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Importance of Base Load Generation for Competitive, Reliable and Sustainable Electricity Supply

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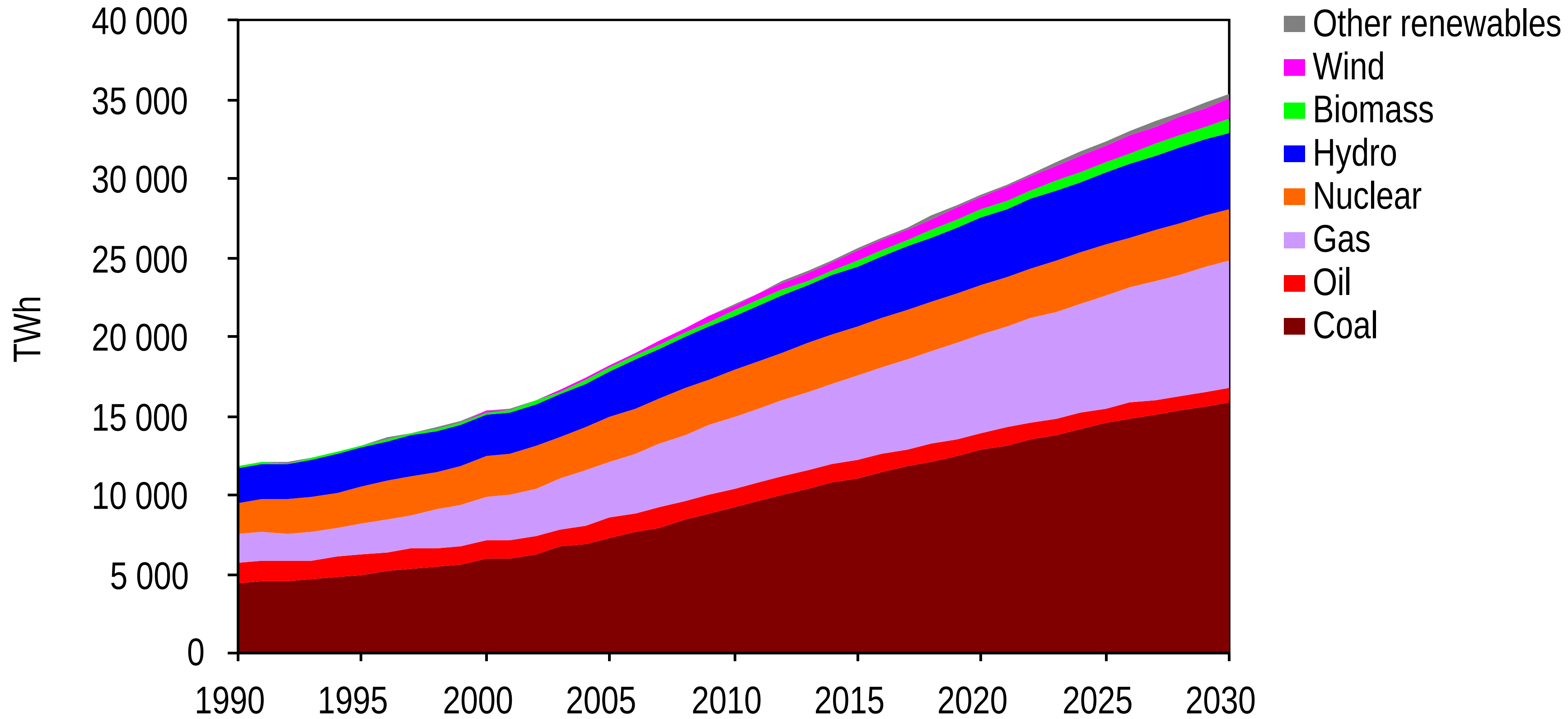
Outline

- Global perspective on power sector trends and generation mix
- Base load and peak load power stations
- Base load generation options and investment decisions
- Key messages

Reference Scenario:
World Electricity Generation 1990-2030



World electricity generation nearly doubles between 2005 & 2030, with coal maintaining its dominant position

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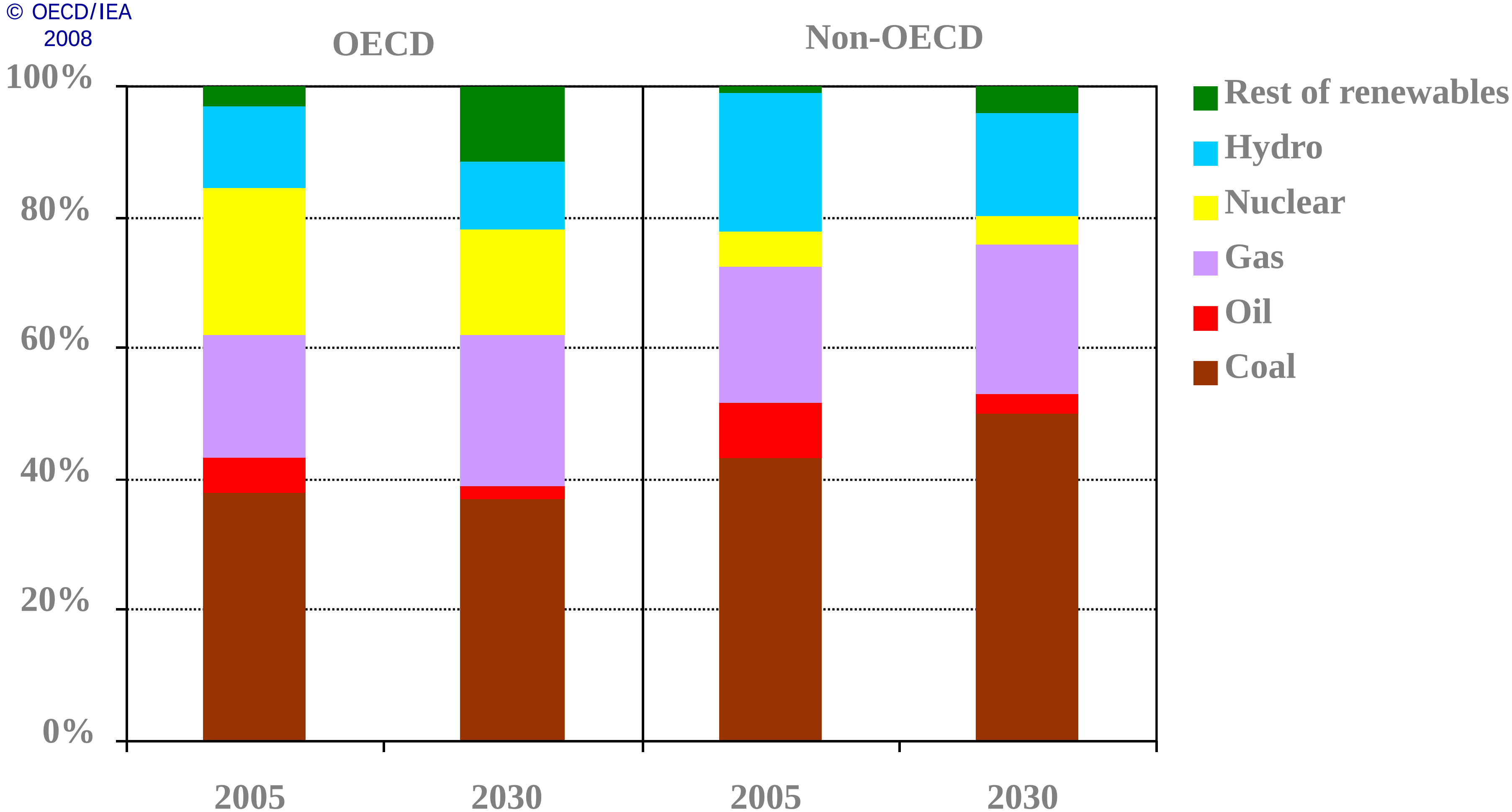
Reference Scenario:

