



Climate Change Risks and Opportunities for the Electricity Distribution Industry

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1 Introduction

The generation of electricity is the single largest source of carbon dioxide (CO₂) emissions in South Africa. The combustion of coal is the primary source of these emissions as 90 percent of the country's electricity is generated in coal-fired power stations.¹

This heavy reliance on an inefficient coal-based economy increases the country's vulnerability to climate change. Economic growth in the country has increased electricity demand over the last decade, coupled with this, is the mounting pressure to address climate change and to move towards a low carbon economy.

This paper highlights some of the risks that climate change poses on the electricity distribution industry in South Africa, suggests ways that some of these risks can be mitigated and puts forward some of the opportunities that climate change presents to the electricity distribution industry.

2 Climate Change in Perspective

2.1 Climate Change on the Agenda

Climate Change has risen from a "fringe" issue to a mainstream concern. There is now consensus from key segments of society – politicians, scientists, civil society, the media and ordinary citizens that concerted effort has to be made to address climate change.

Climate change issues now pervade a number of areas of life – from consumer choices, organisational strategy and reporting, through to technological development and regulatory reforms.

The 18th century was characterised by the industrial revolution and the 20th century by globalisation. This century will see unprecedented urbanisation, shortages of food and water and intense competition for scarce resources, driven by population growth and economic development. Climate change is being

¹ <http://www.dme.gov.za/energy/electricity.stm>

driven by the use of fossil fuel based energy sources to meet these challenges. The responses to these challenges will require a revolution in energy generation, supply and demand.

Many electric utilities worldwide have responded proactively – reporting on their emissions, reducing energy consumption, and addressing risks & vulnerabilities. Investors now require major electric utilities across the globe to report on their greenhouse gas (GHG) emissions, and on how they are tackling their climate change liabilities (e.g. Institutional Investors Group on Climate Change (IIGCC) has published disclosure standards for electric utilities). The reporting is done through the Carbon Disclosure Project (CDP) which is in its 7th year of investor led action on climate change, growing in size and scope each year. The CDP acts as Secretariat to Climate Disclosure Standards Board formed by the World Economic Forum.

