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# **Coal and Innovation in Eskom - rising to the global challenge**

**Greg Tosen  
7 November 2007**

# Outline

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- **South African Electricity Situation**
- **Current Supply and Demand Projects**
- **Meeting the Climate Change and energy security challenges**



# South African Electricity Situation



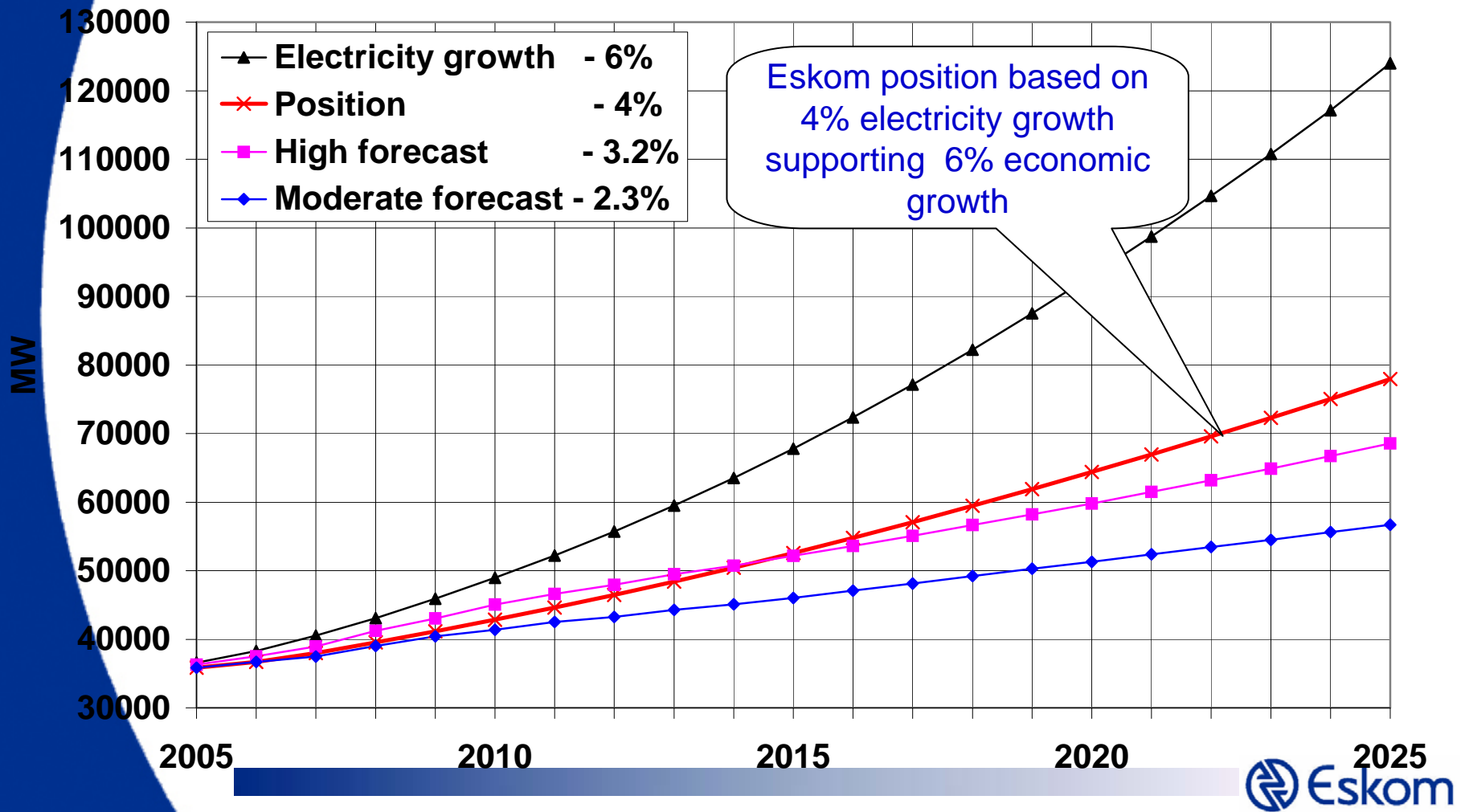
# Electricity demand and supply – key challenges