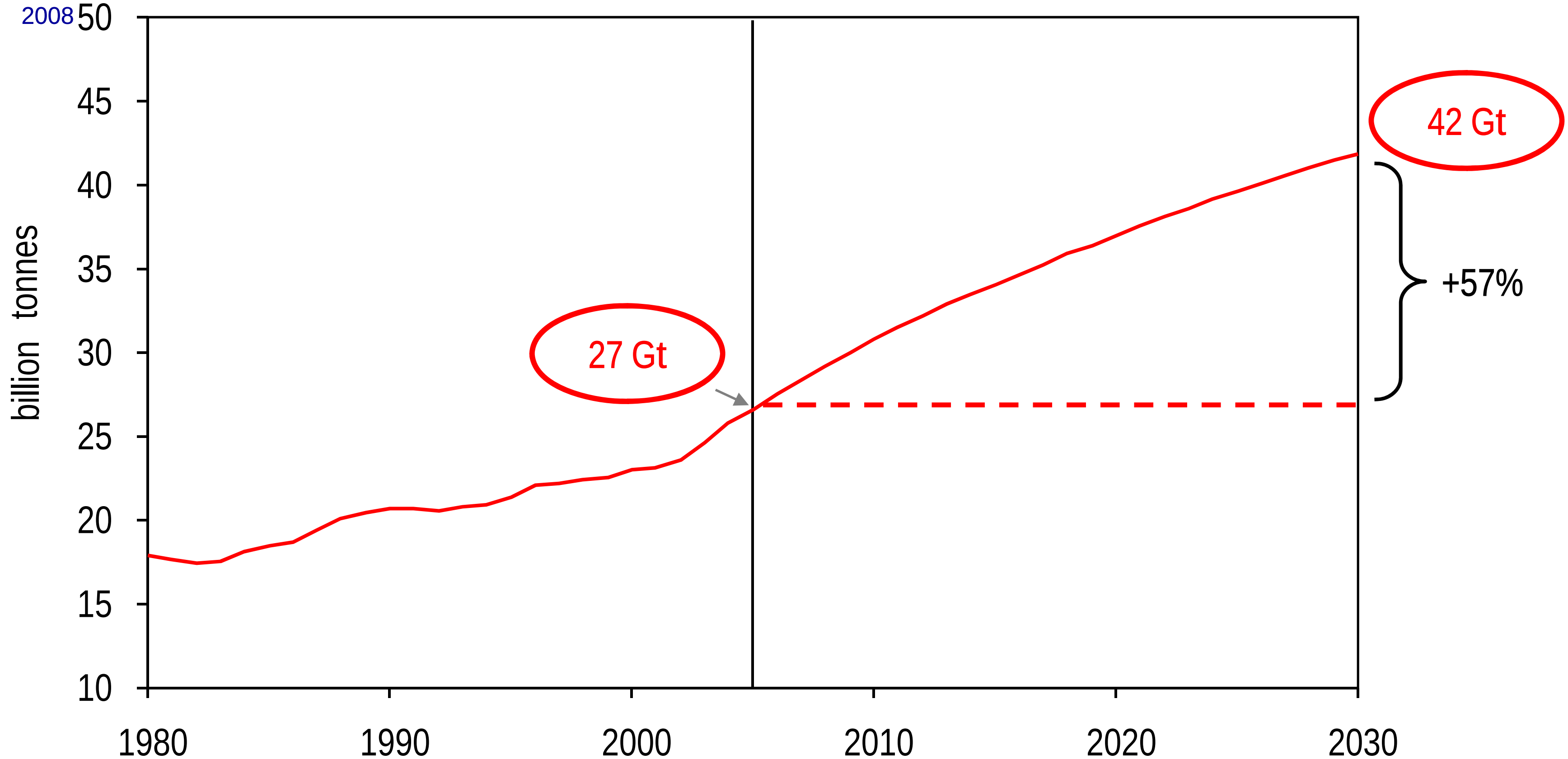
Fuel Mix in Power Generation



Dependence on coal for power rises strongly in emerging economies

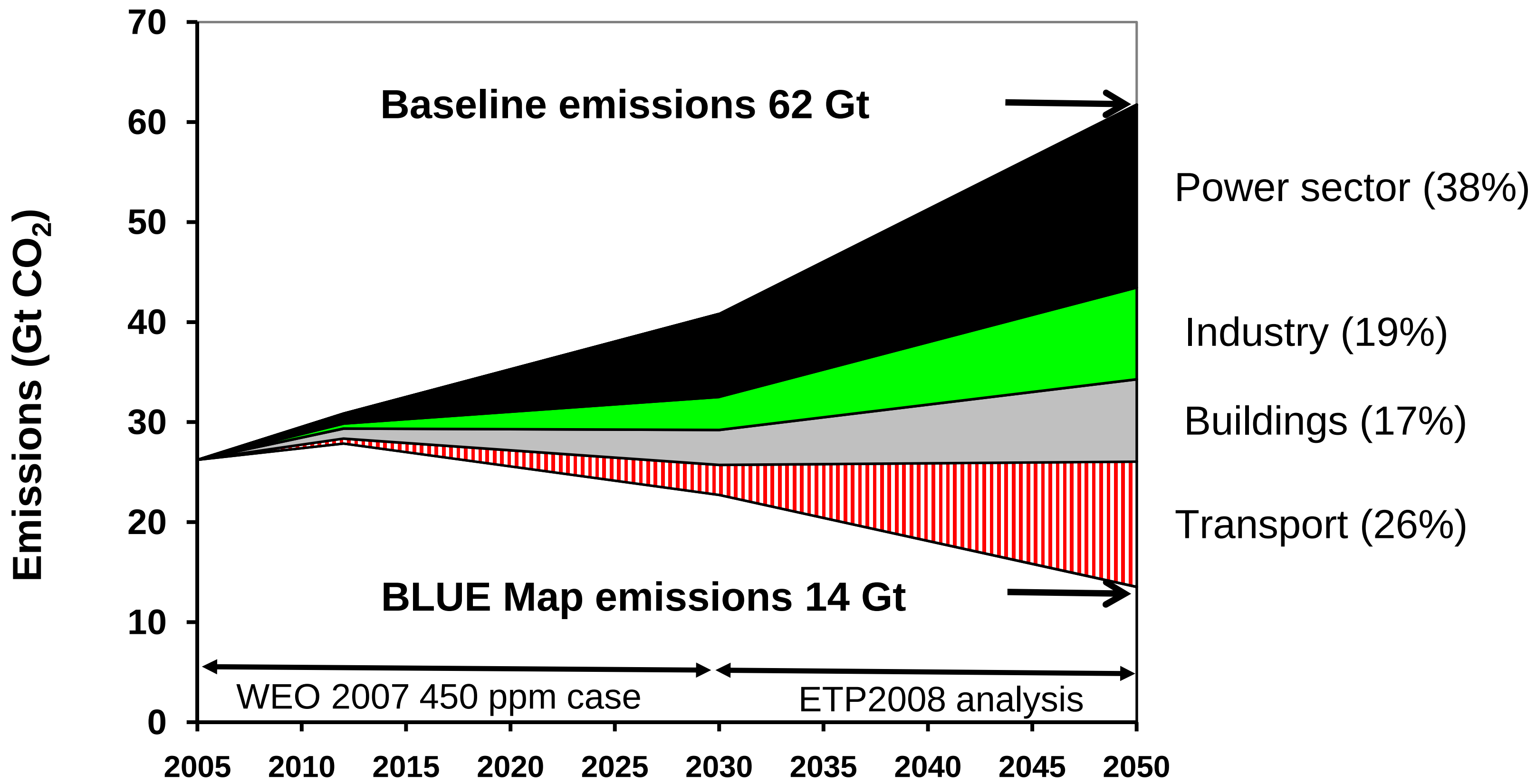
Reference Scenario:

