

Eskom Holdings SOC Ltd

Building Eskom's resilience to climate impacts: Challenges and opportunities

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Climate Science: Lessons and Integration

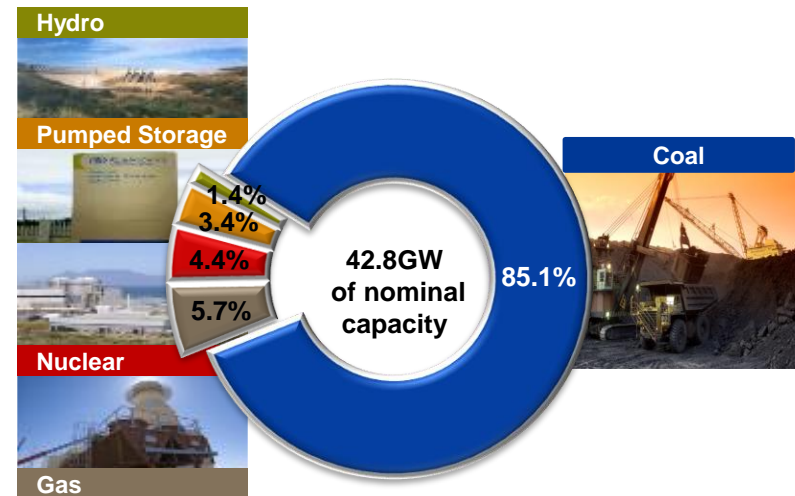
Managing mitigation and adaptation co-benefits