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- South Africa has reached the end of its surplus generation capacity
- 1st challenge: Avoiding mismatch between demand and supply
  - Excess capacity - stranded resources
  - Capacity shortage - constrained economic growth
- 2nd challenge: Correct choice of capacity to be constructed from an array of available options that differ dramatically in terms of:
  - Cost (construction and operating)
  - Lead time to construction
  - Environmental impact
  - Operating characteristics

# Long Term Demand forecast

## National + Foreign long term forecasts plus Position line



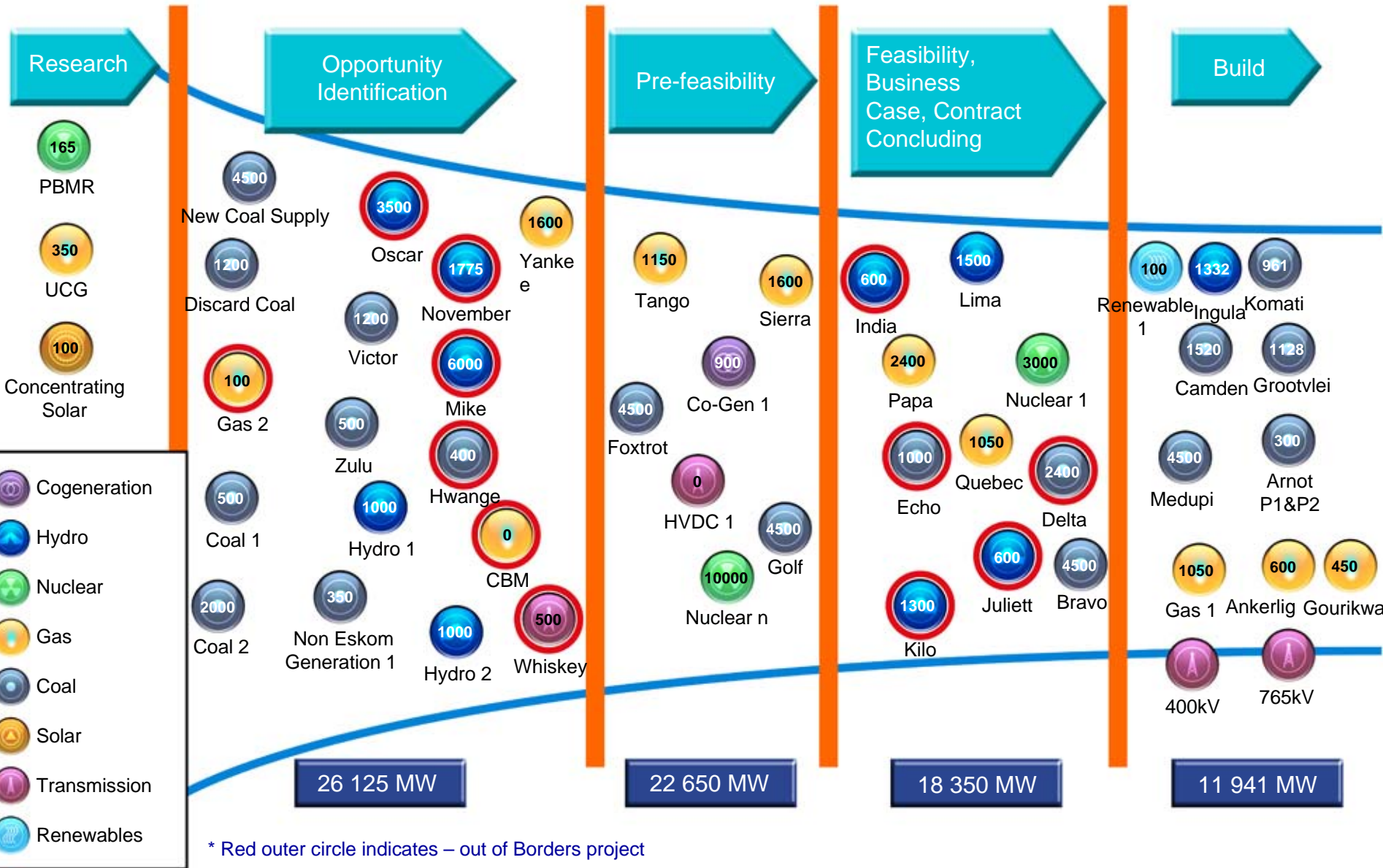




# Current Supply and Demand Projects



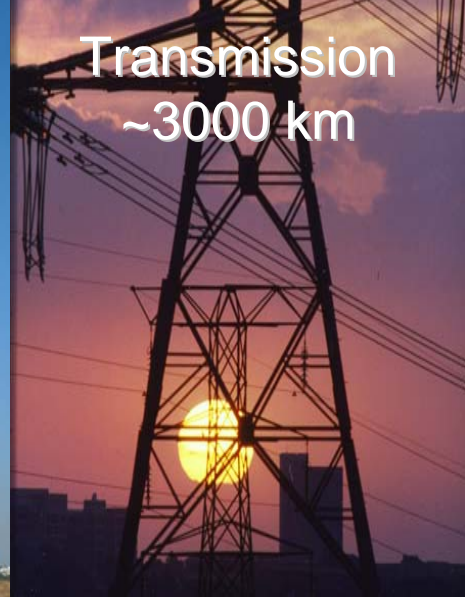
# Capacity Funnel Projects





# Capacity additions underway

(Various stages of implementation)



**R150bn planned – 2007 – 2011 alone!**





# Meeting the Climate Change and Energy Security Challenges

# Climate Change Response Strategy

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- Key Elements
  - Diversification of supply side mix
  - Energy Efficiency
  - Technological Innovation
  - Carbon market
  - Policy advocacy
  - Adaptation