Global Energy-Related CO_2 Emissions

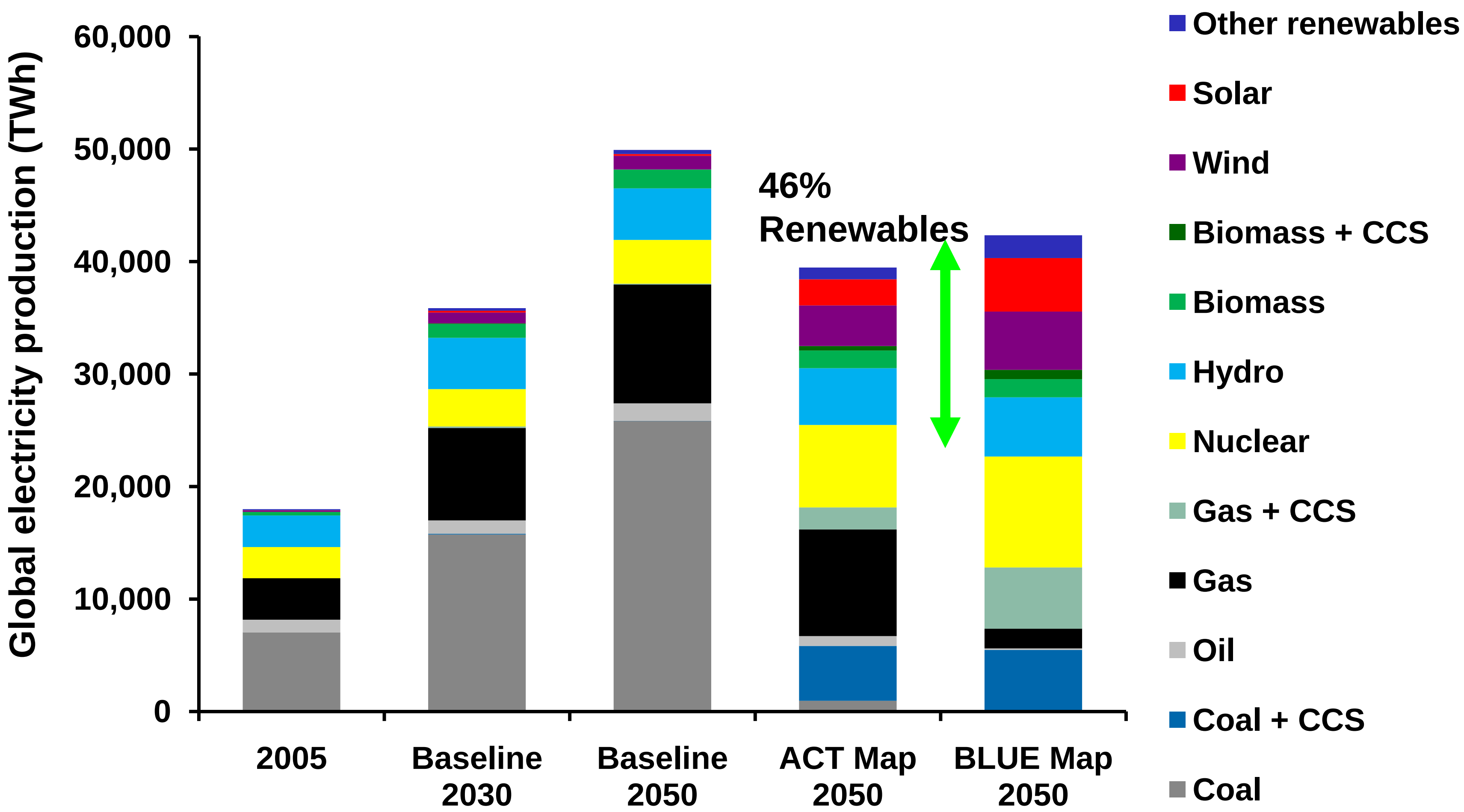


Global CO_2 emissions rise to 42 Gt in 2030, 57% above current levels and double the 1990 level

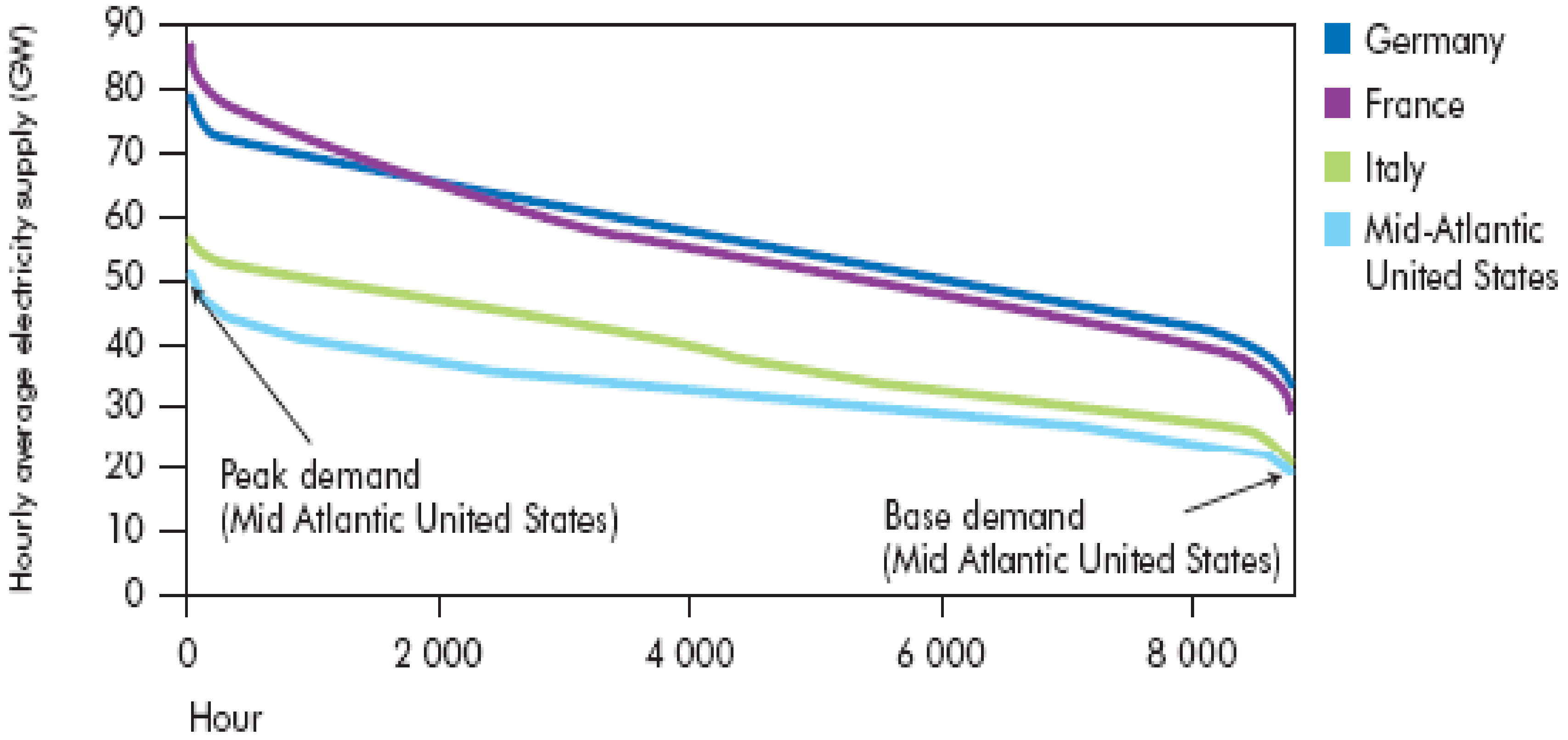
Global CO2 reduction – Potential contribution by sector



