in reality
  - US Companies will be increasingly evident in Europe with downturn in US …. to detriment of UK/European industry

US setting the benchmark for the industry worldwide

CONCERNS FOR THE FUTURE

What will happen next

Some UK Industry Concerns

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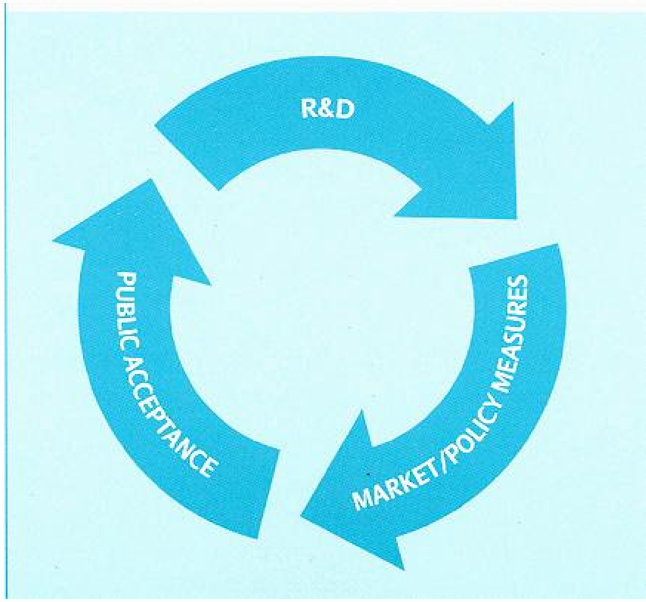
- **International Competitiveness of UK Industry?**
  - include alongside `Security of Supply` and `Environment Protection`
  - need for strong base-load UK market for export springboard
  - encourage economic benefit by focus on areas for wider policy aims but where strengths can be stimulated/developed in UK as spur for more export

- **Consistency and Appropriateness of Policies?**
  - need for sufficient confidence to underpin private sector investment and RTD
  - minimise delays in setting clear future policy, uncertainty has had detrimental effect on UK-base companies and reduced export credibility
  - correctly targeted market based measures for technology take-up
    - unlike DEFRA 20MW Biomass Scheme that basically excludes UK GTs
    - unlike the disjoint in CHP; need now to restore industry confidence
    - unlike exclusion of Biomass Coal Co-firing post 2006 in REN schemes

Need for balanced and consistent approach to Energy Policy to set the right framework

Positioning of Energy RTDD



- **Full Context?**
  - RTDD should not be done independently but part of synergistic approach embracing R&D/Policy Measures to support Market/Social Acceptance
- **Overall System Approach?**
  - Basic research/enabling technology acquisition
  - Device Research and Component Validation
  - System Demonstration and Deployment
- **Improved Co-ordination?**
  - UK expanding its Energy RTDD after reductions of recent years
  - need for effective co-ordination across Government/Industry/Research Community

Energy RTDD cannot be done independent of the world in which it sits

Even more UK Industry Concerns

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- **The Right Balance of Future Technologies?**
  - no one solution, emphasis changing with time, all types of energy sources

    \`Affordable\` REN......but also \`Clean\` Fossil

    and probably \`Accepted\` Nuclear Fission

    and in time \`Workable\` Nuclear Fusion
  - much improved Energy Efficiency including enhanced Co-generation/CHP
  - continued improved energy management, transmission, storage and systems integration to address impact of Distributed Power
  - alternative energy carriers and fuels

- **Identification of Key Cross-Cutters?**
  - critical components/modules : such as ... Gas Turbine with high fuel flexibility

    and .... Fuel Cells for Power and Transport
  - advanced modelling/simulation : \`Virtual Power Plant Demonstration\`
  - materials and manufacture : eg high temperature, high added value parts
  - power electronics, e-trading/ICT applications

Broad based energy research approach required

Some Final Thoughts

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- **Setting the Future Agenda**
  - important to involve Industry in the process together with other key players of Research and Government
  - Energy Foresight Initiative has proved to be an excellent vehicle, partly filling the vacuum left by the demise of CEGB - it needs to be continued
  - innovation will be at the heart of the ability to meet a reconciliation of the future complex energy and environmental issues within the UK

- **Greater International Co-operation**
  - UK Energy RTDD strategy needs to be developed within a full European context with reference to global issues : significant opportunities should exist within future EC Framework RTD Programmes
  - Active co-operation should be developed on \`big\` global issues internationally - eg CO_2 Capture and Sequestration, Nuclear Fusion

Need for overarching UK Energy RTDD framework tackling both nearer/longer term - spanning several governments

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