



# Electricity sector transformation and the expected impact of Climate Change mitigation measures

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**Eskom context**



**Economic Impact**



**Greenhouse Gas emissions reduction commitments**



**Social Impact and Eskom successes to leverage**

# Eskom has been providing power to South Africa over the past 95 years (1/2)

**1** In 1923, The Electricity Supply Commission was established to address the need for a national power system, which could meet the demands of the entire country

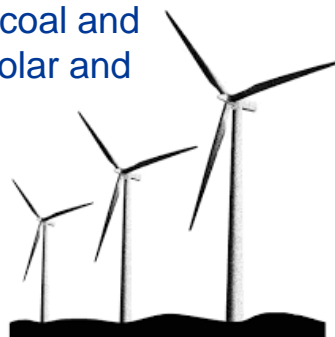


**3** Eskom currently owns and operates 30 power stations in South Africa with a total nominal capacity of ~42 GW

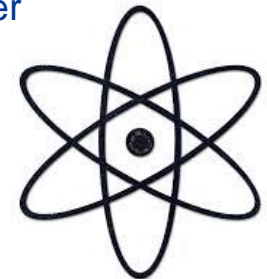


**2** Eskom is now, Africa's largest electricity utility and is a 100% South African state-owned enterprise and has ~44 000 employees

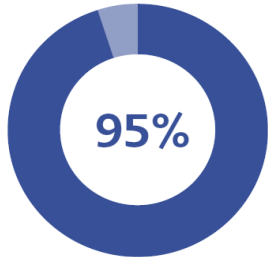
**4** Base load is generated from coal and nuclear supported by wind, solar and hydro peaking stations



**5** Eskom operates Koeberg, Africa's only Nuclear Power station



# Eskom has been providing power to South Africa over the past 95 years (2/2)



**6** Eskom generates approximately 95% of the electricity used in South Africa

**7** Eskom also supplies approximately 45% of the electricity used in Africa predominantly in the Southern African Development Community (SADC) region