Global Power Generation Mix

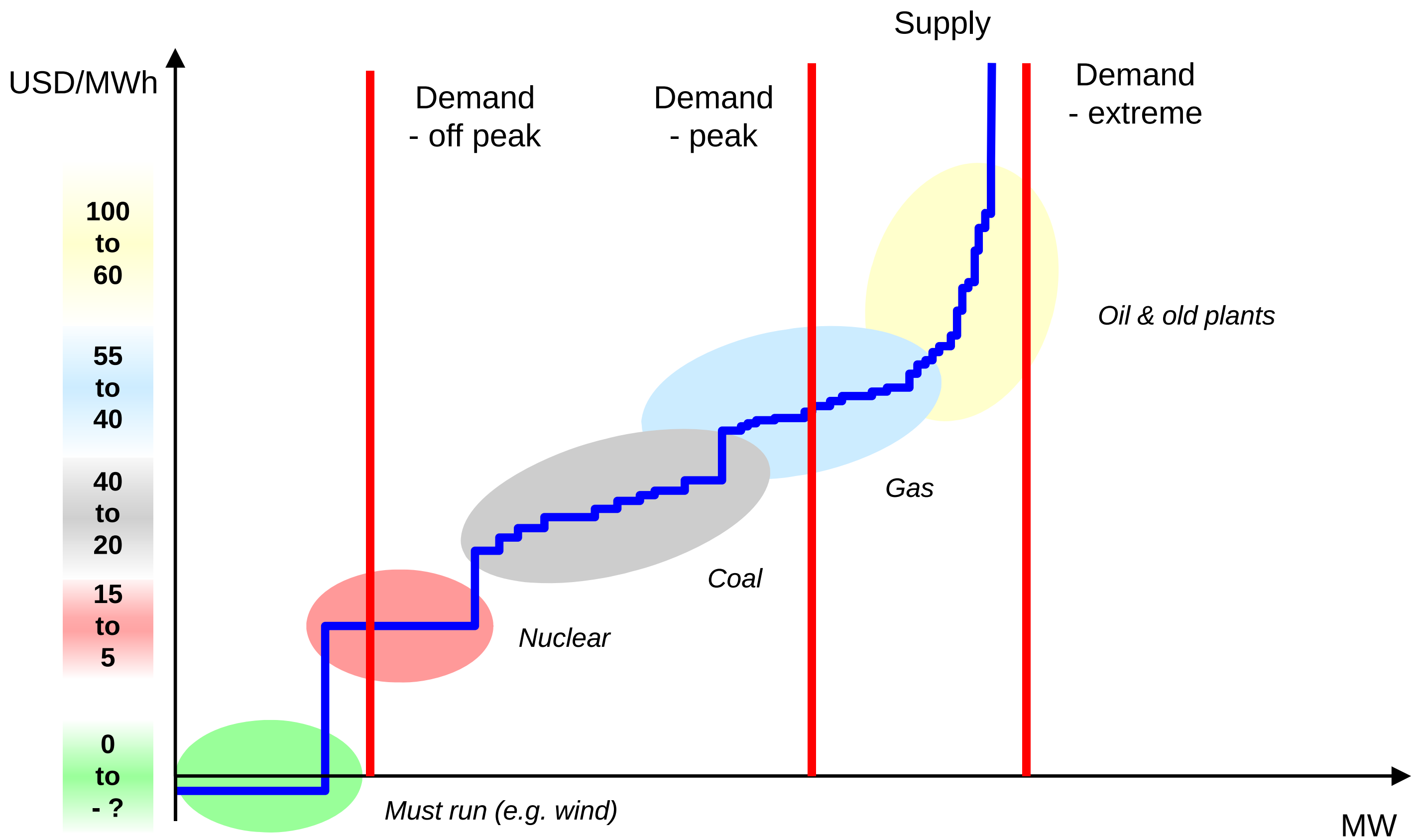


Load curves for selected IEA countries

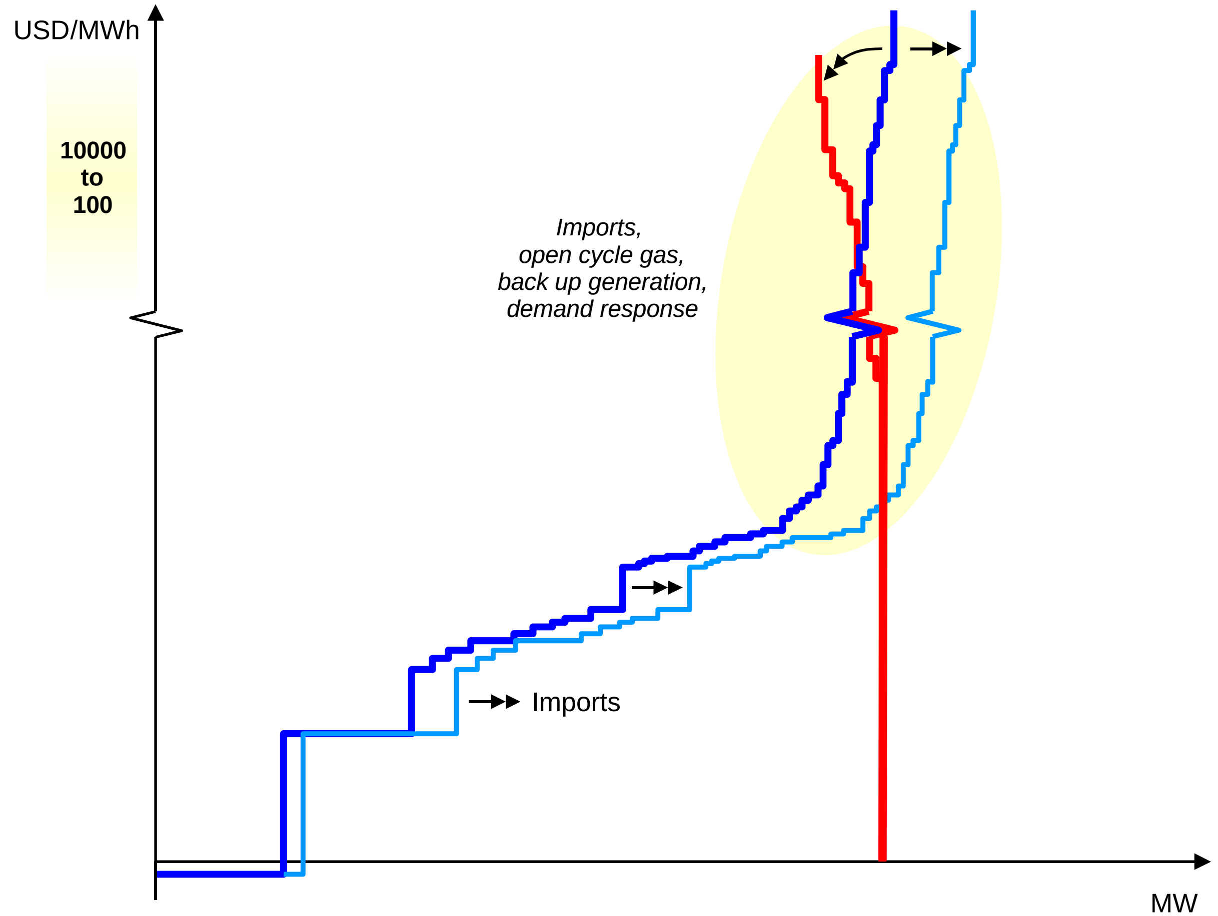


Note: The load curve shows hourly supply ranked from highest to lowest.

Marginal pricing ensures optimal dispatch in competitive generation markets



Flexibility is critical for market clearing in tight situations



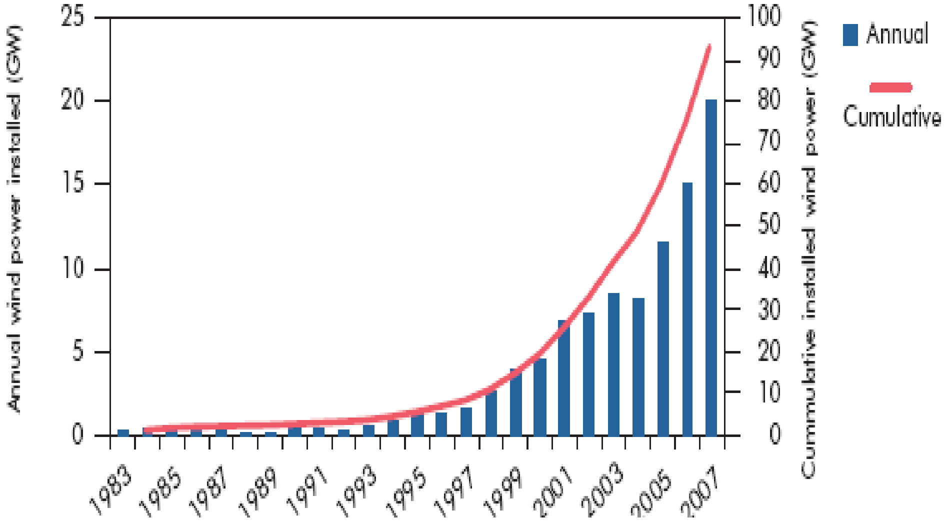
Hydro-based Generation

- **Challenges**
  - Often requires new transmission capacity
  - Environmental and social implications
  - Long lead times
  - Variability of water levels

