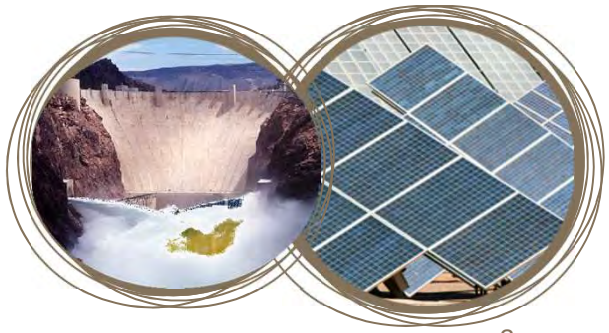
The Greening of Energy –

Eskom's role in the Renewables Industry in South Africa

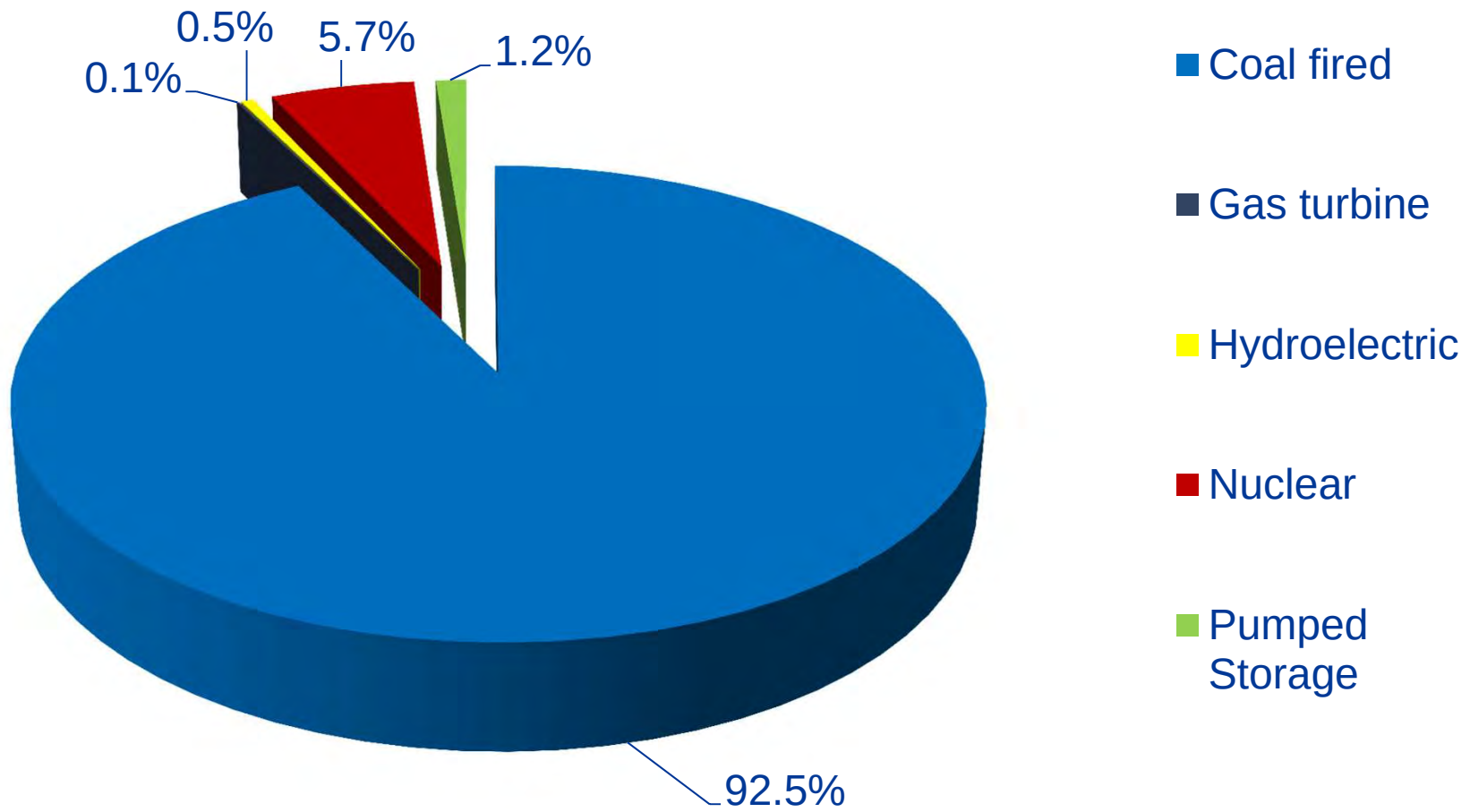
Contents



Key Messages

- Eskom is committed to move to a lower emitting and lower water use energy mix and to improve energy efficiency in its own operations and those of its customers and stakeholders.
- Eskom is clear that that it cannot meet the future electricity demand needs of the country on its own and welcomes the involvement of the private sector to support it in meeting the future needs of South Africa.
- The solutions to meet the future needs must look at regional options (Central and Southern Africa), distributed generation closer to the customers, ensure that the tariff trajectory is affordable and support the aspirations of Government policy on job creation and local supplier development.
- Important decisions on the implementation of the Integrated Resource Plan have to be made to continue the momentum of the current renewable energy IPP procurement programme and Eskom's new build programme.

Energy Production in South Africa