**8** 10.1GW of new generation capacity being built including Kusile, Medupi, and Ingula

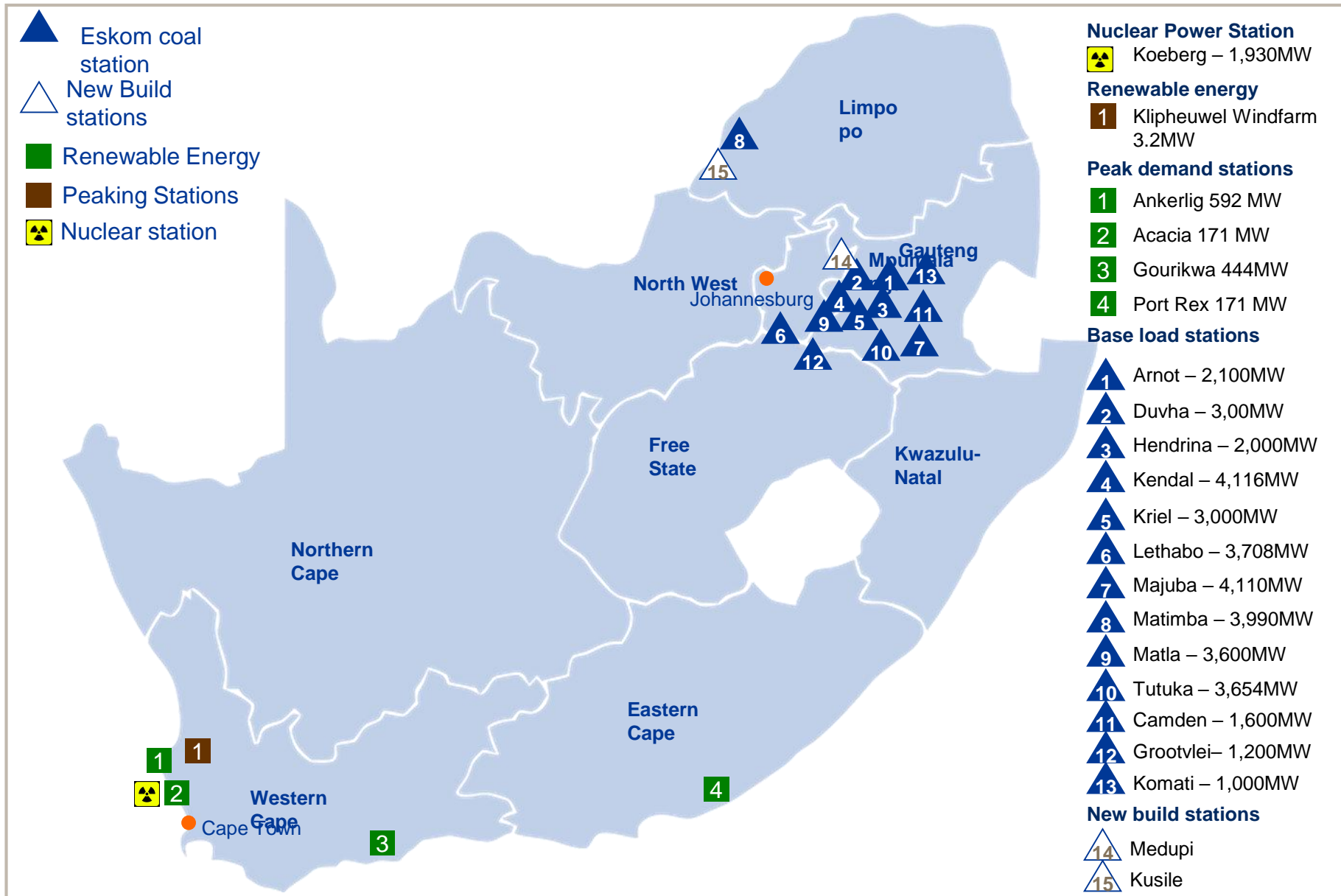


**9** SA's first power stations were well advanced for their time, but small by today's standards with sets of 33 MW and later 60 MW



**10** In 1962, the first "big" sets, 100 MW and 125 MW, were commissioned. This eventually led to the present 600 MW and 800 MW sets, which are among the largest and technologically most advanced in the world

# Nearly all coal capacity is found in one area of the country





# Geographical overview of current Eskom Capacity Expansion Programme

## MEDUPI POWER STATION PROJECT

DESCRIPTION: Supercritical, coal-fired power station  
 LOCATION: Lephalale, Limpopo  
 CAPACITY: 4,764MW (6 x 794MW)  
 PROJECT COST (P80): R145 bn (excl. IDC)



## KUSILE POWER STATION PROJECT

DESCRIPTION: Supercritical, coal-fired power station  
 LOCATION: Witbank, Mpumalanga  
 CAPACITY: 4,800MW (6 x 800MW)  
 PROJECT COST (P80): R161.4 bn (excl. IDC)



## TRANSMISSION (Power Delivery) Projects

PROJECT COST: R63.5 billion (excl. IDC)



- Koeberg Steam Generator Replacement Project
- Ankerlig Transmission Koeberg Second Supply (ATKSS)
- Open Cycle Gas Turbine (OCGT) dual fuel conversion

- Majuba Rail Project (68km railway)
- Generation Coal and Emission Projects
- Duvha Unit 3 Recovery Project
- Majuba Silo Recovery
- Return to Service Programme (3,741 MW)

Sere Wind Facility (100MW)



Ankerlig OCGT (1,338MW)



Gourikwa OCGT (746 MW)



## INGULA PUMPED STORAGE SCHEME DESCRIPTION:

Pumped Storage Scheme  
 LOCATION: Drakensberg mountain range, near Ladysmith  
 CAPACITY: 4 X 333 MW Units = 1,332 MW  
 PROJECT COST (P80): R29.8bn (excl. IDC)



Coal-Fired Power Plant



Rail



Wind Facility



Hydro Power



Gas Power



PDP Transmission Lines

Over the past 12 years, since 2004/05, the build programme has had significant impact



Permanent & fixed term employees grown from ~**1000** at inception to **2001** in 2017

**Safety performance improved** from **1.08 LTIR** in 2005 to **0.15 LTIR** in 2017

**Fatalities reduced from 9** occurrences in 2009 to **2** in 2017  
*(combined contractor & employee performance)*

## Capacity increase

**10 750 MW**

Additional capacity

**7 271 KM**

Transmission lines built



**35 390 MVA**

Substation capacity commissioned

**R510 bn**

In value of projects in execution (ERA)

