Technology Transfer and Localisation

Presented to *Action for Energy*

Hugh Kennedy

Indaba, 05/06/2009

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Alstom Group
Two activities

N ° 2 worldwide in Rail transport infrastructure

N ° 3 worldwide in Power generation infrastructure

N ° 1 worldwide

in high speed
and very high speed

N ° 2 worldwide

in urban transport
(metros and trams)

N ° 1 worldwide in:

integrated
power plants

hydro
power*

air quality
control systems

services for
electricity utilities

* through Alstom Hydro, a 50/50 joint venture between Alstom and Bouygues set up in 2006

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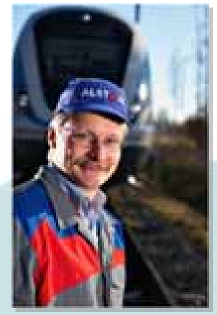
Alstom Group
76,000 employees in over 70 countries

60% in Europe
45,000 employees



16% in North America
12,500 employees

17% in Asia & Pacific
13,000 employees

1% in Middle East & Africa
1,000 employees

6% in Latin America
4,000 employees

Source: Alstom 2007/08

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The largest portfolio for integrated power solutions

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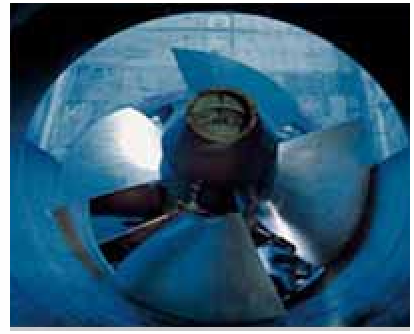
Gas Turbine

Steam Turbine



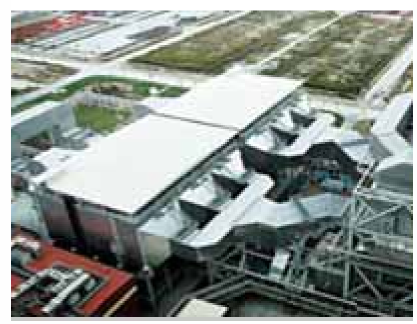
Hydro Turbine

Wind Turbine

Boilers

Generators

Air quality control systems



Instrumentation and monitoring

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Agenda

- Localisation and technology transfer
- What is the experience?
- What are the problems?
- What needs to be done?

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Technology Transfer
Why do we need it?

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- Southern Africa has embarked on an ambitious power generation capacity expansion programme
- Eskom's current expenditure estimate is R385 billion over 5 years, excluding:
  - Neighbouring states
  - IPP's (including renewables)
- Without localisation the balance of payments and the Rand will suffer increasing the cost
- This represents an ideal opportunity to kick-start <u>regional</u> growth

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Technology Transfer

Localisation is not required to meet energy needs but rather economic imperatives.

"The essence of modern economic growth is the increase in the stock of useful knowledge and the extension of its application." (Kuznets)

"The transfer of technology is fundamentally a matter of the flow of human knowledge from one human being to another" (Barton)

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Technology Transfer

For developing countries to be dynamic, they should:

- upgrade their knowledge base by investing in human resource development
- take advantage of the technologies available elsewhere
- invest in inhouse R&D efforts to work on imported technologies and to challenge increasingly sophisticated technologies in the process of industrialization.

The absence of any of these factors is likely to retard the pace of technological learning.

Source ICTSD - UNCTAD

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Technology Transfer
History

- Eskom's capacity Expansion Programme from the 70s to the 90s was similar in scope to today's programme
- It was successfully implemented with high local content
- Eskom developed a significant Architect Engineer capacity leading the world in:
  - Dry-cooling
  - Low CV high & ash coal
- Major OEMs had only small project teams in the country
- At the end of the build programme the teams and the capacity dissipated due to a lack of internal markets and limited access to external markets

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Alstom in South Africa
Completed Projects

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Turbine Islands

- Komati,
- Grootvlei, Arnot,
- Kriel Duvha,
- Matla, Tutuka,
- Lethabo,
- Matimba, Majuba,
- Koeberg

Boilers

- Arnot, Camden,
- Matimba, Kendal

A history of delivering power generation projects

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Alstom in South Africa
Current Projects