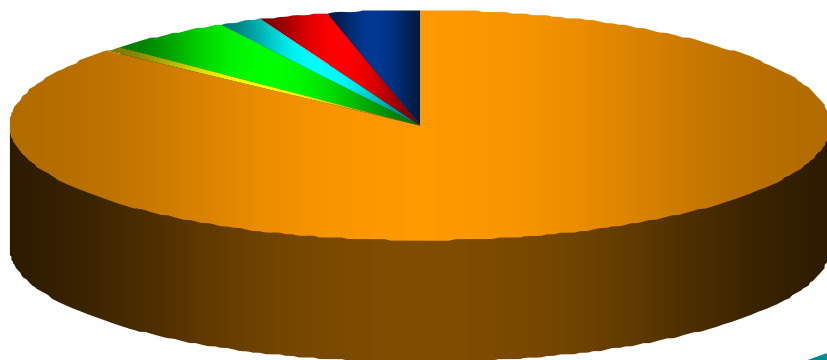


# Diversification of Supply Side mix

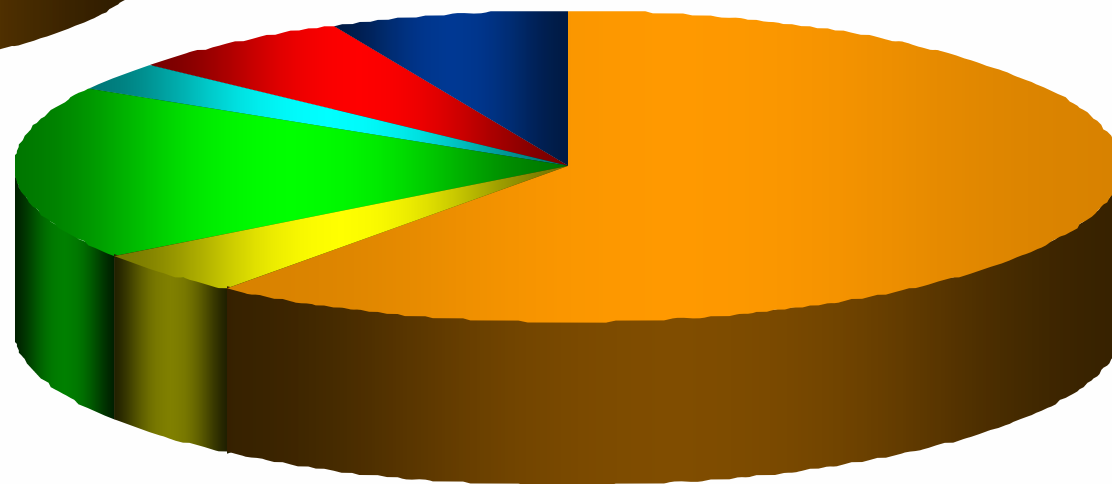


# Diversify primary energy mix

## Existing



## Mix by 2025



- Coal
- Nuclear
- Imports
- OCGT
- Renewable Energy
- Pumped Storage



# Energy Efficiency

- Demand-side management and energy efficiency to achieve 8000 MW by 2025