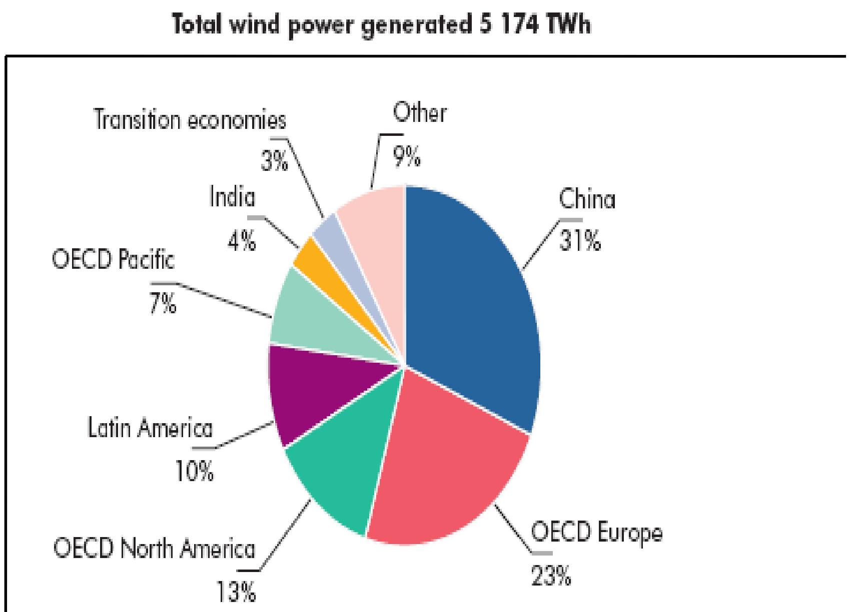
- **Opportunities**
  - Well established technology
  - No GHG emissions
  - Highly cost competitive
  - Load following
  - Hydro & wind a good combination