- Medupi
  - 6 x 800 MW turbine islands
- Kusile
  - 6 x 800 MW turbine islands
- Arnot
  - Integrated retrofit and capacity increase to 6 x 400 MW
- Gariep
  - Retrofit of hydro generators
- Koeberg Retrofit
  - Retrofit and capacity increase of LP turbines

Active in all areas of power generation

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MEDUPI
Air Cooled Condenser

Global expertise – Local strength

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MEDUPI
Feedwater Pumps

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MEDUPI
Deaerator Feedwater Tank

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MEDUPI
HP and LP Heaters

Global expertise – Local strength

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MEDUPI
LP Turbine Casings

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Technology Transfer

Technology Transfer has been a key component of economic growth, but “as a result of free trade and globalisation, the international regulatory structure is also different. Today, an indigenous firm in the developing world may be less able to begin through a protected market, as did the US industrial firms of the early 19th century. And because of intellectual property (IP) protections in TRIPS, the firm may be less able to begin by imitating existing technologies, as did Japanese firms in the middle of the 20th century.”

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Current Programmes

- Current programmes to enforce localisation are CSDP and ASGI-SA
- ASGI-SA requires that a target local content by value is reached (e.g. Medupi Turbine 50% and boiler 60%)
- Currently Local Content targets force suppliers to procure locally, sometimes at an inflated cost due to lack of competition and high local input costs
- Total cost/benefit to the country is not considered

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Current Programmes

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Competitive Supplier Development Programme

- CSDP seeks to commit the supplier to investment in capacity in South Africa
- Up to now CSDP is applied after contract award and project by project.
- The opportunity for choosing the best possible investment is lost
- No time allowed for investment and development before the start of the project execution
- Focus on manufacturing and “flagship” projects

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Current Programmes

- Effectively local content programmes form a barrier to entry and amount to a subsidy of local industry
- The fundamental questions to be asked before applying a “subsidy” should be:
  - is there a market imperfection making it hard for an industry to get started, and
  - can the industry be expected to be efficient and to survive without protection after a start-up period
- Far more work is required to understand the costs and benefits (how do we value a job created?)

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Maximising Localisation
Obstacles

- Technology ownership (Intellectual Property)
- Risk
  - OEM's retain full liability on project
  - Any significant failing by a local supplier cannot be fully recovered

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Licensing

- Licensing was a popular method in the past for developing countries to acquire technology, but:
  - The technology is typically limited to current or even previous generation (e.g. Chinese Nuclear programme)
  - Export is restricted or prohibited

- The tendency is toward multinationals investing in developing markets to obtain a basis for export to a global market (Source ICTSD)
- FDI, joint ventures and partnerships can make the technology transfer lasting

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Industry Loading

- After Majuba was ordered in the early 80s the build programme stopped, with no new projects to sustain industry and a limited service opportunity
- The current build programme is only moving back to similar levels of industrialisation now
- Medupi + Kusile at the original target programme represented a significant peak in required production capacity
  - 48 months, 5 month between units, 11 months between stations

