

## **Eskom Holdings SOC Ltd**

Building resilient energy assets and infrastructure

About Eskom

South African National Policy Environment

Eskom Climate Change strategy

Eskom's Climate Change Strategy: The 6 point plan on climate change

Eskom's climate impact related risks

Resilience at Eskom

Barriers and challenges

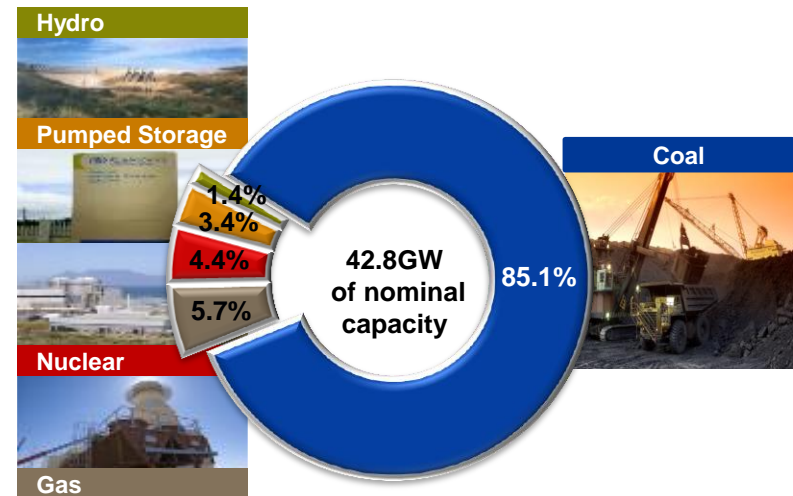
Eskom Integrated Risk and Resilience Management Procedure

Requirements for successful implementation



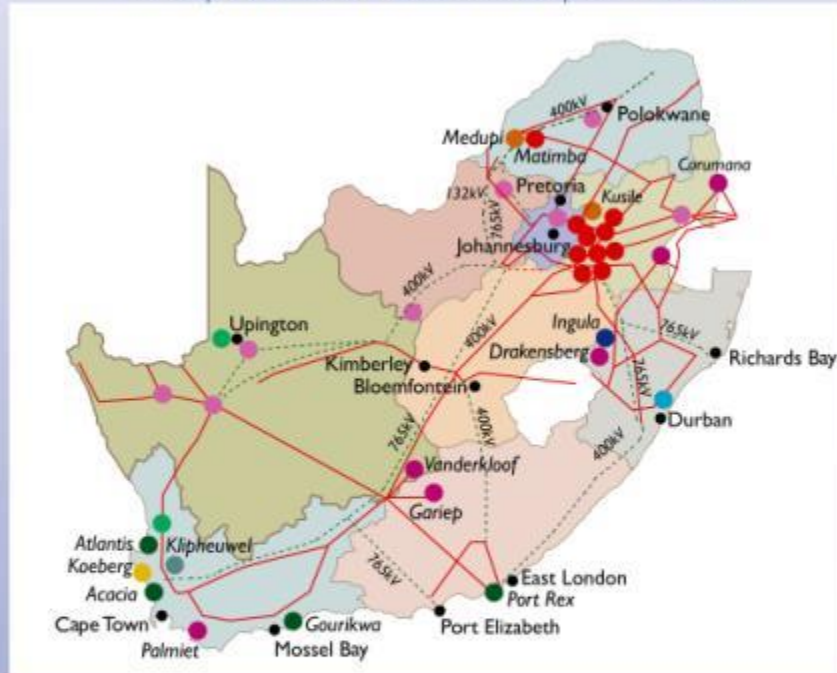
- Strategic 100% state-owned electricity utility, strongly supported by the government.
- Supplies approximately 95% of South Africa's electricity.
- Performed 158 016 household electrification connections during the year
- As at 31 March 2016:
  - 5.6 million customers (2015: 5.4 million)
  - 28 (including 1 nuclear) operational power stations with a net maximum generating capacity of 42.8GW as 31 March 2016 (2015: 42.09GW)
  - 17.4GW of new generation capacity being built, of which 7.0GW already commissioned
  - Approximately 368 331 km of cables and power lines
  - 47 978 employees, inclusive of fixed-term contractors, in the group (2015: 46 490 ) .