South Africa heavily relies on coal, followed by Nuclear

Eskom at a glance

Type	Number	Nominal capacity
Coal-fired	13 stations	37 745MW
Gas/liquid fuel turbine	4 stations	2 426MW
Hydroelectric	6 stations	661MW
Pumped storage	2 stations	1 400MW
Nuclear	1 station	1 910MW
Wind energy	1 station	3MW
TOTAL	27 stations	44 145MW

Utility and country	
Total electricity produced (TWh)	**237**
Electricity generation mix:	
Coal-fired power stations (%)	**92.8**
Renewables (%)	**0.8**
Pumped storage and other (%)	**1.2**
Gas (%)	**0.1**
Nuclear (%)	**5.1**
Environmental performance	
Water usage [L/kWh SO]	**1.35**
CO_2 [kg/kWh SO]	**0.99**
Particulate emissions [g/kWh SO]	**0.33**
SO_2 emissions [g/kWh SO]	**7.75**
NO_x [g/kWh]	**4.18**

Eskom at a glance

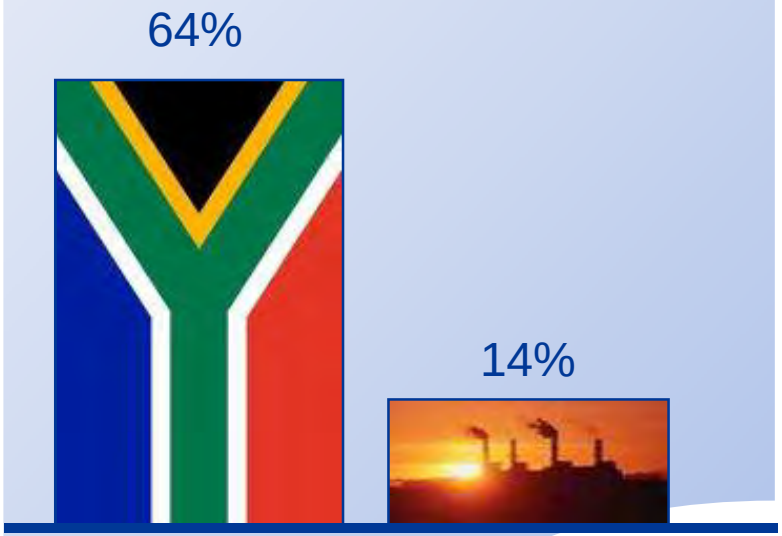
Station	Location	Nominal capacity MW
Gas/liquid fuel turbine stations (4)		2 426
Acacia	Cape Town	171
Ankerlig	Atlantis	1 338
Gourikwa	Mossel Bay	746
Port Rex	East London	171
Hydroelectric stations (6)		661
Colley Wobbles	Mbashe River	42
First Falls	Umtata River	6
Gariep	Norvalspont	360
Ncora	Ncora River	2
Second Falls	Umtata River	11
Vanderkloof	Petrusville	240

