



Strategic Approach to Climate Change Resilience

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Lwandle Mqadi, Climate Change and
Sustainable Development Senior Specialist,
Eskom SOC Ltd¹



South Africa's power company, Eskom Holdings SOC Ltd., has adopted a holistic, integrated risk-based approach to understanding and responding to the challenges associated with climate change. Its approach involves not only research with national climate change centres to understand, produce and use climate data but also to better understand operational thresholds that are sensitive to climate factors.

Engaging asset managers—who are required to report on the impacts of climate—is an important component of Eskom's approach. They are encouraged to document and share climate-related impacts and the resilience measures they put in place in the integrated risk management system via adaptation case studies. Corporate climate change specialists support and shape this process with guidance and tools.

Finally, with large investments in dry-cooling technology, Eskom acknowledges that additional capital expenditures and resulting reductions in operating efficiency are required to ensure energy security in an environment of increased water scarcity.

CONTEXT

South Africa, like Canada, is on the frontlines of climate change. And while climate change impacts and responses differ between the two countries, the power sector in each nation faces similar planning and operational challenges.

In 2015, South Africa recorded above-normal temperatures across the country—a trend expected to further intensify. In the Highveld region, the first nine months of the year were the warmest ever recorded. The 2015 winter is also expected to receive below-average rainfall.

Average temperatures in South Africa have risen by 0.6°C during the last century, and hot days and nights have become more frequent.² Accelerated climate change will lead to even higher temperatures and will further deplete South Africa's limited freshwater resources. Other impacts, such as rising sea levels and increased variability in rainfall, could cause more intense floods and infrastructure damage if adaptation efforts are not adequate. Eskom, Africa's largest power company and one of its biggest consumers of freshwater, has long acknowledged its role in reducing greenhouse gas emissions and in improving the resilience of the power network.

CORPORATE-LEVEL CLIMATE CHANGE ADAPTATION STRATEGY

Established in 1923 as the Electricity Supply Commission, Eskom became a public, limited-liability company in 2002, wholly owned

by the Government of South Africa. Its generation portfolio boasts more than 44,000MW worth of installed capacity, 85% of which comes from coal-fired plants. Eskom also operates gas-fired thermal stations, hydropower assets, pumped storage plants, a wind farm, a small photovoltaic plant and a nuclear plant.³ The company also administers large transmission and distribution networks spanning close to 30,000 and 325,000 kilometres, respectively.

Eskom adopted a Climate Change Policy in 2004 focused on carbon reduction and later amended it to include all aspects of climate change. In 2007, the company launched a Six-point Plan to deal with climate change in the following areas:

- Diversification of power generation sources and technologies
- Energy efficiency
- Adaptation
- Innovation through research demonstration and development
- Investment in carbon markets
- Progress through advocacy, partnerships and collaboration³

Eskom's Integrated Risk Management Process identified climate change risks faced by each business area; each area then began to implement its own climate change risk management plan. The company's Climate Change and Sustainable Development Department (part of the Sustainability Group) provided technical support and relevant business intelligence.³ Eskom reviews its strategy every three-to-four years, as new relevant information becomes available.

In 2011, the year Durban hosted the negotiations of the United Nations Framework Convention on Climate Change (UNFCCC), Eskom reviewed its plan in line with South Africa's national climate change commitments. The review led Eskom's leaders to prioritize and formalize an adaptation strategy because of concerns that climate-related hazards would increasingly threaten energy security. The strategy features short- and long-term actions to build Eskom's adaptive capacity and long-term resilience.⁴

"Climate change is a level 1 risk, which means that its management gets directly reported back to the Management Committee Operations," says Lwandle Mqadi, a Climate Change and Sustainable Development Senior Specialist with Eskom's Climate Change and Sustainability Department. "The fact that Eskom is a state-owned utility, and that the Department of Public Enterprise has a Climate Change Framework for State-Owned Companies in place covering adaptation, further influences Eskom to follow an integrated approach to climate change."

PROMOTING RESILIENCE AT THE ASSET LEVEL

Eskom recognizes that an effective adaptation strategy must be based on science and has invested in applied research. Some of this research focuses on defining the maximum climate-related loads that Eskom's assets can cope with before incurring costly operational failures or interruptions. To help identify these operational thresholds, Eskom continuously

undertakes a comprehensive survey of its generation and transmission/distribution assets.

So far, the surveys have yielded a wealth of asset-level information, along with ideas about which data to collect and analyze in the future. The surveys also assist the organization's efforts to build a strong business case to support further adaptation work.

Eskom launched a Climate Change Adaptation Research Case Studies Program: each year, the Climate Change and Sustainability Department helps a few asset managers complete studies on the impacts of weather, climate variability, seasonal changes, and long term climate changes along with assessments of adaptation measures.⁵ The case studies, along with any best practices that emerge, are shared widely within the company. The program ties in with the company's integrated risk management process by encouraging asset managers to include climate change resilience in their integrated risk management (IRM) plans.