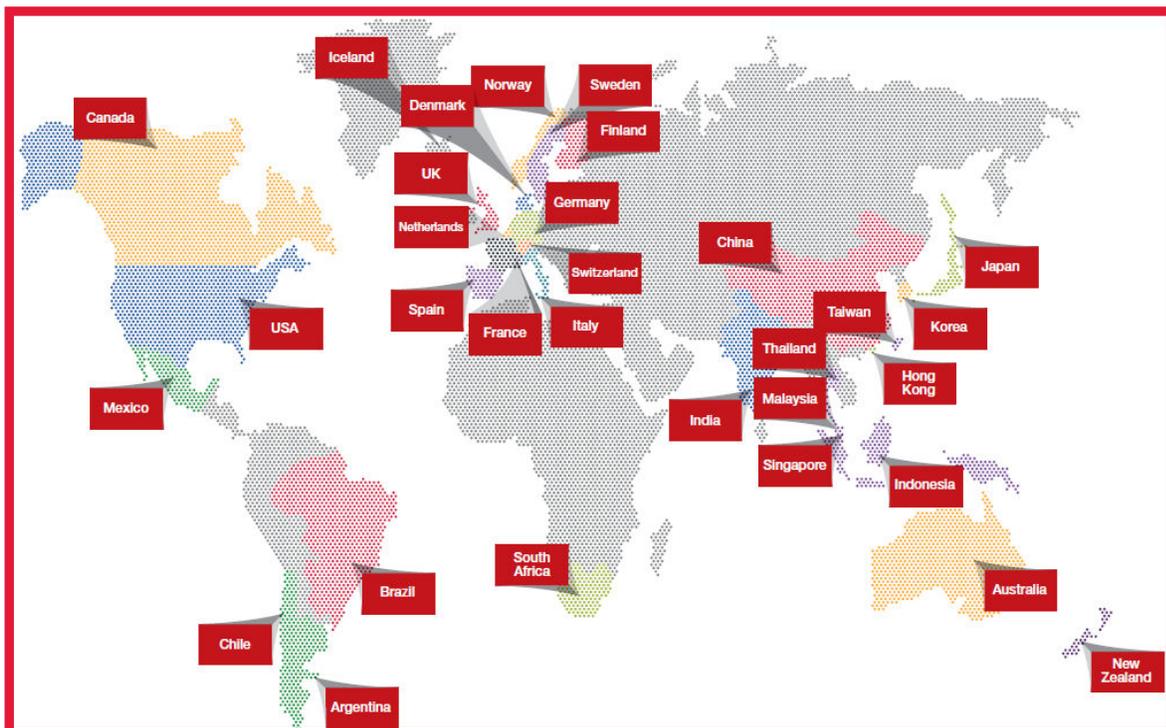


Figure 2.1: The Carbon Disclosure Project (CDP) – Global Coverage 2008

Source: CDP Report 2008: JSE Top 100 (2008)

2.2 Where are we now?

Even though mandatory reporting has not been introduced in South Africa, the country is one of the highest emitters of carbon dioxide and it is being placed under intense scrutiny to reduce its emissions. Much attention is now placed on the future of global climate change commitments, in the lead up to the Copenhagen Summit in December 2009 and key developing countries, such as India, China, Mexico, Brazil and South Africa are being placed under increasing pressure to address their emissions.

Greenhouse gas emissions from developing countries have increased at a higher rate than those of industrialised countries since 2004, although the former emit significantly lower emissions *per capita* than developed countries². As part of its response to climate change issues, South Africa prepared a National Climate Change Response Strategy, developed the Long Term Mitigation Scenarios (LTMS) and formed an Inter-governmental Committee to address climate change and its effects on the country.

2.3 Long Term Mitigation Scenarios

Following the LTMS, cabinet made the following key decisions:

- **GHG emission reductions and limits.** South Africa will follow a peak, stabilisation and decline GHG trajectory over the next 60 years.
- **Implement the Business Unusual Call for Action**, i.e. building on existing initiatives - energy efficiency, renewable energy, “green” industries and on-going research
- **Investments in R+D** for electric and hybrid vehicles, new solar technologies, clean coal technologies, carbon capture and storage and participation in a range of other national and international initiatives that could achieve
- **Vulnerability and Adaptation** – understanding the potential impacts and being prepared to meet the challenges.

South Africa’s vulnerability to the impacts of climate change means that across government and society, we need to understand the potential impacts of climate change and be prepared to take action towards adaptation.

2.4 South Africa in Focus

South Africa is comparatively vulnerable as it is a significant global emitter (12th highest emitter globally) and has amongst the highest emissions per capita in the world. The reliance on an inefficient coal based economy through the use of advanced but energy sapping fossil fuel technologies, such as the coal-to-liquids programme makes our electricity and liquid fuels consumption particularly carbon intensive.

Some strides are being taken in addressing the country’s vulnerability, such as the formulation of the Climate Change White Paper due to be completed in 2010. A 2c/kWh levy on non-renewable electricity is already in place, the country’s first carbon tax, which is likely to be escalated. Mandatory reporting of emissions is also likely to be instituted in the very near future. There are strategies under development in national, provincial and local government departments and across all sectors. It is within this context that the climate change risks and opportunities for the electricity distribution industry are brought to light.

² Greenhouse gas emissions growing faster since 2000: new data on worldwide emissions 1970-2005. 2009. JRC European Commission. http://ec.europa.eu/dgs/jrc/downloads/jrc_090525_newsrelease_edgar.pdf

3 Climate Change Risks for the Electricity Supply Industry

When looking at the electricity distribution industry, one of the first obvious risks that come to mind is physical risk, damage to infrastructure, equipment and networks. However, there are other equally critical risks to consider when it comes to the impacts of climate change. Some of these risks are:

- Direct Physical Impacts & Vulnerabilities
- Regulatory
- Consumer and Market Preferences
- Investor Concerns
- Brand and Reputational
- Rising energy and fuel costs

3.1 Direct Physical Impacts

3.1.1 Impact of power outages

Outages caused by the weather can result in failure in the supply of power. Interruptions and longer term outages can cause major financial losses for utilities and the customers that depend on the service.