Eskom at a glance

Station	Location	Nominal capacity MW
Pumped-storage (2)		
Drakensberg	Bergville	1 000
Palmiet	Grabouw	400
Wind energy (1)		
Klipheuwel	Klipheuwel	3
Nuclear (1)		
Koeberg	Melkbosstrand	1 910

Strategic Drivers

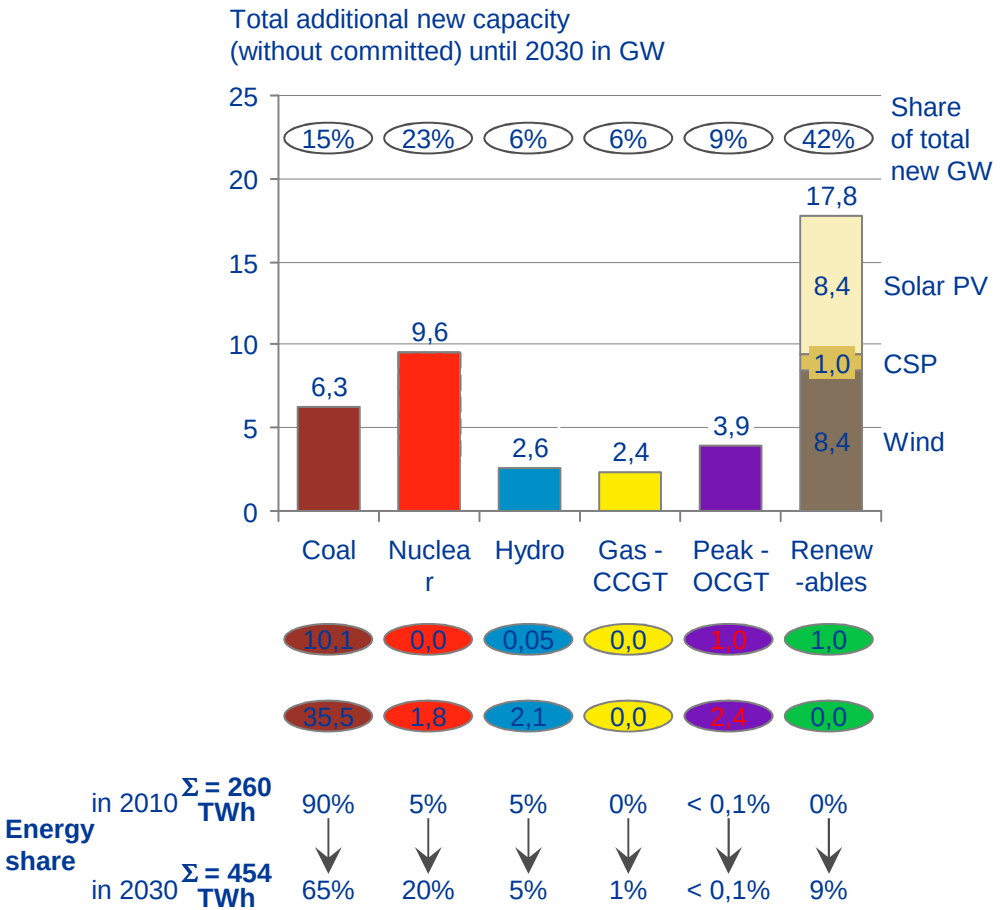
South Africa 1994 - 2008 growth



The gap between demand and supply requires vast investments in power generation capacity: To meet the demand, Eskom total generating capacity has to increase to 70 000 MW by 2025