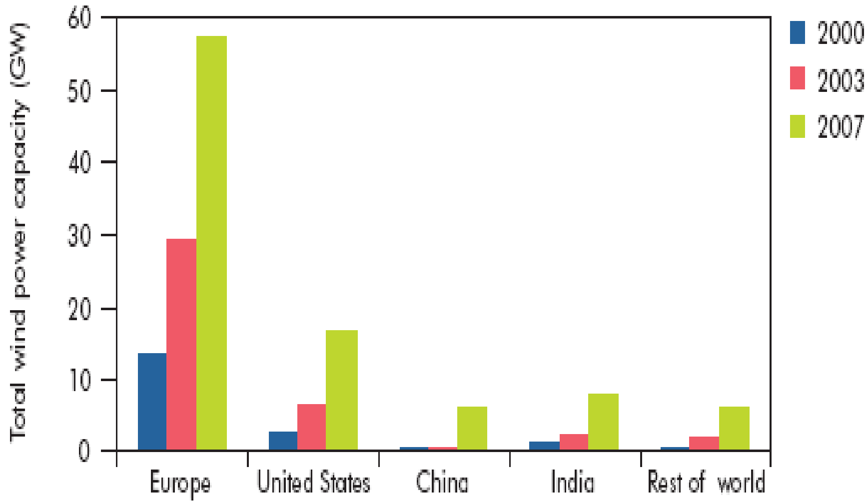
HQ Hydro facilities
Baie-James, Canada

Non-hydro renewables are becoming part of the main stream generation…

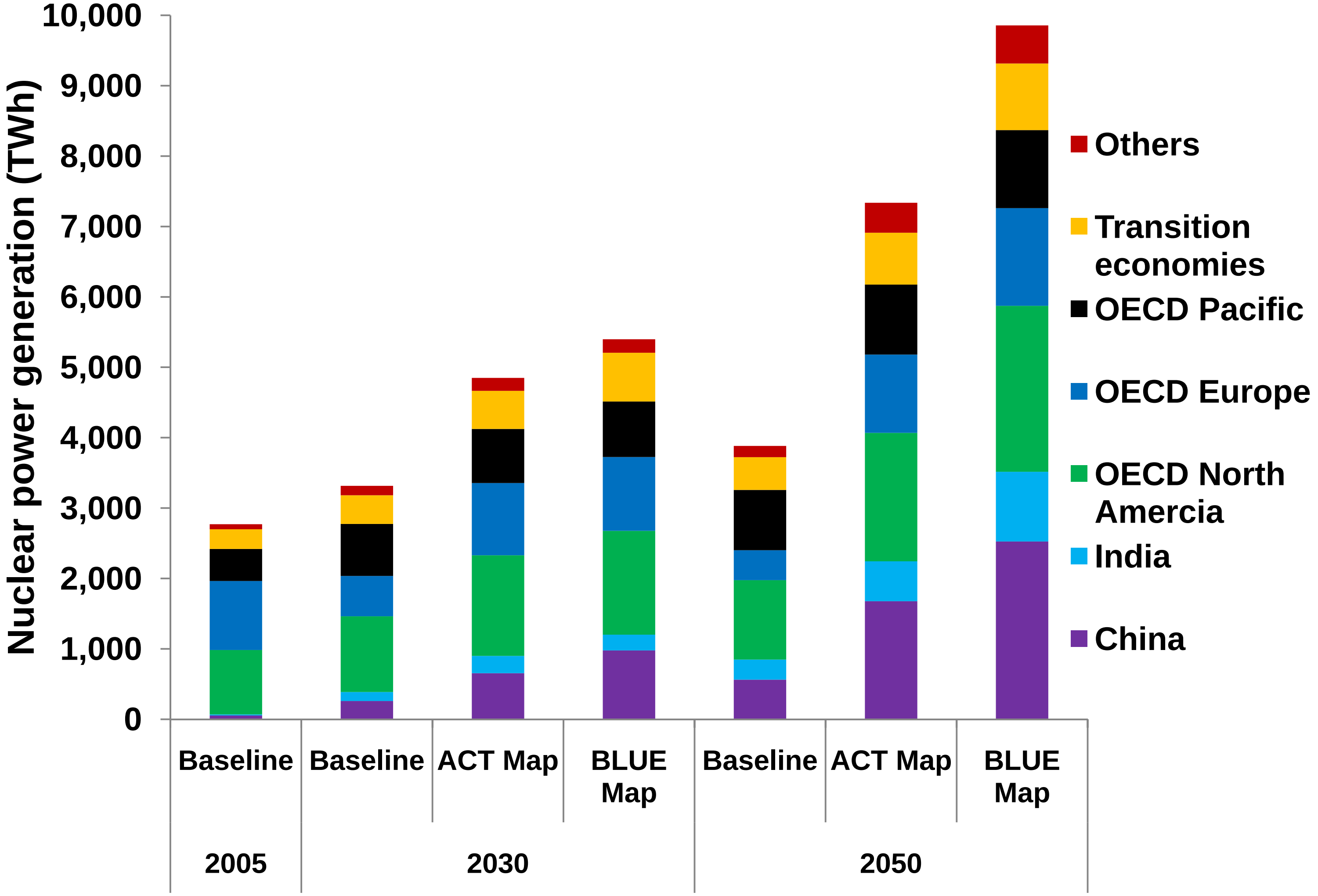


IEA Blue Map Scenario – 2050

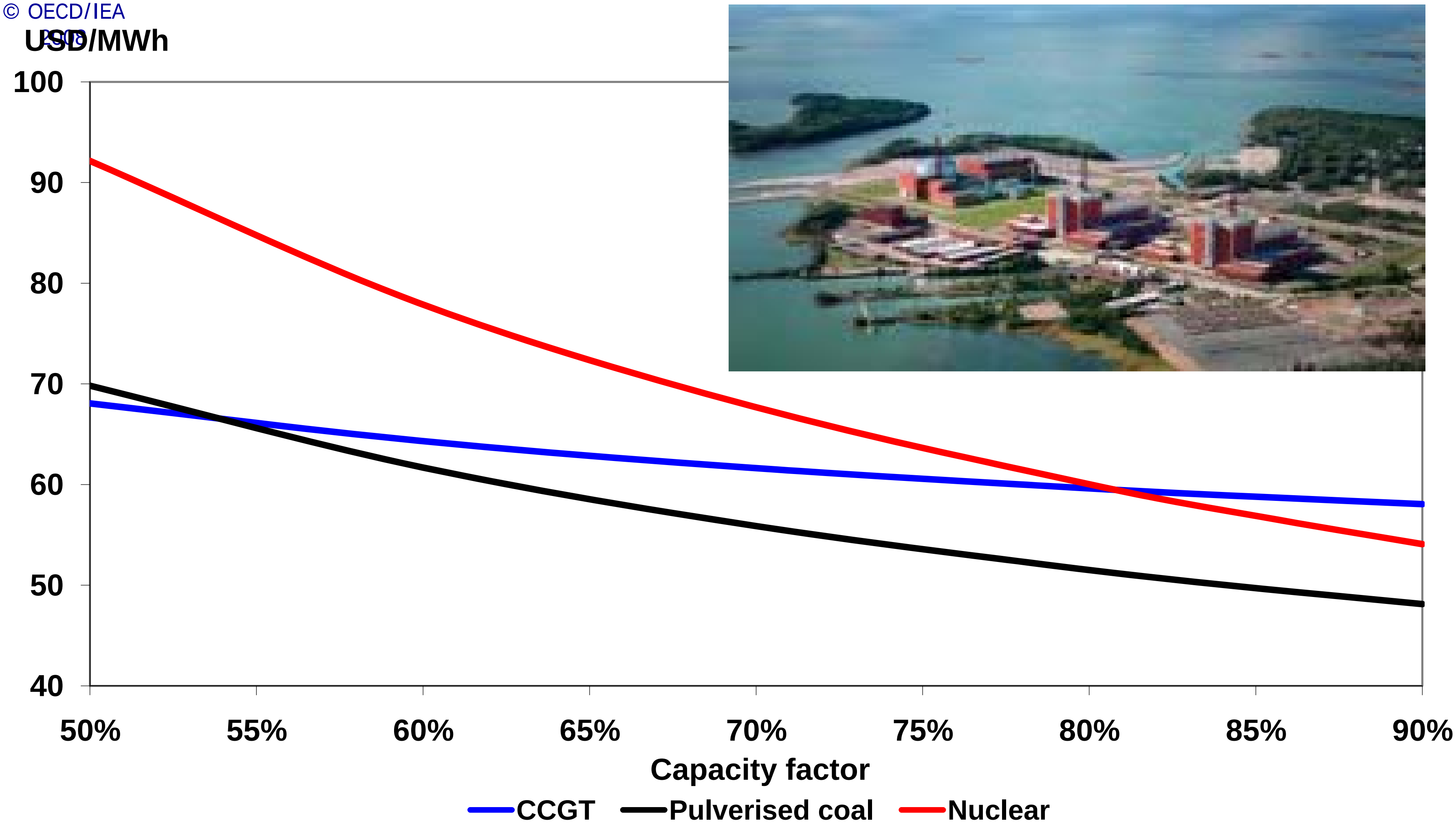




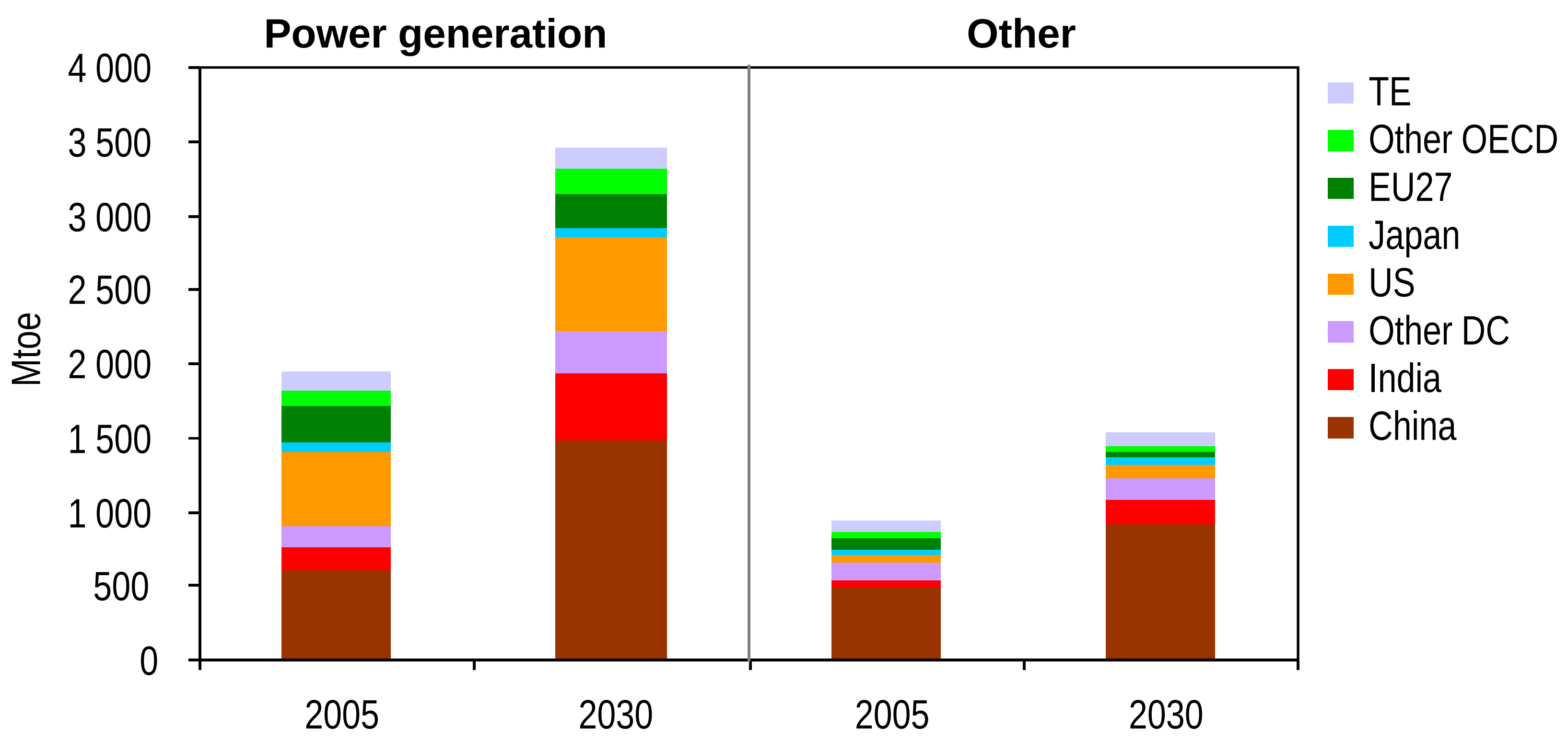
Nuclear Power Generation Projections



Competitiveness of nuclear power is highly sensitive to capacity factor



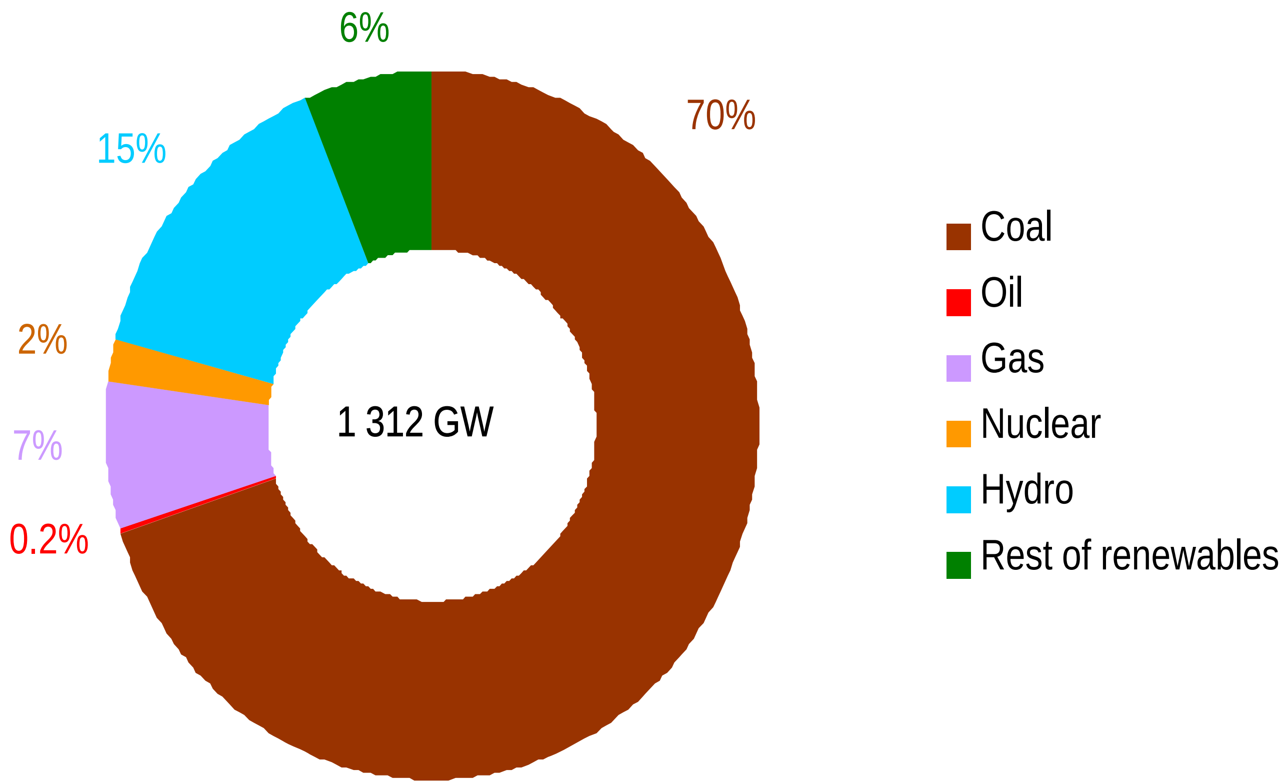
Reference Scenario: Primary Coal Demand by Region (Mtoe)