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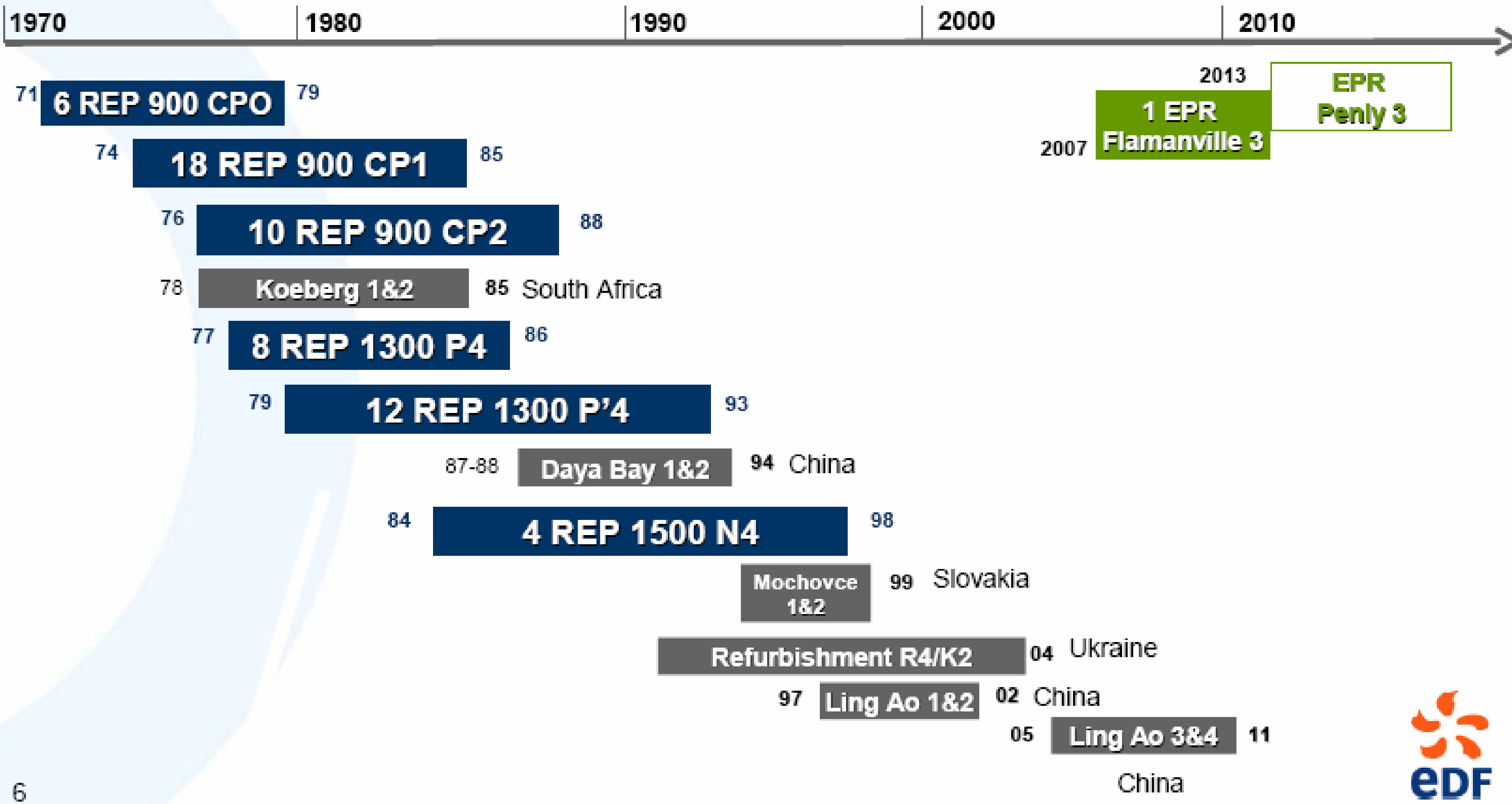
International Experience