Strategic Drivers

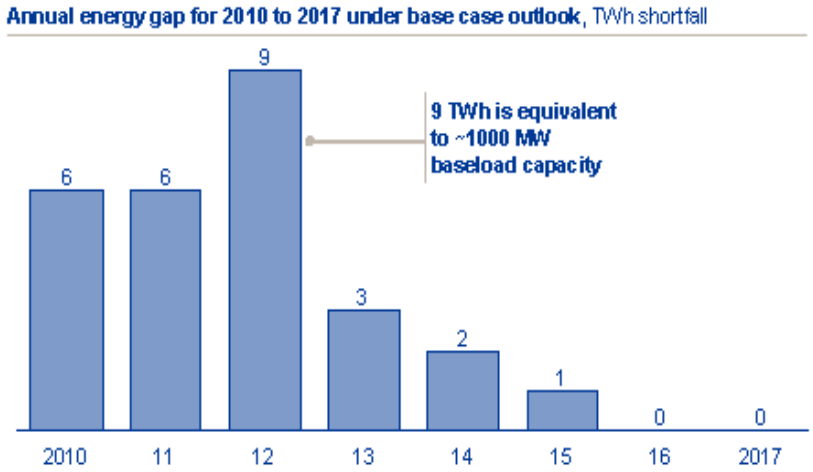
Policy-Adjusted IRP (Capacity)



Source IRP 2010

IRP 2010 Capacity allocations under policy adjusted scenario, places a strong emphasis on renewable energy in the new capacity allocation

The country will be faced with shortages until 2015 with the peak being a 9 TWh shortage in 2012.



IRP 2010 was developed to meet several key government objectives including lower carbon emissions

Integrated Resource Plan

Is **a "living" plan**, which will be updated on an on-going basis to reflect the changing needs of South Africa and respond to changes in our economic, social and technological environment.

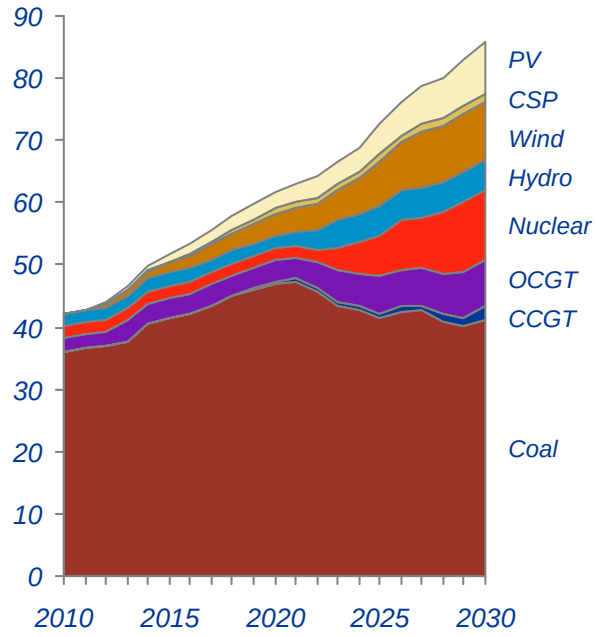
This is the first IRP that government directed and it seeks to **find a balance** between competing government objectives:

- **Affordability**
- **Reducing carbon emissions (*Towards a Green Economy*)**
- **Water conservation**
- **Localization and,**
- **Regional development**

IRP reduces carbon intensity by ~34% while coal and nuclear is still the backbone of the energy supply