**R346 bn**

Spent to date



**23** Generation & **48** Power Delivery high priority projects / schemes in execution & supported by the business

~ **50** projects in development

## Completed build projects:

- **OCGT & Gas 1 (2084 MW)**
- **Return to Service (3741 MW)**
- **Arnot capacity increase (283 MW)**
- **Sere wind farm (100 MW)**
- **Ingula Pumped Storage Scheme (1332 MW)**
- **Medupi & Kusile (3182 MW)**
- **Koeberg U2 (30 MW)**

~ **43 000**

Jobs created at peak of construction  
*(employees & contractors)*

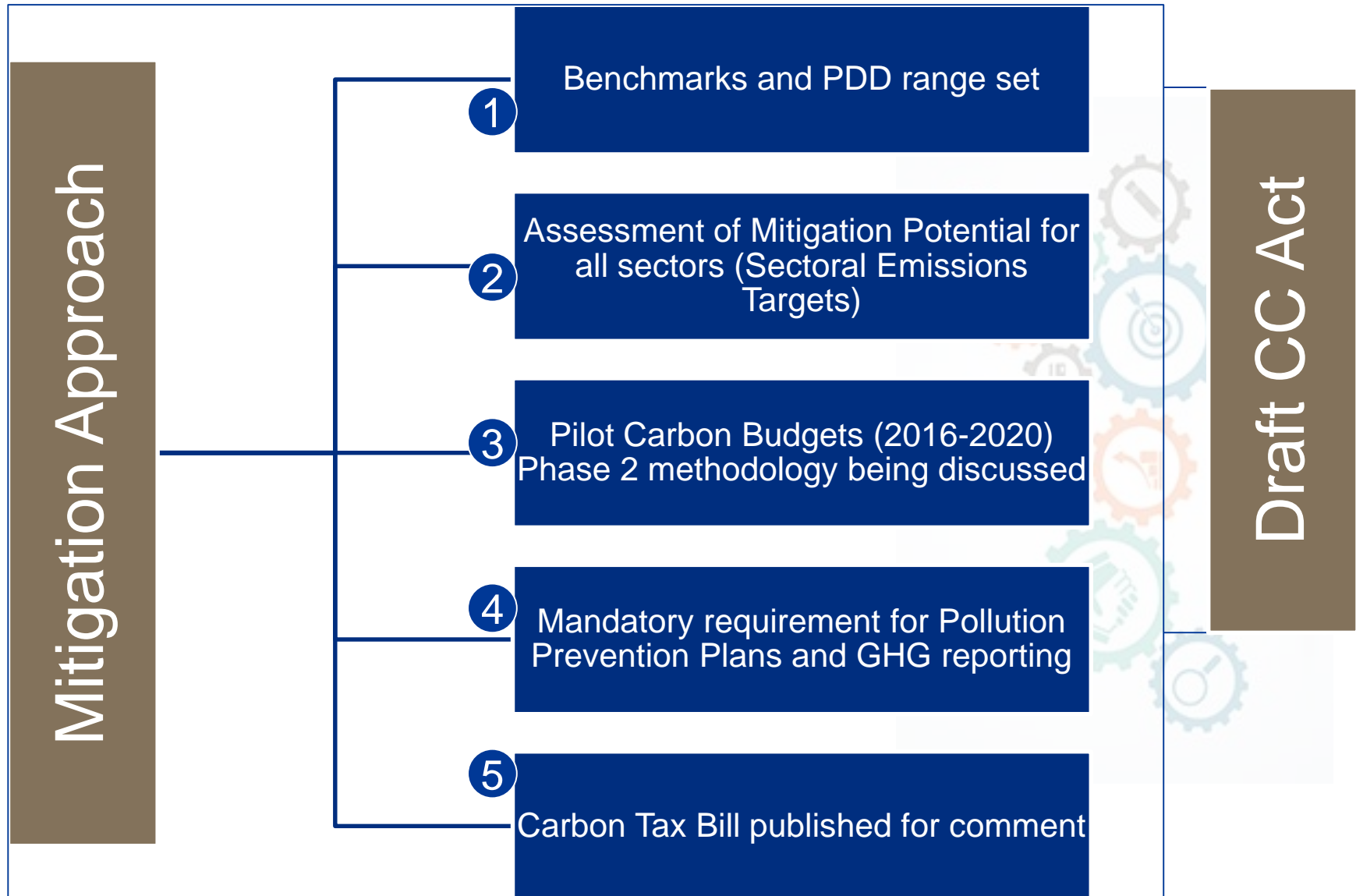
**R115 bn**

local content

of **R190 bn**  
*(contracted value)*

Supporting **project management** capabilities... by creating processes, systems, methodologies, tools & structures