The climate adaptation case studies align with a five-step procedure that standardizes how practitioners and asset managers will manage adverse impacts due to climate-related risks:

1. Assess key weather and climate variables, and their associated impacts within the identified **vulnerable areas** (information gathering through research or observations).
2. Outline project boundaries.
3. Explain operational vulnerability through the IRM process and outputs.

4. Identify and describe current plans, strategies, policies, standards and procedures that manage climate change risks.
5. Define a climate change adaptation plan, including required studies and information, within IRM plans.

To improve access to relevant climate-related data, Eskom partnered with research groups from the University of Cape Town, the University of KwaZulu-Natal and the Council for Scientific and Industrial Research (CSIR). The partners develop high-resolution climate projections, along with forecasts of extreme-weather events. Asset managers use these custom data, together with internal business intelligence, to inform medium- to long-term strategies to assess Climate change impact(S) and adaptation options.

INNOVATION AND CLIMATE CHANGE ADAPTATION

South Africa's limited freshwater resources help Eskom justify large investments in alternative cooling technologies that rely on air rather than on water.⁶ In the 1980s, the company began to invest in dry cooling as a tactical response to water scarcity—a decision later justified by the reductions in

freshwater resources due to climate change. Eskom's Six-point Plan on climate change identifies dry cooling as a short-term adaptation solution for all of its new thermal-generation assets. This approach is discussed in more detail in CaseStudy 8 – Cooling for Thermal Power Generation in a Changing Climate.

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LESSONS LEARNED

The success of Eskom's Climate Change Adaptation Research Case Studies Program was not instantaneous. "It required a lot of man-effort and technical capabilities from experienced engineers,"

says Lwandle Mqadi¹. However, with more than 10 case studies completed and shared across the company, momentum is building. Lwandle Mqadi reports that most challenges associated with the integration of climate resilience into risk management relate to how climate change risks are interpreted and captured within the IRM process, rather than to climate change science itself. "Not every climate risk gets addressed or captured appropriately. Sometimes because of financial constraints, the management of some risks gets delayed while other risks are being managed."¹

Eskom's example illustrates that climate change adaptation sometimes requires making trade-offs between economic and

environmental performance, and resilience. Dry cooling, for instance, incurs higher construction and operating costs than conventional wet cooling and reduces efficiency. However, Eskom accepts these trade-offs and costs as necessary to reduce the company's dependence on South Africa's diminishing freshwater resources and to enhance the security of its power supply.

Today, the equivalent of four full-time employees support the implementation of Eskom's climate change adaptation strategy, and individual business areas provide additional resources. "Thus far, budgets for climate change adaptation have come from within the business, but we are looking at other funding opportunities," says Eskom's Lwandle Mqadi.¹

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¹ Mqadi, L. Personal Communication. (2015)

² Karmalkar, A., McSweeney, C., New, M., & Lizcano, G. United Nations Development program Climate Change Country Profiles – South Africa. (School of Geography and the Environment, University of Oxford, 2012). at <http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/UNDP_reports/South_Africa/South_Africa.hires.report.pdf>

³ Eskom. Powering your world. (2015). at <<http://www.eskom.co.za/Pages/Landing.aspx>>

⁴ Park, J. & Hopkins, N. Business and Climate Change Adaptation: Toward Resilient Companies and Communities. (UN Global Compact and UN Environment Program, 2012). at <https://www.unglobalcompact.org/docs/issues_doc/Environment/climate/Business_and_Climate_Change_Adaptation.pdf>

⁵ Chiloane, K., Naidoo, S., & Mqadi, L. Impacts of Weather and Climate on Eskom Power Utility. Adaptation (Eskom Holdings SOC Ltd, 2013). at <<http://www.climatechangeedu.eu/fileadmin/ASSETS/LEAN/Banners/chiloane.pdf> (accessed 10/14/2015) >

⁶ Pather, V. Eskom and water. Proceedings of the 2004 water institute of Southern Africa Biennial conference. (2004).



KEY TAKEAWAYS

- 1** **Covering the costs of adaptation to climate change is a challenge**
- 2** **Incorporating climate change resilience into Eskom's Integrated Risk Management requires custom data and specialist support**
- 3** **Adaptation decisions sometimes require choosing between resilience and technical/financial performance**

ORGANIZATION(S)

Eskom Holdings SOC Ltd. (South Africa)

POWER SUB-SECTOR(S)

Electricity generation, transmission and distribution

ADAPTATION TYPE(S)

- Informational – Climate Services
- Management – Insurance and financial risk management
- Management – Re-organization and governance
- Physical – New generation, carrying and transformation capacity

CLIMATE CHANGE IMPACT(S)

- Rising ambient temperature, droughts, and number of hot days

ADAPTATION COSTS

- The estimated overall cost of Eskom's climate change adaptation is moderate to high.
- The cost of applied research varies from low to moderate.
- Capital and operating costs of dry-cooling technologies are high compared with wet cooling.

ADAPTATION BENEFIT(S)

- Increased reliability
- Better environmental performance
- Improved resilience of Eskom's systems
- Reduced vulnerability to extreme weather events

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FULL REPORT

<https://ouranos.ca/en/programs/energy-adaptation-case-studies/>