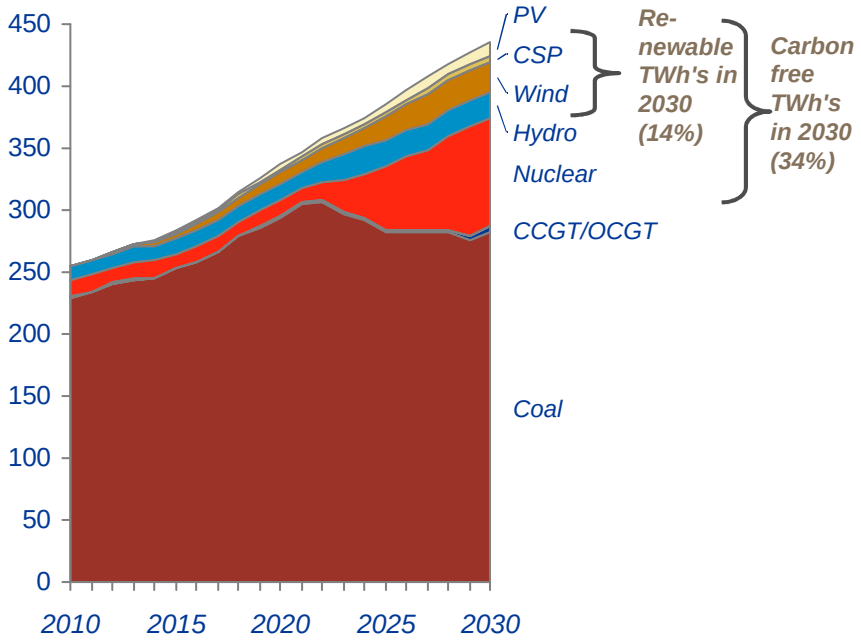
Power supply sources

Capacity installed EoY in GW[1]



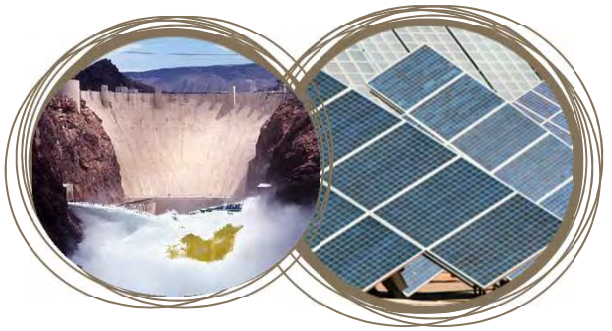
Energy mix

Electric energy supplied in TWh p.a.



CO_2 intensity

Contents



Eskom is fully supportive of renewable energy generation in South Africa

Developing renewable energy in South Africa is important

- Reduce CO_2-emissions
- Mitigate climate change
- Diversify energy sources

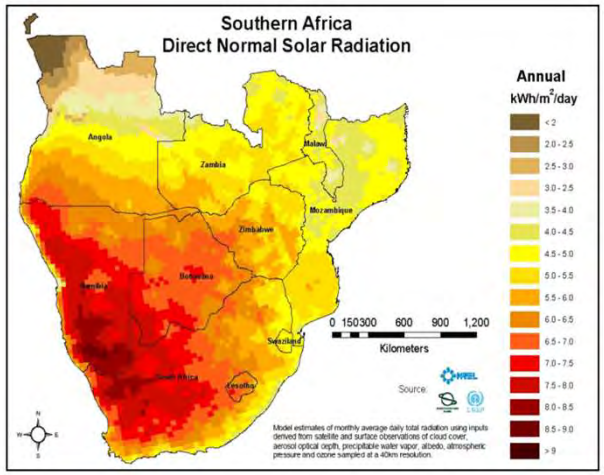
Government has taken several important steps to drive renewables deployment

- Large portion of IRP allocated to renewables
- Renewable Energy Purchase programme introduced

South Africa has abundant resources (especially for solar)

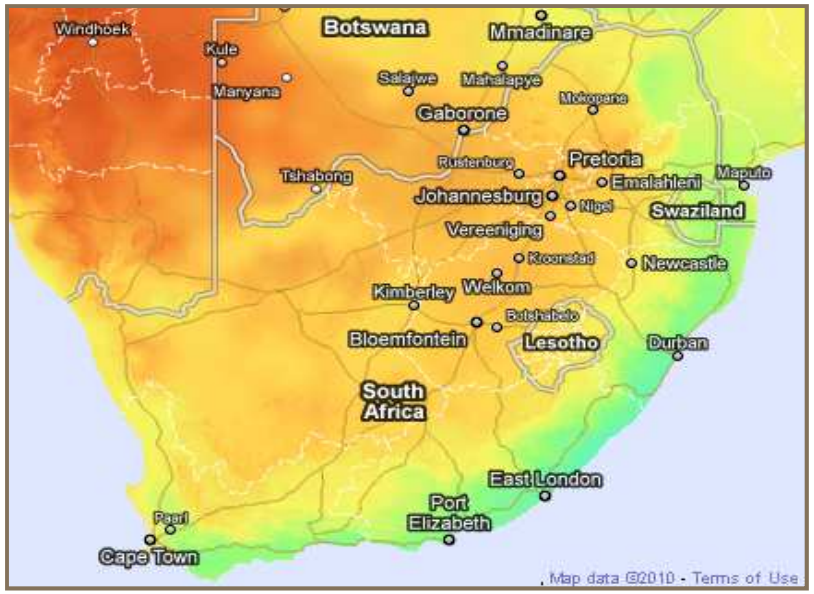
- Average solar radiation of about 2,300 kWh/m^2/year
- Large areas in the cape with average wind speeds of more than 6 m/s