- 3000MW by 2013 (R10bn)
- Billion kWh programme internally



# Wal-Mart



Natural Lighting and cooling



Smart refrigeration



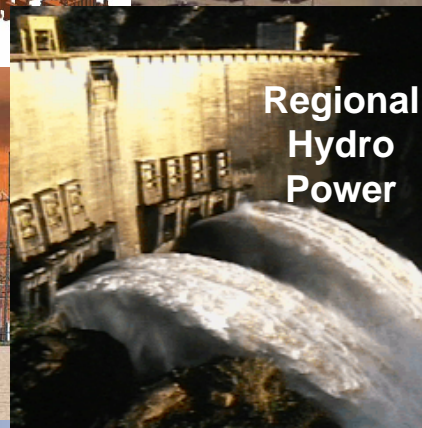
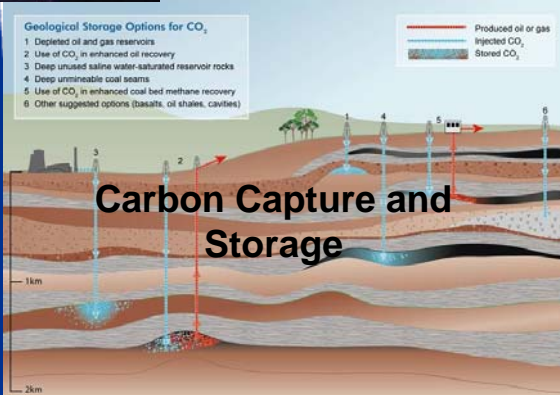
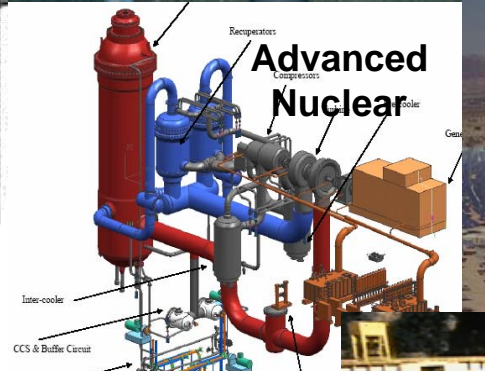
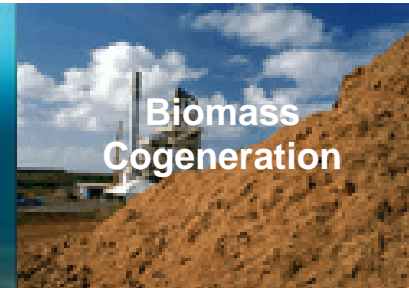
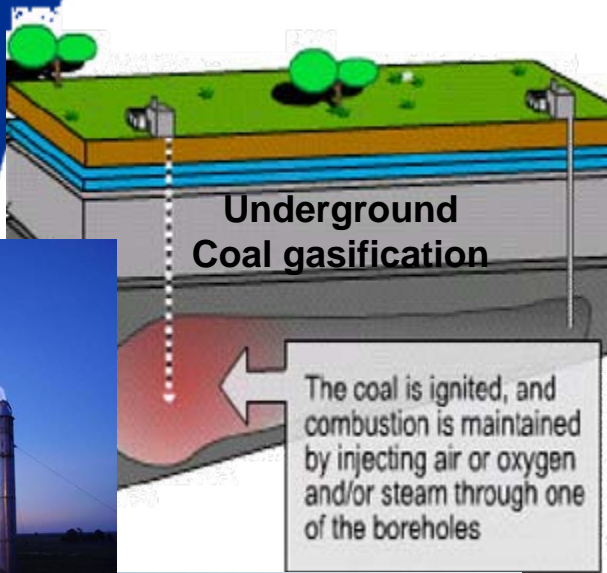
LED Lighting