## Generation capacity – 31 March 2016



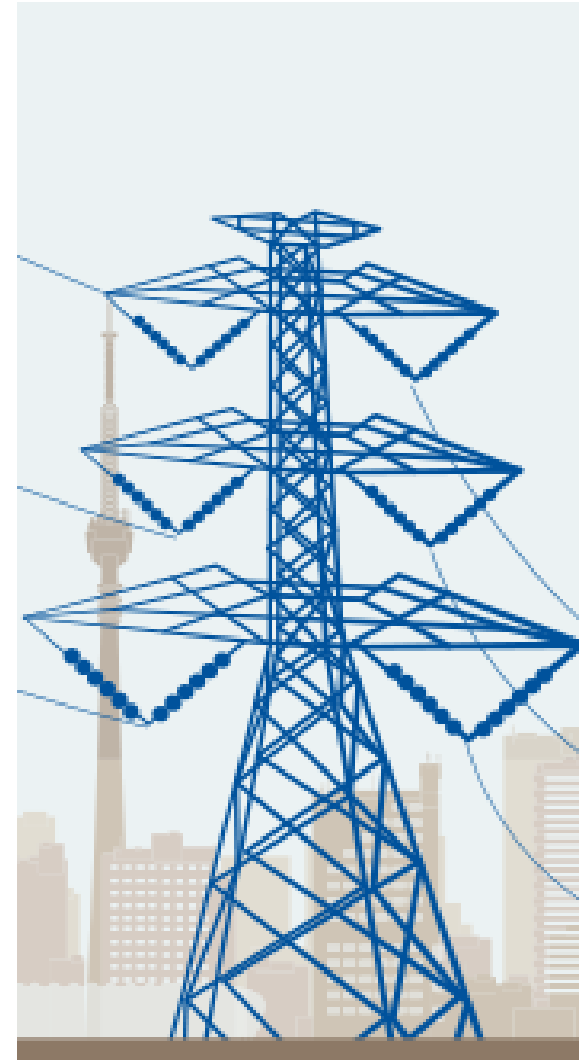
## South African grid map

The map indicates the South African power network



### Key

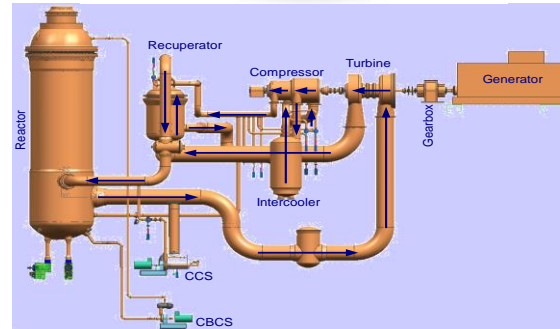
- Existing grid system
- Possible future grid system
- Future hydroelectric power station
- Future thermal power station
- Hydroelectric power station
- Interconnection substation
- Town
- Future renewables
- Renewables
- Thermal power station
- Future interconnection substation
- Nuclear power station
- Future gas station
- Gas power station





# Eskom's Climate Change Strategy: The 6 point plan on climate change

1. **Diversification** of the generation mix to lower carbon emitting technologies
2. **Energy efficiency** measures to reduce demand and greenhouse gas and other emissions
3. **Innovation** through research, demonstration and development
4. **Investment** through carbon market mechanisms
5. **Adaptation** to the negative impacts of climate change
6. **Progress** through advocacy, partnerships and collaboration



- ❑ Unprecedented extreme low temperatures caused the freezing of the cooling tower water affecting water circulation, July 2012.



- ❑ Snow overloading in KwaZulu Natal in August 2012. Snow and ice loading beyond design limitations of networks could result in conductors parting, insulators pulling out of attachment hardware and structures collapsing.
- ❑ A National Technical Bulletin 12TB-017 for the mitigation measures to be implemented on MV networks at risk to snow: **Adaptive capacity**.

# Eskom climate impact related risks

Ambient temperature above 35°C has an impact on the air cooled condensers (ACC) in power stations resulting in performance loss

Increased wind speeds above 20m/s have a huge impact on the tripping of the turbine, thereby resulting in load reduction

Snow fall events can cause inadequate circulation of the cooling water in the cooling towers

High wind speed resulted in increased dust generation and increase ash dams slopes erosion.

Low temperatures may lead to contraction of oil with power transformers. This can lead to low oil levels, resulting in internal faults on transformers.