Eskom facilitates the deployment of renewable energy and the ramp up of a renewable energy industry in South Africa

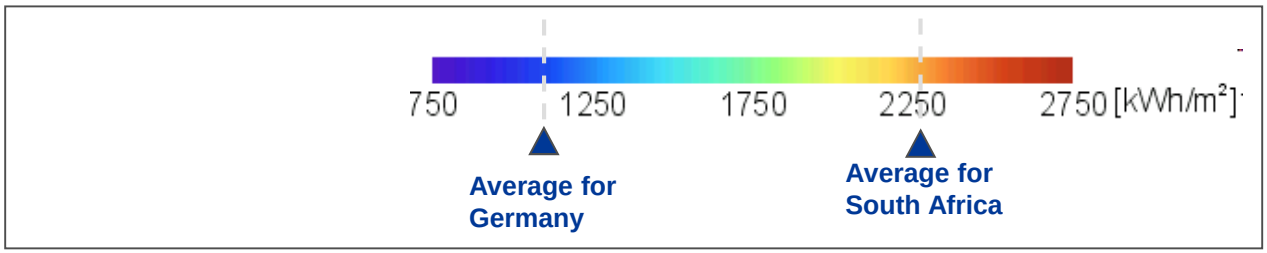


Very high solar irradiation in South Africa excellent for Solar Technologies

Solar irradiation in South Africa ...



... as compared to Germany, where residential grid parity will be reached soon



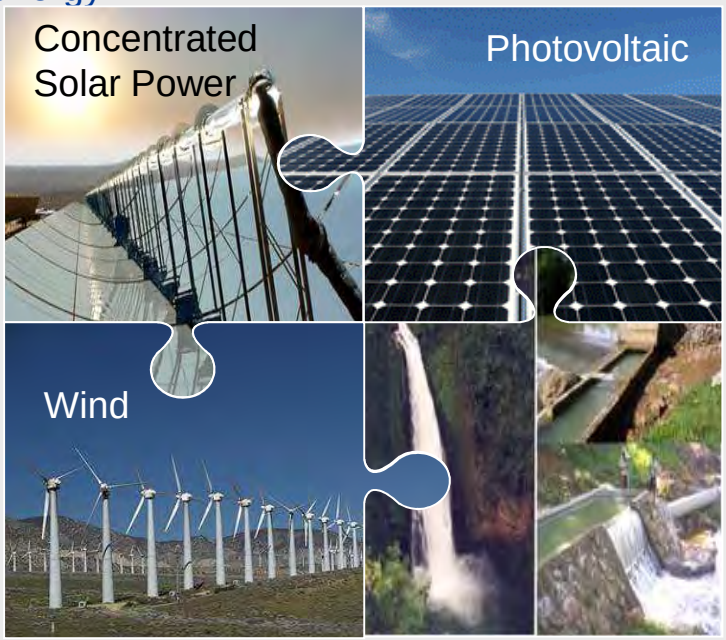
SOURCE: Joint Research Center of the European Commission; PVGIS; BCG analysis

We aim to contribute to a cleaner, more sustainable energy future for South Africa

Addressing climate change requires addressing both supply and demand factors in the energy sector

Reduce carbon intensity of energy supply

One key lever is to increase the share of renewable energy and nuclear in the overall energy mix