# Technological Innovation

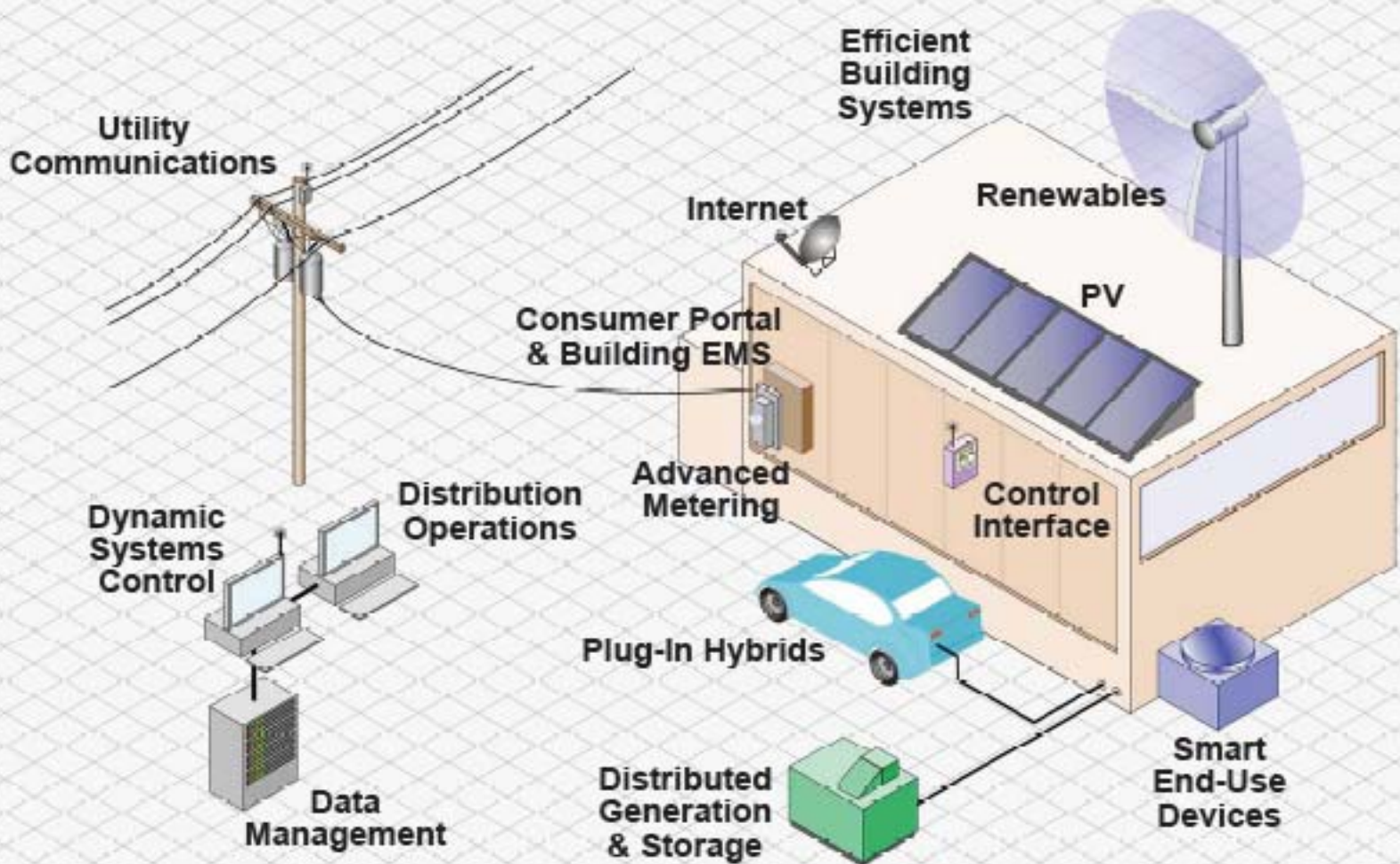


# Technology opportunities under development





# An Efficient Future...



EPRI 2006



# Carbon Market

# Investment Decision Making

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- Eskom's approach to Investment decision making includes consideration of:-
  - Indirect costs – transmission benefits, CO<sub>2</sub> cost and benefit, diversification benefits
  - Direct costs – capital, Operating & Maintenance, Fuel
  - Project risk
  - Strategic business alignment
  - Safety, health and environment
  - Macro and socio economic impact
- Investment decisions must ensure long term energy security whilst reducing CO<sub>2</sub> emissions
- CO<sub>2</sub> value essential to level the playing field