China & India account for 78% of the growth of coal use in power generation and 91% of the growth in other sectors

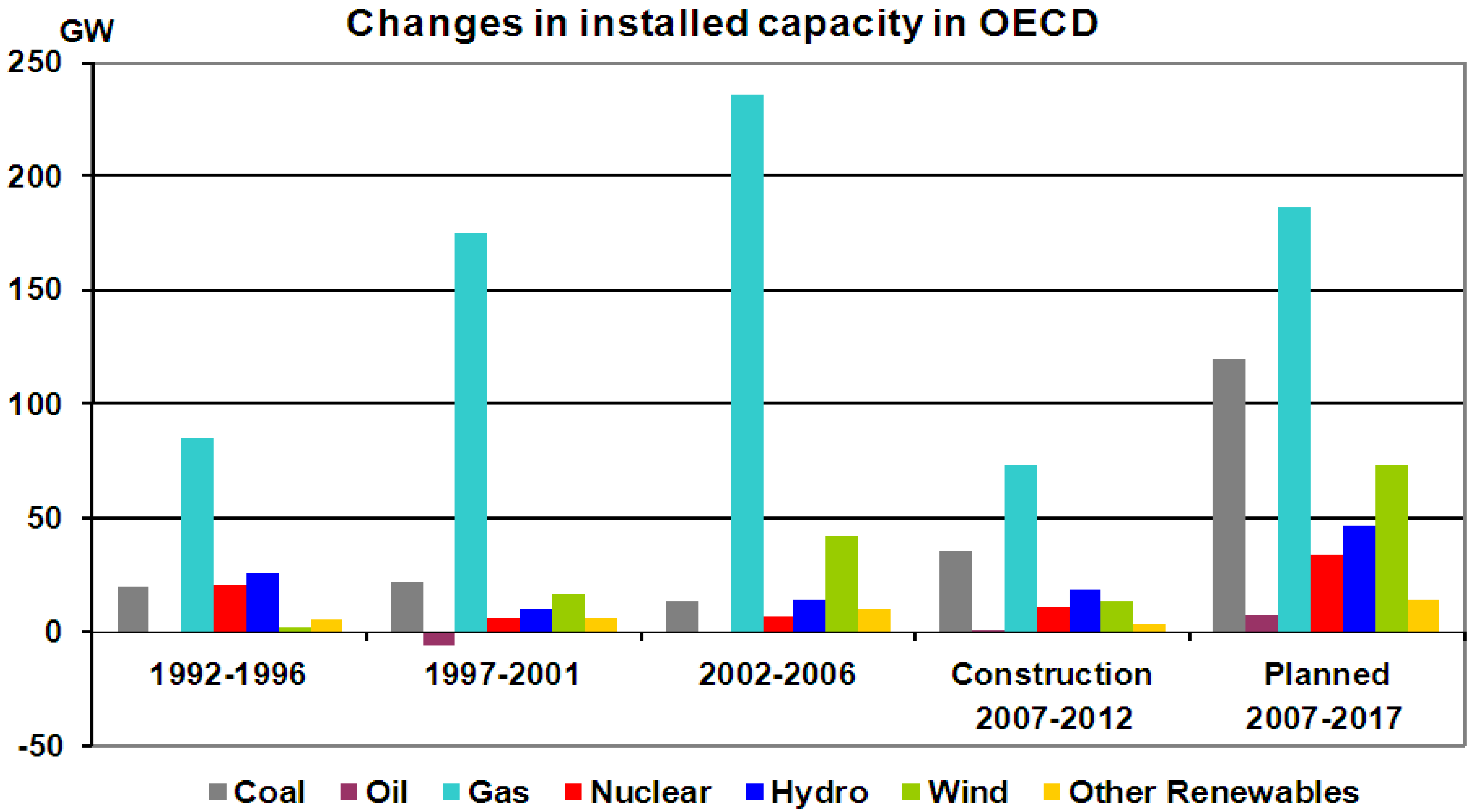
Reference Scenario:

Power Generation Capacity Additions in China, 2006-2030



Capacity additions to 2030 In China exceed the entire current installed capacity of the United States

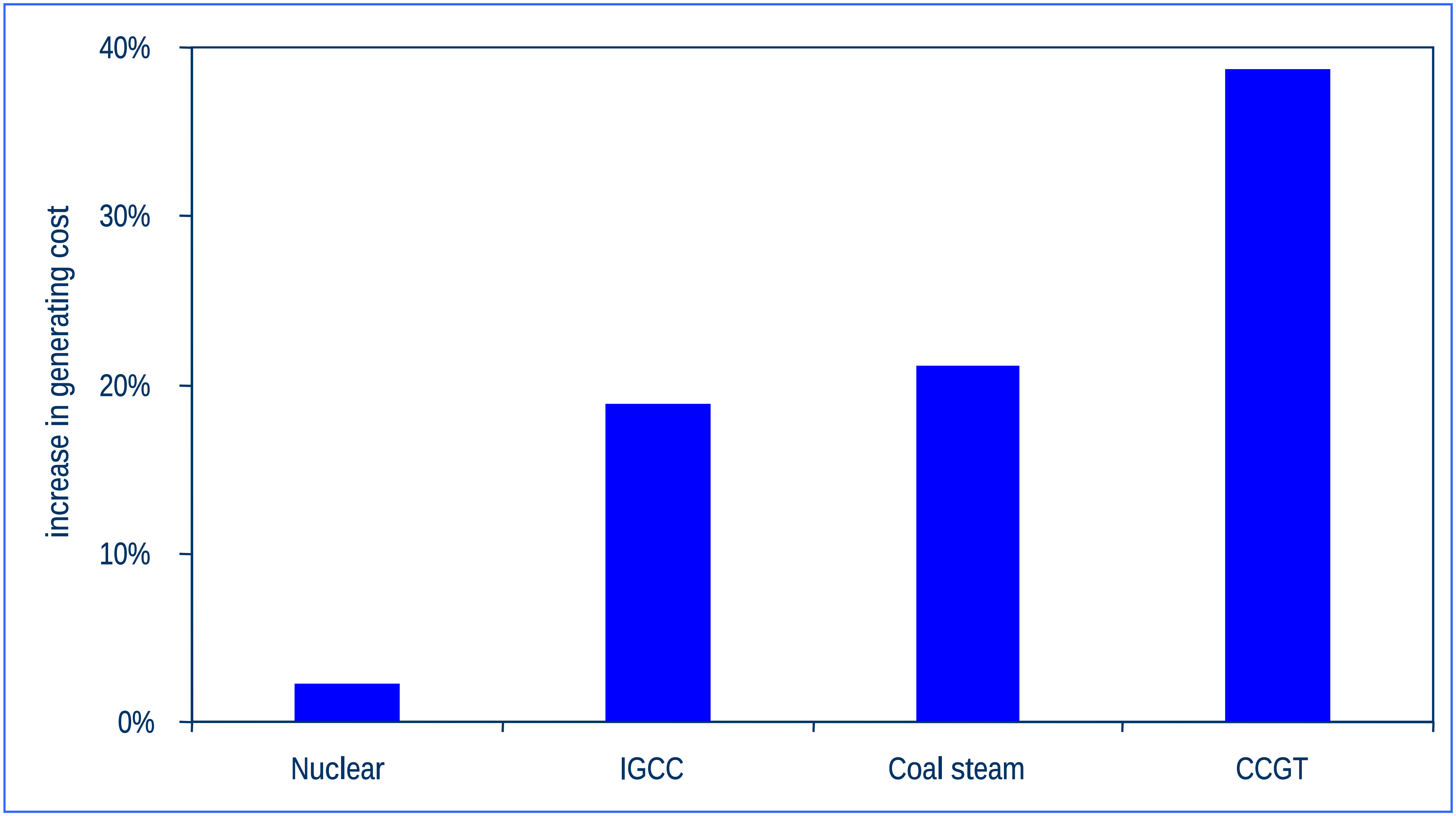
Predominant investments in gas-fired power plants in OECD countries…