Reduce demand through more efficient energy use

Eskom is also driving a number of demand side management initiatives

Solar water heaters	Often 30-40% of electricity is used for water heating, which can be saved with solar water heaters
Energy efficiency program	Installation of energy efficient equipment e.g. compact fluorescent lights bulbs.
Industrial demand side management	Energy auditing & optimizations for industrial clients

Eskom has a long history with renewable energy…

1873

At the Pilgrim's Rest gold mines, 2 small hydro generators were used to power the first electrified railway

1923

The government of South Africa announced the launch of The Electricity Supply Commission (Escom)

1927

The Sabie River hydro station came into commercial operation. This was the first hydro station designed by Escom engineers

1967

Cahora Bassa hydro power station on the Zambezi river intended to supply power to South Africa

1971

Gariep (formerly Hendrik Verwoerd) hydro power station started feeding into Escom's transmission system (360MW)

1977

The Vanderkloof hydro power station commissioned (240MW)

1987

Escom renamed Eskom

1995

Stirling Dish was Installed at DBSA

2002

R&D wind energy facility at Klipheuwel in the Western Cape (3 MW)

SOURCE: Eskom history; company information

While awaiting for an IRP allocation from DoE, Eskom is already delivering first projects for the country

Sere Wind Farm

Description

- 100 MW Wind farm being constructed in Western Cape region
- ~50 turbines of 2 MW each
- Scheduled completion in 2013

Summary

- Wind is recognised as the most proven renewables technology worldwide
- ~220,000t CO2 saved per year based on 0.9t CO2 /MWh

PV at Eskom sites

Description

- Installation of photovoltaic systems at Eskom sites
- Initial installation of one hectare per site at two sites adding 1 MWp of capacity in 2011

Summary

- PV is zero emissions technology
- PV does not require water during the power production cycle
- PV is a well-established, safe technology
- PV can be installed quickly at plant site

CSP demo plant

Description

- World's largest 100 MWe Concentrating Solar Power plant with molten salt for energy storage is being developed for construction near Upington.

Summary

- Plant required to investigate CSP technology in South Africa
- Vital to Eskom's carbon footprint reduction/ low carbon growth strategy

Eskom is currently discussing its role regarding developing, operating and maintaining renewables assets, driving local industry development and developing local skills with the key relevant players.

Contents

Eskom's role

Eskom has focused on three main areas to ensure it supports the Renewable Energy IPP Procurement Process

Role as Single Buyer and Governance	• Ringfenced System and Market Operator unit set up to act as Single Buyer and Wholesaler. • Eskom fast tracked internal governance processes and the team has a mandate in which it can operate for the initial Renewable Energy IPP progamme.
Grid Connection and Customer Service	• Dedicated Grid Access unit set up in the Customer Services Division as one stop contact for connection queries. • Ongoing customer services around network connection quality will be provided from this unit. • Extensive network analysis to understand connection possibilities and limitations.
Grid Operations	• Technical teams sent to other countries to understand best practice. • At current levels of penetration, there should be relatively small impact and it will be used as a learning opportunity. • Over time it is anticipated that higher levels of operating reserves will be required and this will be analysed. • Transparency on forecasting and dispatch will become important.