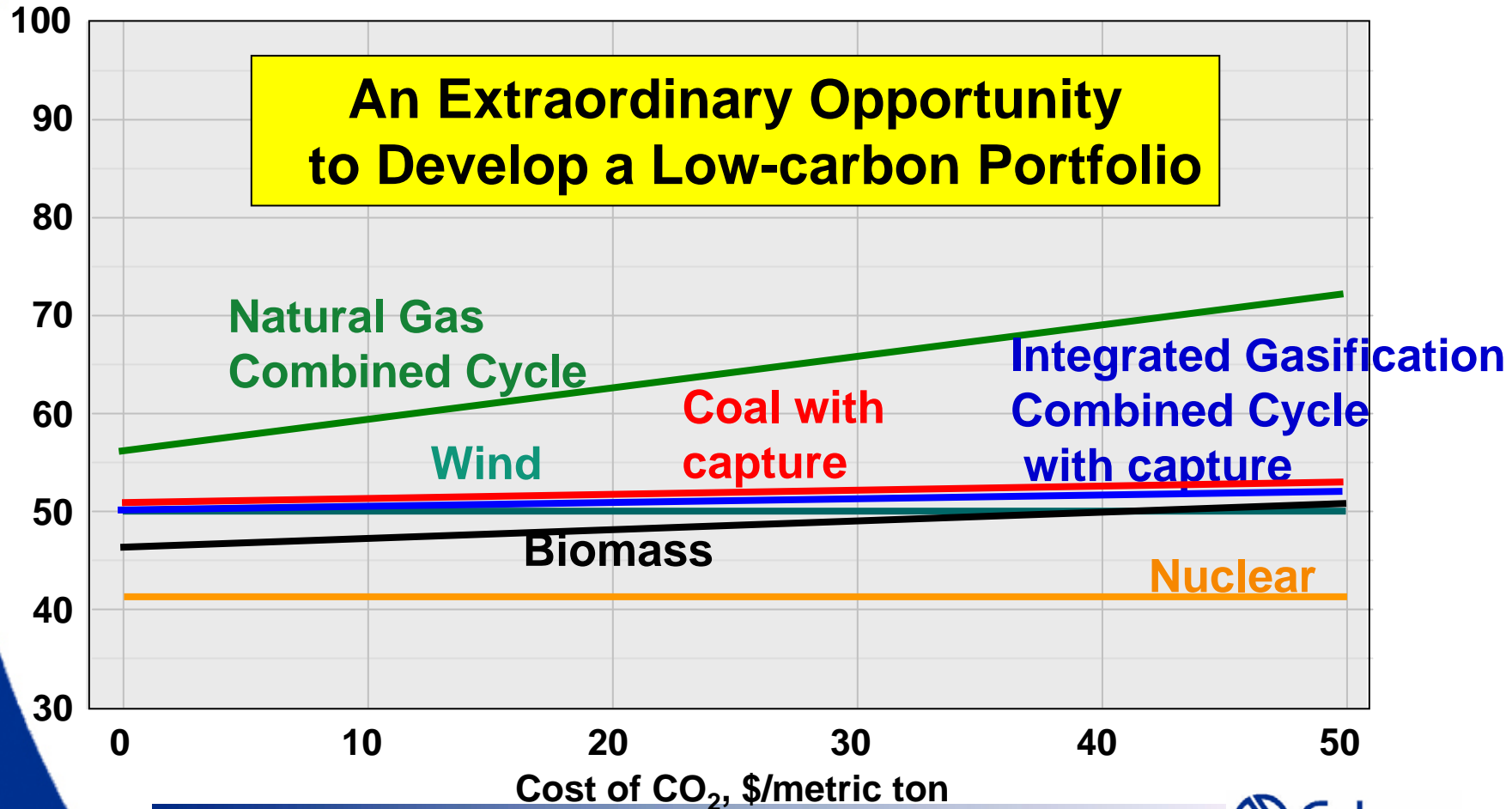
# Carbon Market Mechanisms

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- Clean Development Mechanism
- Shadow Carbon value used in investment decision making (50% of EU emissions trading scheme value)
- Future widespread and mature market essential
- Applicable to all technologies and practices

# Comparative Costs in 2020-2025

Levelized Cost of Electricity, \$/MWh



Source - EPRI



# Adaptation



North Atlantic Oscillation a key factor in international climate vulnerability, with impact on fisheries industries

Egypt/Cairo/The Nile: Coastal areas threatened by sea-level rise; Nile river basin sensitive to climate, with regional implications

Horn of Africa heavily affected by recurrent droughts

Important commercial agriculture adapted to bimodal rainfall; shifts in rainfall patterns would have far-reaching impacts

East African Great Lakes and reservoirs respond to climate variability with pronounced changes in storage

Floods in 1999 severely affected coastal population and infrastructure, with long-lasting economic and development impacts; adaptation and recovery very costly and beyond the means of African countries

Intensity of extreme events increased significantly over South Africa; biome shifts will favor horticulture over plantation forestry; malaria risk areas projected to expand southward

Rainfall variability modulated by vegetation dynamics, surface properties in the Sahel; empirical evidence of species changes

High proportion of population concentrated in coastal areas in West African cities such as Lagos and Banjul, thus especially vulnerable to sea-level rise

Regional climate modeling experiments show deforestation in Central Africa will impact climate in distant south (teleconnections)