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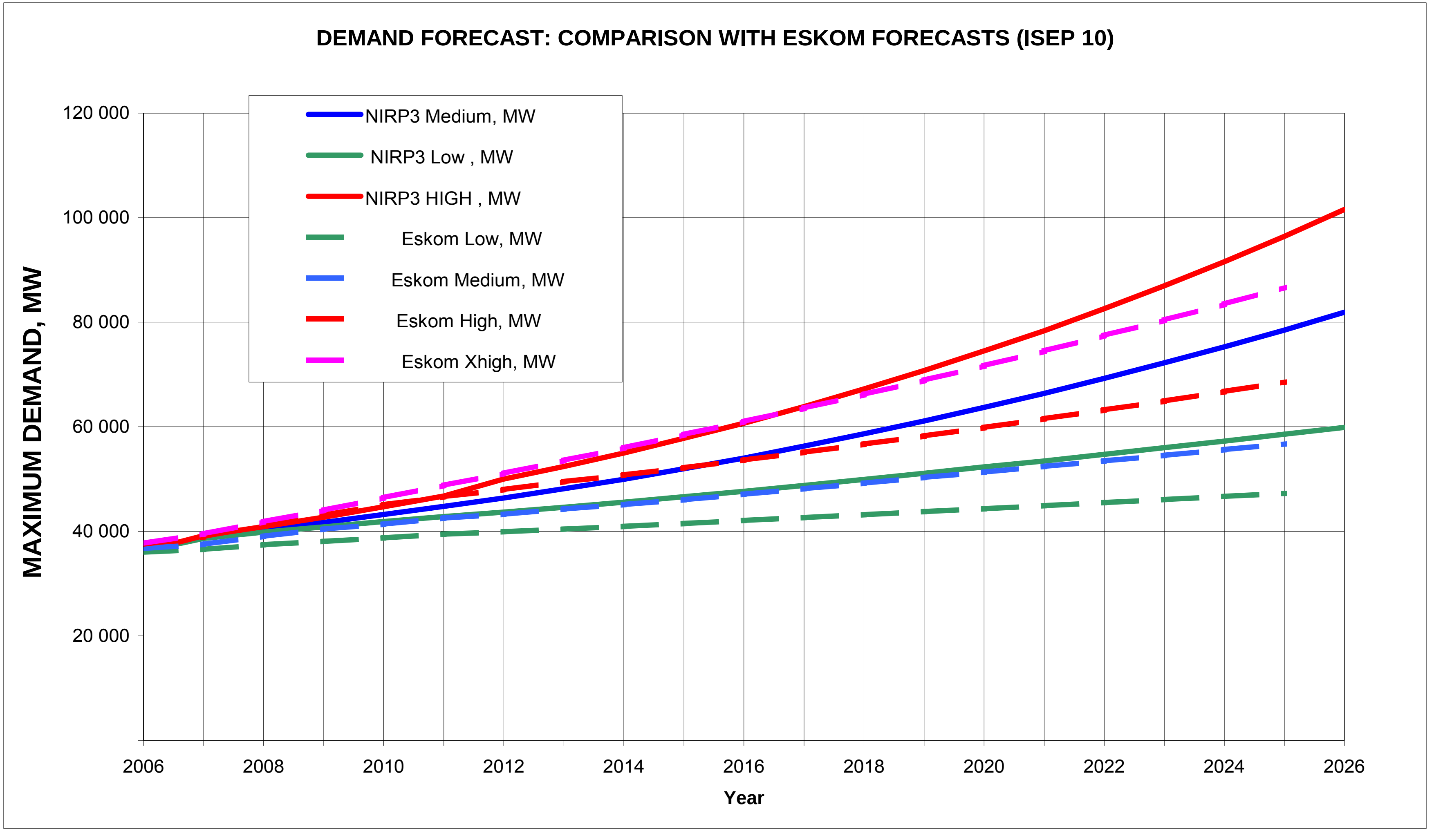
Current Scenarios



New generation requirement between 0.6 and 3.5 GW/y

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The World Market for Power Generation