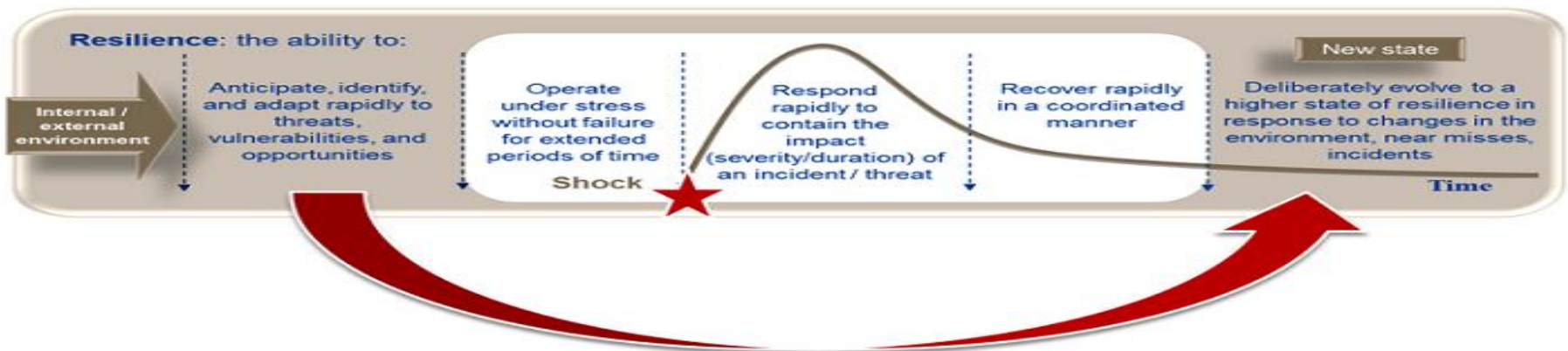
Extreme low temperatures caused the freezing of the cooling tower water affecting water circulation.

Sub Tx & Dx class networks are at risk due to storms and severe wind. Severe winds beyond design limitations of networks could result in conductors clashing or structures collapsing. Different threshold values of mechanical wind loading exist dependant on the structure types, span lengths and tower profiles.



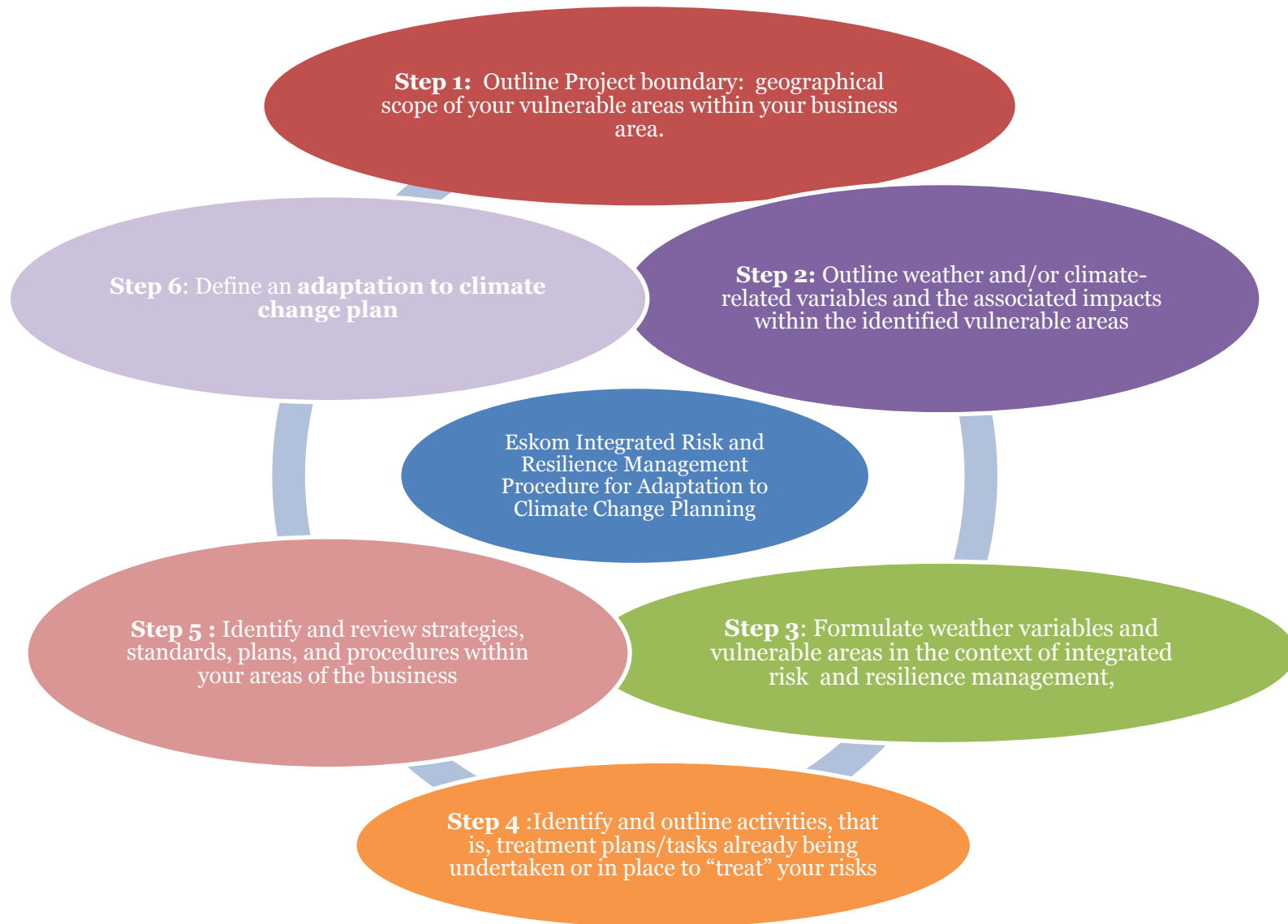
Resilience for Eskom means the ability to:

- ❑ Anticipate, identify, and adapt rapidly to threats, vulnerabilities, and opportunities
- ❑ Operate under stress without failure for extended periods of time
- ❑ Respond rapidly to contain the impact (severity/duration) of an incident / threat
- ❑ Recover rapidly in a coordinated manner
- ❑ Evolve to a higher state of resilience in response to changes in the environment, near misses, and incidents
- ❑ In terms of adaptation to climate change, Eskom's ability to adapt to the related climate related risk factors is one of the specified resilience capabilities required. This is undertaken across the operational, tactical and strategic levels of the organisation. Resilience focuses on different phases through business as usual as well as business unusual states as illustrated in the blue block.





- Operating in a “mitigation” centric environment due to the nature of the assets and business.
- There is a gap between climate change impact science data & information and long term scenario planning for energy assets.
- Complexity in terms of integrating climate change impacts (including extreme weather events and climate variability) scenario results into integrated risk and resilience management plans which are short to medium term.
- How to “quantify” climate change impacts i.e. the cost of adaptation specifically for investment decision making.
- Unclear role of insurance in defining medium to long term climate change costs.



# Eskom Integrated Risk and Resilience Management Procedure for Adaptation to Climate Change Planning



- ❑ This procedure has been compiled to provide a step-by-step guide to the Eskom Holdings SOC Ltd (Eskom) business on how to manage the adverse impacts of weather changes, seasonal shifts, extreme weather events, disasters and long-term climate change on Eskom infrastructure and systems.
- ❑ This procedure standardises how practitioners in Eskom will manage adverse impacts due to weather changes, climate variability, seasonal shifts, projected long-term climate changes including extreme weather events, in terms of integrated risk and resilience management, thus ensuring that all climate risks are managed appropriately by the Eskom business.
- ❑ Data utilised to inform “the climate risks” includes historical climate data , current weather data and future climate science based climate change impact projections .Future climate science based climate change impact projections are developed in partnership with external climate science based research institutions in South Africa.
- ❑ Some line Divisions may NOT necessarily have a document referred to as “Adaptation to climate change Plan” but may either:
  - ❑ Identify integration points and utilize existing governance structures to integrate adaptation to climate change “treatment plans” i.e. existing Strategies, Standards and Plans.
  - ❑ Develop multiple adaptation to climate change plans per identified vulnerable areas across the various regions within a Division.
- ❑ This procedure is currently being benchmarked through various national and international platforms that Eskom is currently involved with as specified by a strategic initiative on partnerships.

# Requirements for successful Implementation

- ❑ A clear definition of the “supply chain” per business area (including a GIS outline of the area).
- ❑ Clear understanding of each areas vulnerability to the impacts of extreme weather events, climate variability and long term climate change (where data and information is available).
- ❑ A clear understanding of each vulnerability areas’ integrated Risk Management Profile.
- ❑ A clear understanding of the various scenarios and options for climate change adaptation implementation to further inform investment and operational decisions.
- ❑ Involvement of a multi-disciplinary team to collect data of value: Eskom Risk & Resilience champions and Managers, Risk, Resilience and Reliability Team, Insurance Managers, Assurance Managers, Water Managers, System Engineers, Boiler Engineers, Engineering Managers (including Designers & Planners), Safety Managers; Maintenance Managers; Finance Managers, Investment and Planning Teams.
- ❑ A dedicated resource to lead and co-ordinate the multi-disciplinary team, collate information, interact with CCSD team, compile the overall plan for the Business Area Plan and lastly ensure inclusion of relevant risks, risk owners, planned treatment plans and controls.
- ❑ Partnerships with climate change scientists, climate impact specialists, risk and resilience specialists, maintenance and long term planning specialists.



Thank you

Group Risk and Sustainability Division

Climate Change and Sustainable Development Department

Eskom SOC, South Africa

[Mqadil@eskom.co.za](mailto:Mqadil@eskom.co.za)