Coastal marine fishery likely to be negatively affected by changes in Bangwuela current

Long-lasting impacts of drought on national economies for SADC region

Complete loss or displacement of Succulent Karoo biome projected under climate change, and many species losses in other biomes

**The vulnerabilities**

-  Desertification
-  Deforestation
-  Sea level rise
-  Loss of forest quality
-  Reduced freshwater availability
-  Degradation of woodlands
-  Cyclones
-  Coral bleaching
-  Coastal erosion
-  Spread of malaria
-  Impacts on food security



# Adaptation

- Negative impacts of climate change will be experienced no matter what mitigation options are taken:-
  - Variable weather patterns – more droughts and floods, hotter summers, colder winters
  - Land use change
  - Changing population patterns
  - Changing customer base – impacts on agriculture and vulnerable industries.
- Eskom adaptation actions
  - More robust water supply infrastructure
  - Low water consumption technology choices
  - Robust transmission infrastructure
  - Contingencies – eg spare towers
  - Integrated system – flexibility in delivery
  - Redundancy in the system





# Key Enablers





# Key Enablers

- ❑ **Strategically aligned regulatory environment**
- ❑ **A national energy efficiency ethic**
- ❑ **Efficient and timeous approvals – especially environmental**
- ❑ **Unlocking the value of Carbon – CDM and global Carbon value**
- ❑ **Green power market mechanisms**
- ❑ **Strategic alignment on Primary energies – coal, uranium, imports**
- ❑ **Availability of skills**
- ❑ **Maximisation of local benefits – fleet strategies, ASGISA leverage. SA Inc approach**
- ❑ **Availability of global manufacturing and contracting capacity**
- ❑ **Increased investments in RD&D and technology transfer**



***Thank you!***