3.1.2 Damage to operational performance

Extreme weather events and incremental change impact the bottom line of electric utilities by degrading site conditions, damaging assets, decreasing efficiencies of operations, reducing availability and quality of raw materials and natural resources. These events can also disrupt energy supplies which can then increase energy prices. Asset design and operation maintenance procedures will need to take into account changing climatic conditions and potential disruptions.

3.1.3 Increased demand from rapid urbanisation

The trend toward increasing urbanisation is expected to be accelerated; Africa has some of the fastest rates of urbanisation worldwide and will experience particularly high pressure in this regard. Electricity companies will face major challenges in providing new generation capacity and supply reliability within urban areas to meet the increased demands from domestic customers.

3.1.4 Changes in weather patterns

Increasingly hotter summers are leading to higher cooling demands and increased flooding, especially in coastal areas, causes damage to infrastructure.

3.1.5 Stress on water resources

Changes to the weather and an increasing population are placing global fresh water resources under increasing stress. Less water, declining water quality, and growing water demand are creating immense challenges to the electricity sector which is a major user of water. Delivering and treating clean drinking water, combined with providing safe sewerage and waste water treatment systems to an increasing global urban population will create significant increases in the demand for electricity. The impacts of climate change will also increase the competition for water resources among the electricity sector and other users for example, agriculture, fisheries, drinking water, industry and natural habitats. This will place pressure on the government to introduce regulatory controls and increase water pricing.³

3.1.6 Regulatory Risks

A 2c/kwh levy on non-renewable electricity is already in place, the country's first carbon tax, which is likely to be escalated. Mandatory reporting of emissions is also likely to be instituted in the very near future.

3.1.7 Consumer and Market Risks

Customer expectations of secure energy provision will place increasing pressure on utilities. This may lead to adverse media and customer comment and loss of consumer and investor confidence. With rapid urbanisation it will become increasingly difficult to meet the demands from domestic customers, essential urban utilities (like water and sewerage) and future technological advances in transportation (e.g. electric vehicles).

4 Climate Change Opportunities for the Electricity Supply Industry

Although there is uncertainty about the extent and rate of future climate change, there is sufficient information the electricity industry to assess the potential impacts and build on the many opportunities that climate change presents. Some of these opportunities are:

- Access to national and international support mechanisms
- Carbon Markets – access to the Clean Development Mechanism (CDM) and carbon financing mechanisms
- Emissions reduction programmes
- Renewable energy and environmental services
- Improved efficiencies and competitiveness

³ *Building Business Resilience to Inevitable Climate Change*
http://www-05.ibm.com/uk/green/cdp2009/pdf/ibm_carbon_disclosure_project_2009_electric_utilities.pdf

- New or expanded markets
- Consumer preferences
- Investor relations – ability to attract investment to grow the industry
- Compliance with national and international regulations
- Reputation and Branding

4.1.1 Access to CDM and Carbon Financing

The Clean Development Mechanism (CDM) has been instrumental in the development of clean energy projects around the world as part of efforts to reduce global greenhouse gas emissions. Since electricity distributors in South Africa will, in the near future, be issued with both generation and trading licences, there is an opportunity for them to generate and trade their own clean energy. The projects can be financed through the CDM and other carbon financing mechanisms. In addition to this, Treasury is making provision for the income derived from CDM projects to be tax deductible. It should be noted however, that the CDM project registration is a multi-staged and complex process involving direct interaction with the CDM Executive Board, under the United Nations Framework Convention on Climate Change (UNFCCC).

A thorough baseline & emissions reduction methodology must be submitted to the CDM Methodology Panel and all GHG emission reductions claimed as part of a CDM activity must be additional to that which would have occurred in the absence of that finance.

There are specific guidelines for identifying projects which have a chance of generating carbon credits such as:

- A project should assist in achieving sustainable development.
- A project has to demonstrate additionality (i.e. a project activity is additional if GHG emissions are reduced below those that would have occurred in the absence of the registered CDM project activity).
- Funding of CDM projects from Annex 1 countries is not to result in the diversion of official development assistance.