Improved **oversight, assurance & contract management** ability





# The IRP provides for further diversification – to 2030

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown
2019	2 155					244	300			200
2020	1 433				114	300				200
2021	1 433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1 000	1 500		2 250		200
2027					1 000	1 600		1 200		200
2028					1 000	1 600		1 800		200
2029					1 000	1 600		2 850		200
2030			2 500		1 000	1 600				200
<b>TOTAL INSTALLED</b>	<b>33 847</b>	<b>1 860</b>	<b>4 696</b>	<b>2 912</b>	<b>7 958</b>	<b>11 442</b>	<b>600</b>	<b>11 930</b>	<b>499</b>	<b>2600</b>
<b>Installed Capacity Mix (%)</b>	<b>44.6</b>	<b>2.5</b>	<b>6.2</b>	<b>3.8</b>	<b>10.5</b>	<b>15.1</b>	<b>0.9</b>	<b>15.7</b>	<b>0.7</b>	

- Installed Capacity
- Committed / Already Contracted Capacity
- New Additional Capacity (IRP Update)
- Embedded Generation Capacity ( Generation for own use allocation)

# Proposals to define diversification linked opportunities (1 of 2)

- Aligned government policy on national GHG emissions aspirations and signals for policy certainty.
- Aligned government policy on key technologies to encourage localisation and job creation.
  - Identifying opportunities for increase in local PV suppliers including Operation and Maintenance skills
  - Local PV panel assembly, inverter manufacturing, PV panel testing and assurance facility (if barriers to market entry for international products increase)
  - Identifying jobs related to Vanadium, Manganese & Lithium mining/ Smelters for battery Storage and EV batteries
  - Opportunities for localization through new charging station deployment and associated businesses (kiosks, coffee shops, etc. around them).
  - Gas pipeline infrastructure for imports, gas distribution infrastructure and O&M.

# Proposals to define diversification linked opportunities (2 of 2)

- Identification of retraining opportunities
  - Further opportunities for skills development and employment to support digitalization of power industry which could result in more efficient plant operation
- Alternative uses and beneficiation of coal could contribute to the mitigation of losses in the mining sector from reduction of coal use for local electricity production.
- Identification and support for appropriate implementing agencies/mechanisms, with clear timeframes and performance metrics.
- Identification and support for vulnerable communities and municipalities
- Allocation of low/non carbon emitting technologies to Eskom to maximise on existing sites and infrastructure



# Eskom successes and skills base can be leveraged in the future



## Achievements

**New Build**

Supercritical technology in Medupi and Kusile delivers approximately 30% less CO<sub>2</sub> per MWh of electricity produced

**Integrated demand management**

Integrated demand management (236.9 MW evening peak capacity in 2016/17) and internal energy efficiency (6 GWh in 2016/17). Supported by a skills base to deliver energy audits, smart metering/reporting, energy management solutions, design and testing of equipment, roll out of CFLs (4 765 921 bulbs installed between 2015/16 and 2016/17), project accreditation for carbon emission reductions

**Partnerships**

Track record for in-house and partnership research, technology development and demonstration – addressing all energy sources (coal, nuclear, gas and hydro) including renewables (resource maps/profiles, wind and solar technology testing), batteries and electric vehicles incl. charging infrastructure

**Collaboration with IPP's**

Operational experience with grid integration and grid management ( including 4779MW of operational IPP capacity (31 March 2018))

**Transformation**

Track record for economic transformation and community development, from direct “Corporate Social Investment” in schools and mobile clinics to supplier development and localisation, including the Contractor Academy and flagship projects (Small Business Development Expo and Eskom Expo for Young Scientists)

**Sustainability**

Eskom provides ongoing support to the Government Climate Change negotiation team and is still recognized regionally and internationally for its sustainability endeavors.