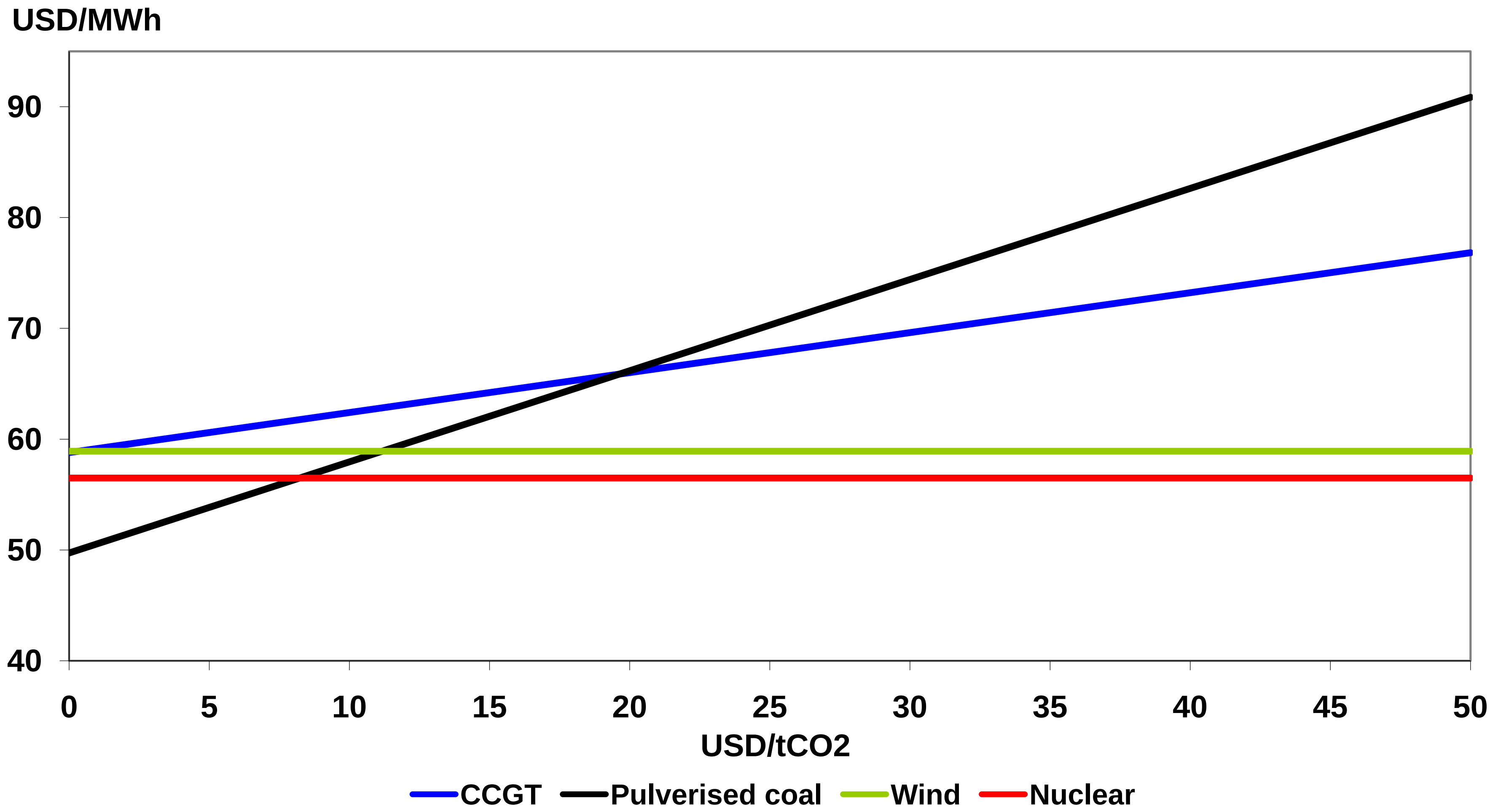
Risk and return assessment tends to favour investments in gas-fired power plants

Technology	Unit Size	Lead Time	Capital Cost/ kW	Operating Cost	Fuel Cost	CO_2 Emissions	Regulatory Risk
CCGT	Medium	Short	Low	Low	High	Medium	Low
Coal	Large	Long	High	Medium	Medium	High	High
Nuclear	Very large	Long	High	Medium	Low	Nil	High
Hydro	Very large	Long	Very high	Very low	Nil	Nil	High
Wind	Small	Short	High	Very low	Nil	Nil	Medium

Impact of a 50% increase in fuel prices on generating costs



Relative competitiveness of generation options changes at USD 10-20/t CO_2



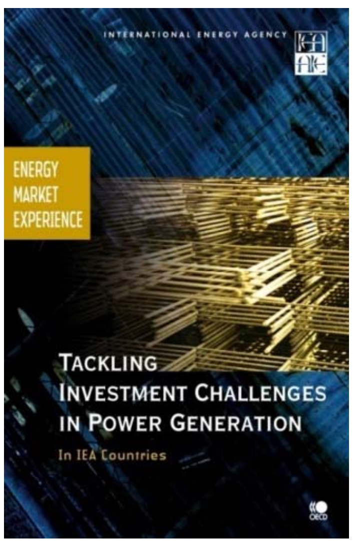
Key messages (1)

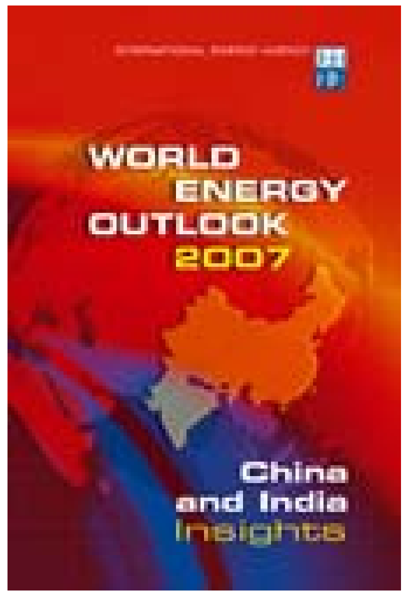
- A key challenge for all countries today is to move to a more secure, competitive and clean energy system
- Deep emission cuts can be achieved, but require a global energy technology revolution
  - On supply AND demand sides
  - In developed AND developing countries
- Decarbonisation of the power sector is a top priority
  - Huge needs for capacity additions in the decades ahead
  - Today's investments will be "locked-in" for 40-50 years

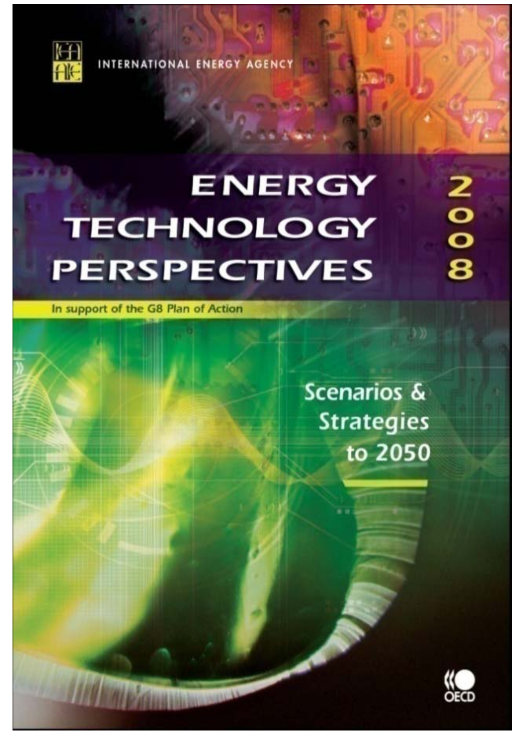
Key messages (2)

- Base load supply provides significant potential for investments in cleaner and greener generation capacity
  - Most electricity we use come from base load power plants
  - Renewables are becoming part of main stream generation
  - There are ways to reduce variability of wind power output
- Markets provide signals for investment decisions
  - Fuel prices affect relative competitiveness of generation options
  - Investors need credible, stable market-based mechanisms for clean technologies
  - A price on carbon helps to mitigate externalities
- Regulatory uncertainties can be reduced by:
  - Independence and transparency in regulation
  - Clear, stable and predictable frameworks
  - Efficient licensing process and timely project approvals
  - Early public participation in regulatory proceedings
  - Adequate resources and expertise

Selected References







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