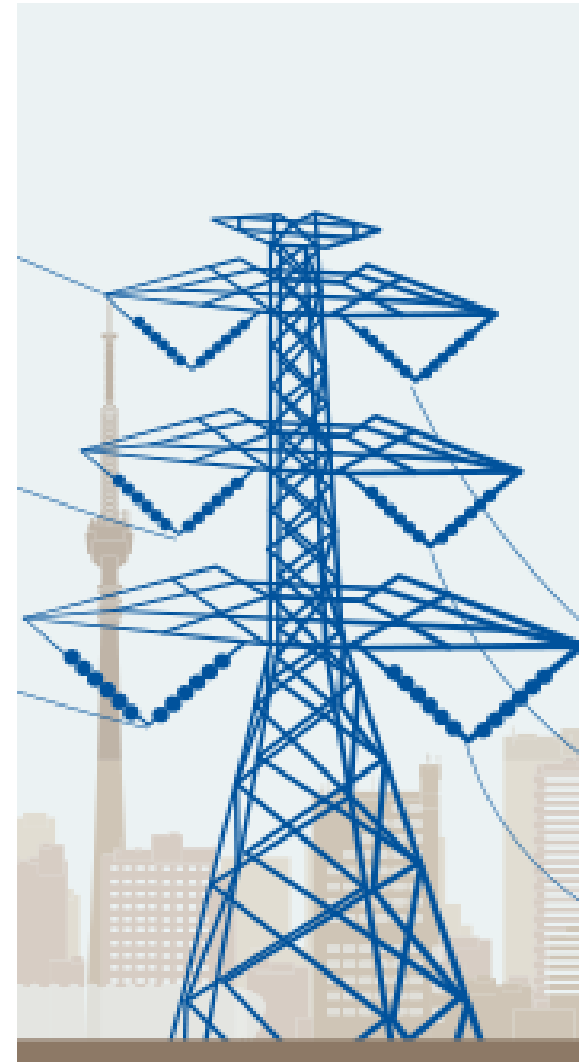
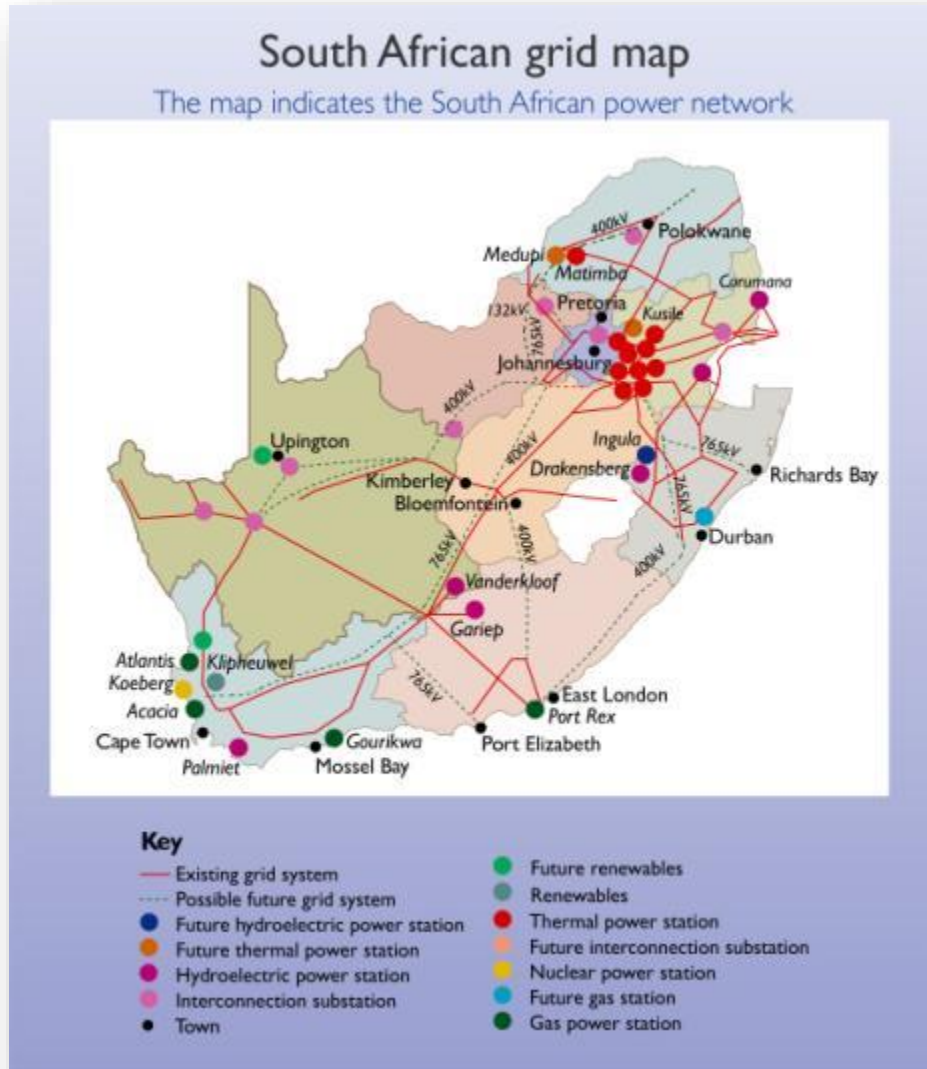
Conclusion: Paris Agreement: Enhancing Resilience



- 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 National Policy Environment

The National Climate Change Response White Paper-NCCRP (2011) guides South Africa's climate change policy.

Signatory and Ratified the Paris Agreement: Adaptation driven Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC).

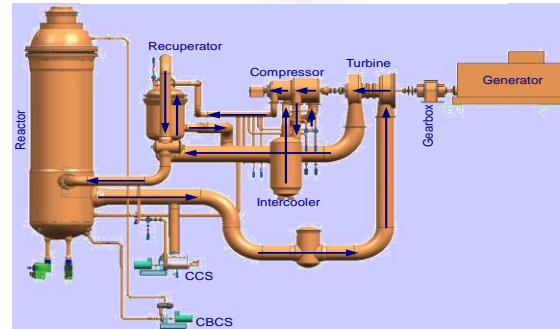
As such, the South African government is currently developing a National Adaptation Strategy (NAS) (2016) as the main plan to define its adaptation strategic initiatives per sector whilst further highlighting its capacity building, technology and financial needs.

SA's NDC: The country's aspirational goal on adaptation is to "build resilience and adaptive capacity to respond to the climate change risks and vulnerabilities whilst providing guidance on the integration of climate change responses into current and future development objectives, through optimising policy, planning, and implementation coherence of climate change adaptation actions."