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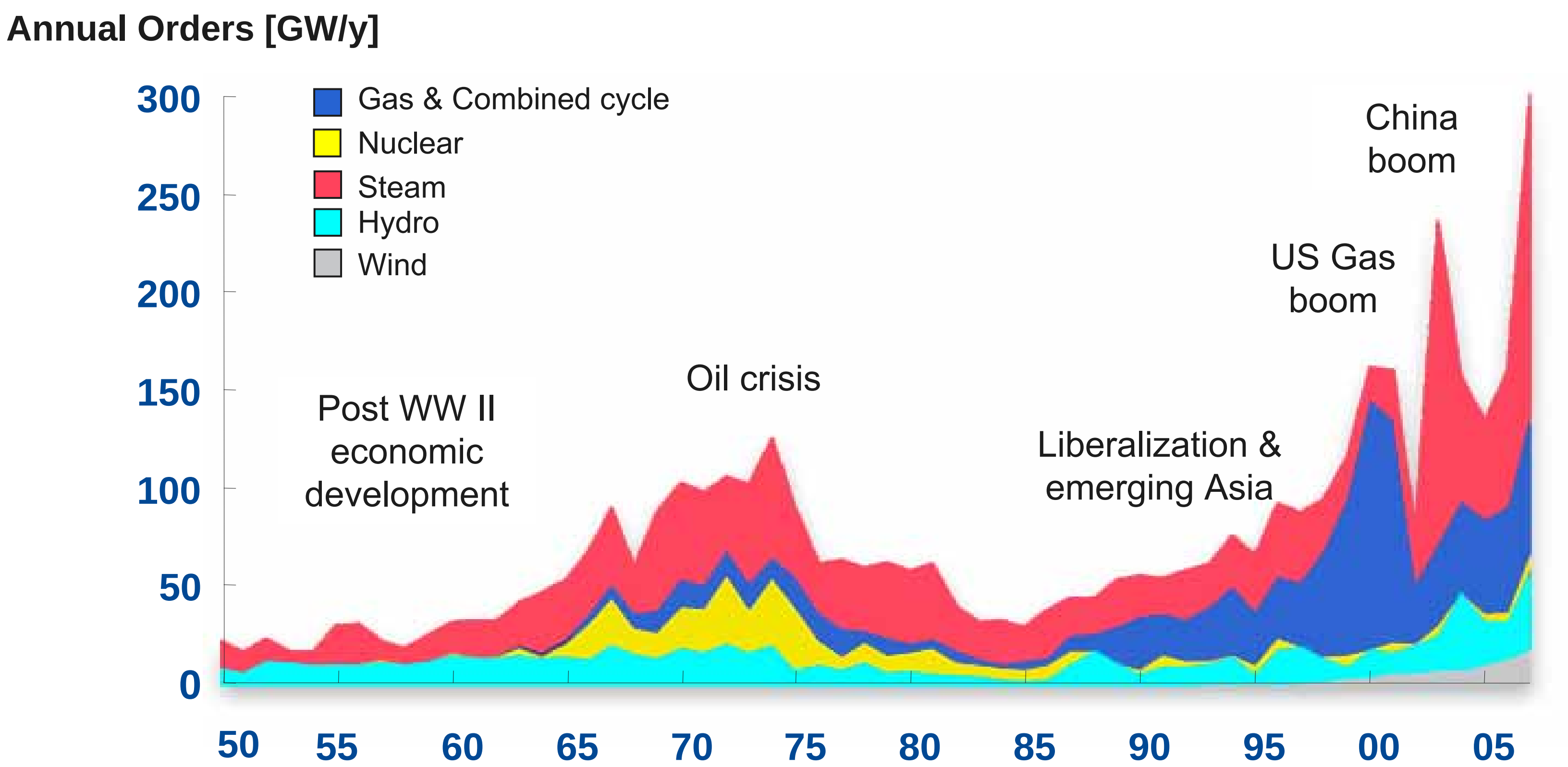

From 1978 exclude GT & ST Industrial size

South Africa requirement ~ 1.5 GW/y

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Southern Africa's Place

- A small market with good access to technology and an existing manufacturing base, but relatively high costs
- Engineering is the key to unlock this capability
- Volumes of conventional plant will only allow specialisation in specific areas where we could be internationally competitive
- Opportunities to lead in new technologies will be transient, action must be taken urgently

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Maximising Localisation
Requirements

- Transparent project pipeline and procurement process, enabling the development of a sound business case
- Long term commitment from customer and supplier
- Technology transfer within OEM
  - Technology ownership
  - Access to processes and systems
- Supply chain understanding and development
- Design for market
- Supplier development

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Maximising Localisation
Focus Areas

- In order to maximise the benefits of localisation, the focus must be on:
  - Permanent employment
  - Skills development
  - Technology transfer
  - Integration into supply chain
  - Applicability to a wide range of industries
- Large capital investments in high-tech manufacturing plant does not necessarily address these
- Traditional exclusive focus on manufacturing facilities can reduce the effective return on investment

Bringing increased NPV to the country's expenditure

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Maximising Localisation

- By establishing a true local EPC capability in the country the OEM can:
  - Maximise involvement and development of the local supply chain
  - Effect technology transfer without compromising IP
  - Assist local suppliers to join the global market
- While ensuring on time project execution with the required quality and safety standards

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Proposed Model

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- Long term plan (> 20) years be developed and shared laying out proposed developments in power generation:
  - Nuclear
  - Coal (FGD, CCS, etc.)
  - Renewables

  Taking into account industrial capacity and loading and related infrastructure projects
- Selection of partners to implement programme based on proposals to maximise investment, Technology Transfer and localisation
- Partnership between state and private enterprise to deliver SA's requirements

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