4.1.2 Emissions Reduction

Other opportunities for GHG emissions reductions in the electricity sector include:

- Implementing energy efficiency and demand management measures to meet emissions reduction targets
- Retrofitting technologies to clean legacy assets

- Incorporating control technologies (smart grid, smart metering, distributed/micro generation, virtual power plants, demand management)
- Improving grid management
- Undertaking operational and infrastructure improvements to increase the resilience of assets and efficiency of distribution networks
- Voltage optimisation

4.1.3 Renewable Energy Services

The current South African Renewable Energy Feed-in Tariff (REFIT) excludes participation by small-scale generators. Given the rapid urbanisation, improving living standards and the resultant rise in demand for electricity, electricity distributors are increasingly put under a lot of strain to meet these challenges. It is therefore critical that any future demand on electricity is supplied with low carbon impacts. One way of achieving this is through the expansion of the renewable energy industry in the country, through the introduction of a small-scale feed-in tariff which would provide individuals, communities and businesses an opportunity to generate their own renewable electricity.

The small-scale REFIT would be administered by municipalities. The National Energy Regulator of South Africa (NERSA) would be requested to provide guidelines and assist municipalities to develop a simplified generation licence, which would enable the Regulator to keep track of installations connected to the grid. A simplified form of “Obligation to Purchase” agreement between a municipality and a small-scale generator for the supply of renewable power to the grid would also need to be developed.

The costs associated with connecting installations would be borne by the system owners, while the costs associated with upgrading the grid in order to connect new installations, would be borne by the grid operator. The costs for administering a small-scale REFIT would be borne by municipalities and passed through to consumers using existing pass through mechanisms.

Since electricity distributors will be issued with both a generation and a trading licence under the Electricity Regulation Act, it means that they will be able to participate in the national REFIT programme by bundling the same type of small-scale renewable energy installations up to a quantity that would qualify for the REFIT and enter into Power Purchase Agreements with the Single Buyer Office.

Municipalities could also set up their own solar plants which could be the future for solar power in South Africa and make the country a world leader in solar thermal and solar (photovoltaic) PV power.

5 Moving Towards Adaptation

Electricity utilities have an opportunity to effect the transition from a traditional fossil-fuel based economy to a low carbon economy that recognises and values environmental goods and services, and diversifies the economic base at a time when the traditional base is being challenged. In order to take the right steps towards building resilience to inevitable climate change the electricity distribution industry needs to ask whether it is ready to meet the demands of a carbon constrained economy. The table below highlights a set of factors to be considered.

Table 5.1: Adapting to Climate Change

Adaptation considerations	Key Questions
A climate change strategy	Do we need one?
Drivers for a low carbon economy	Do we understand these?
Assessing our emissions	What is our carbon footprint?
Carbon management	Can we save money & be greener?
Organisational change	How do we engage with our employees?
Benchmarking	How do we compare to other distributors?
Project & investment appraisal	Is there an opportunity to create value?
Carbon credits	Can we access carbon finance? CDM?
Supply chain optimisation	What does climate change mean for our consumers & suppliers?

6 The Future

Change is needed now ensure competitiveness and resilience in a future much different from today. Successful electricity distributors will be those who have taken immediate action in response to the clear signals that climate change is altering the way in which we do business. They will have acknowledged the risks and opportunities arising from a changing social, economic and political context and will have instituted processes and business models that understand the changing nature of supply, demand and control in the electricity sector. They will also have an all inclusive strategy to address the challenges of the energy revolution, reducing emissions and adapting to climate change and will use the lessons

gained from the present financial crisis and from history to avoid the even greater and entirely 'predictable surprise' created by climate change.

To pro-actively address the immediate and longer term impacts of climate change senior executives in the sector must take the lead and drive the transition to a low carbon economy.⁴

⁴ *Building Business Resilience to Inevitable Climate Change*
http://www-05.ibm.com/uk/green/cdp2009/pdf/ibm_carbon_disclosure_project_2009_electric_utilities.pdf

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