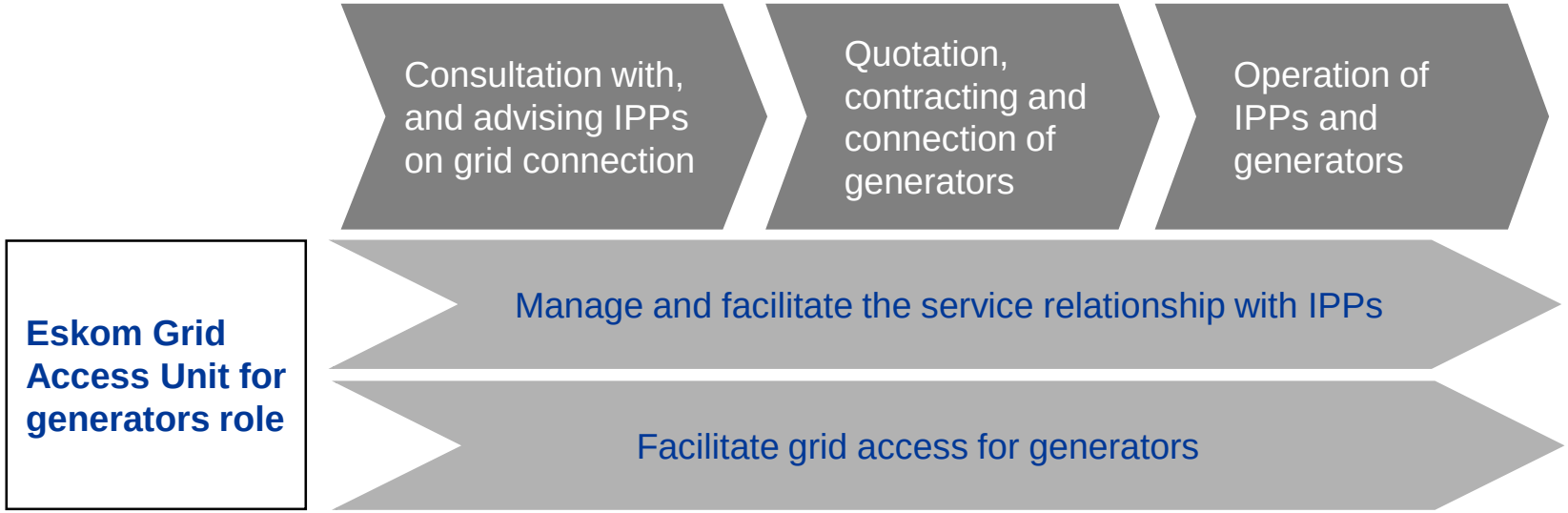
Eskom plays a significant role for renewable energy IPPs in South Africa

Process undergone by all IPPs

	Renewable IPP	Allocation of renewable energy capacity	PPAs	Grid connections
Who leads	• DoE	• DoE	• Eskom – Buyer's Office	• Eskom – Transmission/ Distribution (excludes municipal connections)
Eskom's role	• No role played – no influence	• Make information concerning current and future grid capacity publically available • System operator provides information of grid capacity and stability to DoE to assess the impact of renewable energy on grid stability	• Eskom signs PPAs for all capacity allocated and make payment to IPPs, recovering costs through tariffs	• Eskom Transmission and Distribution ensure equitable and fair access to the grid • In order to assist in service delivery, Eskom set up a Grid Access Unit for generators

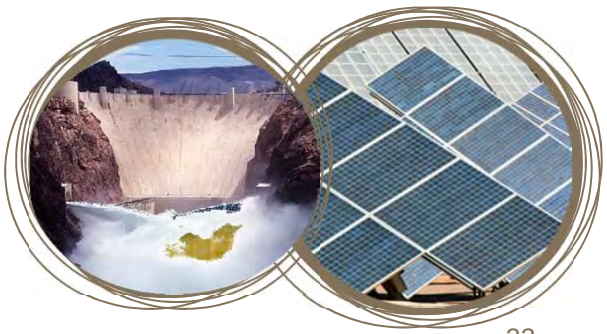
Eskom does not influence or have access to the process of PPA allocation within the country. The role-playing entities are ring-fenced from each other

Eskom process, related to grid connection and the role of the Grid Access Unit



- Submit questions for clarification or enquiries on grid connection to the network owner (Eskom or the municipality)
  - Eskom grid access process on www.eskom.co.za or e-mail GridAccessUnit@eskom.co.za

Contents



What are the next key milestones?

- Financial closure of Round 1 of the procurement programme.
- Connecting the first IPPs within the contracted time periods.
- Allocation of new capacity to Eskom and future IPP procurement programmes to provide certainty.
- Eskom's MYPD3 process to ensure the tariff trajectory supports the aspirations of cleaner and affordable electricity capacity growth.

Please partner with us

- Embrace energy saving as a national culture, joining the global journey towards a sustainable future
- 49M campaign aims to create a culture of energy efficiency in SA
- Remember the three Ps: save **p**ower, save your **p**ocket and save our **p**lanet .
  If you're not using it, switch it off!

THANK YOU

25