Eskom's Sustainable Development Framework, Climate Change Strategy, Adaptation to Climate Change strategy and Procedure contribute directly to SA's NCCRP and NAS : as a key stakeholder within the electricity sector

Eskom's Climate Change Strategy: The 6 point plan

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.

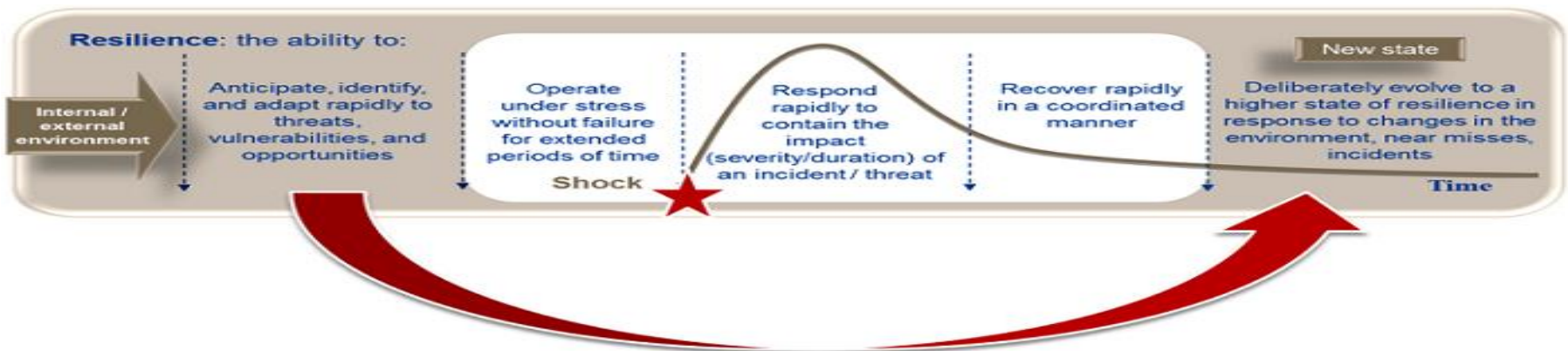
Extreme low temperatures caused the freezing of the cooling tower water affecting water circulation.

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.

Opportunities: Resilience at Eskom

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:

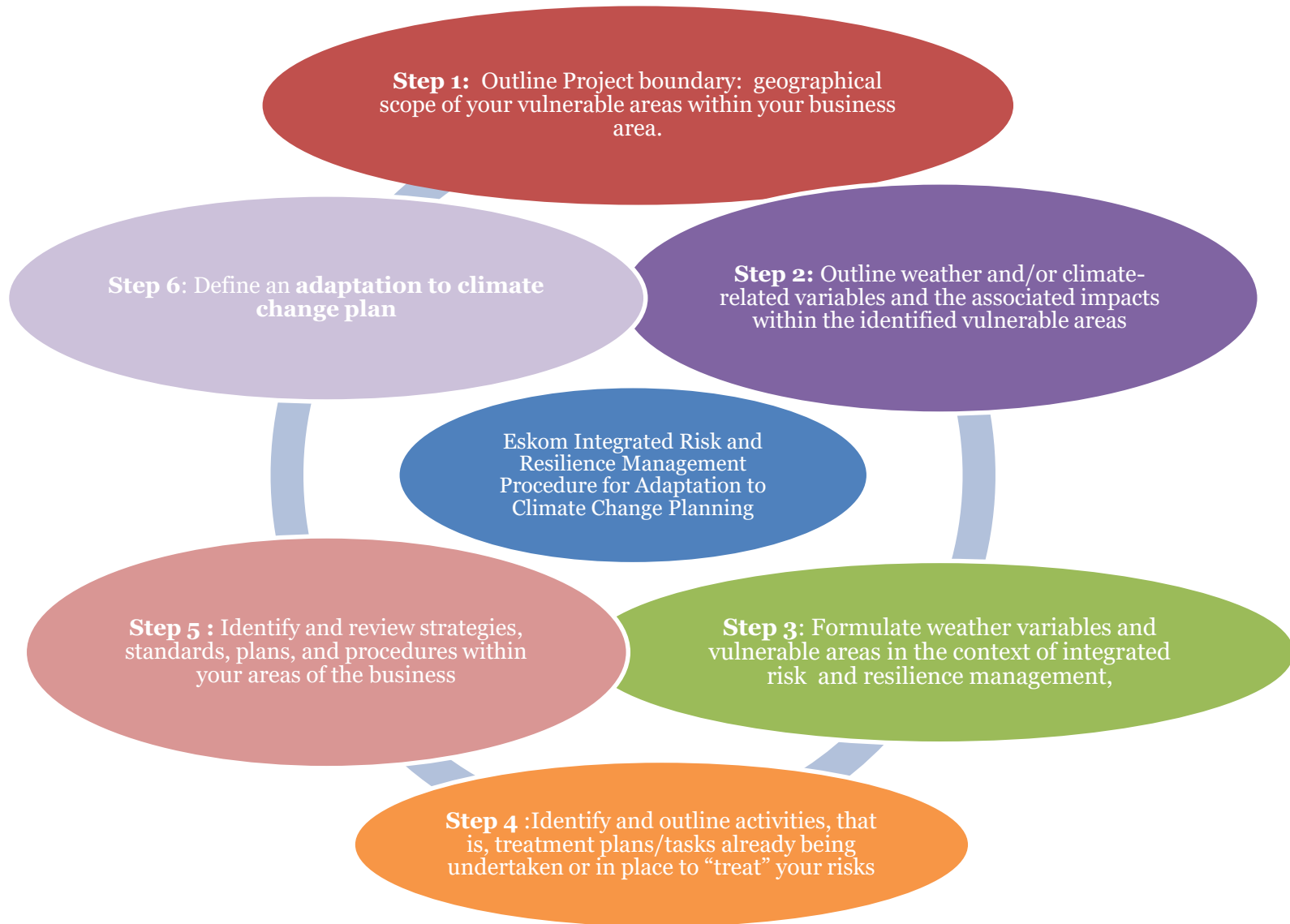


Eskom Integrated Risk and Resilience Management Procedure for Adaptation to Climate Change Planning



- ❑ 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.

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



- ❑ As part of Step 4 of the procedure: In defining treatment tasks for each of the identified vulnerable systems, downscaled long term forecasted climate impact data and information for each particular climate variable is superimposed on that area utilising Eskom's Geographical Information System (GIS) tools.
- ❑ For example in areas vulnerable to flooding, long term forecasted (Year: 2030 and 2050) climate impact data and information downscaled at 50km and 8km is super imposed utilising GIS on the currently vulnerable area to further assess future vulnerability.
- ❑ As a result, historical, current and anticipated climate impacts inform the long term treatments tasks per vulnerability area.
- ❑ Collection of data and information on adaptation costs is also being initiated per vulnerable area utilising the current incident reporting systems, recovery systems, insurance systems and budgeting systems across the business.

- ❑ A clear definition of the “supply chain” per business area (including a GIS outline of the area).
- ❑ Identification of all potential mitigation opportunities per supply chain.
- ❑ An update of an integrated Risk Management Profile with all climate impact risks including mitigation opportunities and emissions profile (for CO2 pollution prevention plans where applicable).
- ❑ 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.

Conclusion: Paris Agreement: Enhancing Resilience

- ❑ Paris Agreement (Article 2) is conceptualised in the context of sustainable development which speaks to Eskom Sustainable Development Framework which further guides Eskom's climate change response.
- ❑ Eskom' Climate Change strategy has been developed to ensure alignment with the NCCRP and its deposited NDC under the Paris Agreement through its strategic initiatives which supports/contribute to:
 - ❑ NCCRP Imperatives which refer to Transition to a Low Carbon Society
 - ❑ National Communications (NCs) and Biennial Update Reports (BURs)
 - ❑ Sectoral carbon budgets and pollution prevention plans
 - ❑ national adaptation strategy
 - ❑ national monitoring and evaluation process.

Thank you

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