

Acting Responsibly and Promoting Sustainability: Eskom Strategic Initiatives to Reduce Carbon Dioxide Emissions

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ABSTRACT This paper examines various strategic initiatives and measures that have been put in place and are being implemented by the Electricity Supply Company of South Africa (Eskom), a state owned power utility that accounts for over 90% of South Africa's electricity. It also operates the generation and transmission system. In the process, it emits carbon dioxide causing global warming and climate change. The paper also looks at the strategic interventions by the South African Government to compel businesses to reduce their carbon emissions. The paper accentuates that even though Eskom is currently using massive coal-fossil fuel to power its plants to generate electricity and, in the process emit carbon dioxide, the parastatal is mindful of the impact this emission is having on the atmosphere and the environment. Eskom has now, apart from government's policy and intervention on emissions reduction, voluntarily initiated various strategies to carry on its business operation with some modicum of responsibility by incorporating other sources of alternative sustainable energies in order to reduce its carbon foot print.

INTRODUCTION

It is beyond polemic that contemporarily climate change caused by unprecedented systemic and systematic emissions of carbon dioxide is now a global issue (Hornborg 2009). It is impacting and threatening human existence and ecosystems. Its global impact is dreadful considering various devastating extreme bizarre weather events manifesting throughout the world (Flannery 2006). This has perhaps informed the unprecedented collective efforts by the international community insisting that there must be emission reduction in order to save the present and future generations from untimely extinction (Glenn and Gordon 2011). Against this backdrop Pachauri (2008: 17) asserts that "it is now becoming increasingly apparent that the global community, over several decades, has pursued a path of development which is clearly not sustainable. In the context of climate change, we are now getting increasing evidence, based on observations, based on data that is available, that the path of development that we have adopted is leading to consequences with changes in the climate that clearly have extremely harmful im-

pacts and hold the potential for far more serious impacts in the future."

South Africa is a developing country but ninety-three per cent of Eskom's electricity is generated from coal-fired stations (Nkomo 2005), emitting carbon dioxide and other forms of greenhouse gases into the environment. These are contributing to and causing global warming and climate change, creating a huge environmental footprint for the country even though it is exempted from the Kyoto protocol that regulates and controls countries' emissions reduction (Makwana 2011). Victor's (2008: 2) study has revealed that the "developing countries already account for roughly half of current world emissions of greenhouse gases and their share is rising rapidly. Achieving widely discussed goals for protecting the climate – such as limiting global climate change to a 2 degree average of warming globally or stabilizing global concentrations of greenhouse gases at the equivalent of 550 parts per million of carbon dioxide (CO₂) – will be mathematically impossible without a swift change in policy within the developing countries." Consequent upon this, the South African government through its various departments dealing with energy, environment and control of emissions of noxious gases, have started implementing national and international policies and measures on emissions reduction (Warburton et al. 2007).

Interestingly, developing countries like China and Brazil that are known for their substantial

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contributions to carbon emissions as a result of their aggressive quest for economic growth and developments (Rohter 2007) "have softened their opposition to limiting growth in their own emissions in part because they have become more aware of their own exposure to climate dangers." (Victor 2008: 4).

South Africa has embarked on aggressive implementation of policy on deployment and the use of alternative renewable energy into its energy mix (Winkler et al. 2007). For example, clean energy sourced from renewable energy is a fundamental solution to the challenge of climate change because it offers a unique opportunity to generate energy that is devoid of carbon dioxide emission causing global climate change (Brook 2010). Against this backdrop, Eskom is now championing implementable strategic initiatives by collaborating with various stakeholders and role players locally and globally to develop global alternative energy initiatives for generation of power and electricity that cut across political and geographical boundaries (Eskom Fact Sheets [EFS] 2011). As leading role players in the South African delegations in global climate change talks, the government and Eskom are discharging a huge responsibility to ensure that South Africa's best interests are represented fairly and that Eskom commits to achievable and sustainable targets of emission reduction (Eskom Climate Change Series [ECCS] 2011). While Eskom is making frantic efforts to respond to carbon dioxide emissions causing climate change, at the same time, the parastatal is also providing sustainable alternative renewable energy as part of its strategy to ensure energy security, access, and affordability for all South Africans (Department of Minerals and Energy [DME] 1998). However, Mwakasonda and Winkler (2005: 95) assert that "making South Africa's energy system more sustainable is a transition that will take decades."

Against this backdrop, in the short term, Eskom will continue to use coal-fossil fuel to produce energy for domestic and industrial activities because, for now, it is still the most viable option but will continue to research and bring about technology that will allow it to shift to full blown sustainable renewable energy. It is in this context that Eskom is committed to diversifying its energy mix to lower-carbon-emitting technologies as it prepares for the impact of the adverse effects of climate change (Hamilton 2010) by

reducing its carbon emissions in a manner consistent with South Africa's economic growth objectives. The company is also committed to planning for the impact of climate change (Zola 2012). These strategic interventions and initiatives are in line with the actions expected to be taken by responsible governments and businesses as underlined in the Stern report which identified climate change and development as being the two greatest challenges of our time and urged that prompt action should be taken by generating political will to put prudent policies into action, especially towards the low-carbon growth. In addition, a proposal was made for stabilizing greenhouse gases levels (Ki-moon 2008).

Objectives

The key objective of this paper is to highlight that Eskom's usage of coal to generate power and electricity which emits carbon dioxide is contributing to global climate change and compromising sustainable development. The emphasis is that Eskom has to take responsibility by ensuring that it reduces its carbon emissions in view of the impact and effect of global climate change. Pursuant to this, Eskom has taken some steps by voluntarily initiating various strategies and measures to reduce its carbon dioxide. With regard to the government, even though South Africa is not mandated under the Kyoto Protocol to reduce its emissions, the country has a responsibility to ensure that it uses all avenues open to it to be part of the global movement that seeks to continue to strengthen implementation of emissions reduction. Bearing in mind that Eskom is one of the major emitters in the country and on the Africa continent, government has intervened by implementing policies and measures on emissions reduction. Government is doing this in order to achieve sustainable development in all sectors of the economy recognising that the economy and the environment are co-dependent because economic stability that incorporates the concept of sustainable development will lead to environmental stability. Whereas, unsustainable economic growth and development will impact on the environment and could lead to environmental degradation if not properly managed and controlled.

METHODS

The method for this research was qualitative analysis of numerous strategic initiatives and

the government's strategic interventions through policies, guidelines, and measures were thoroughly consulted and analysed to evaluate how the issue of carbon dioxide emissions reduction is being tackled in South Africa. Pursuant to this, the study relied extensively on relevant contemporary literature studies and reports written by scholars in the field. More importantly, information pertaining to Eskom's strategic initiatives was extensively sourced from Eskom's website on the internet through a desktop research approach.

STARTING FROM THE BASIS: A CONSIDERATION OF GOVERNMENT INTERVENTION

Even though Eskom has embarked on drastic and aggressive implementation of various initiatives on emission reductions, this has to be done in line with the government policy and laws that have been put in place (Odeku and Meyer 2010). Pursuant to this, it is pertinent to examine the government's various strategies for emission reduction that are geared towards combating global warming and climate change with the drive and political will to implement these strategies through application and implementation of policies and enforcement of laws (Way 2012). It is important to point out that South Africa uses a lot of non-sustainable coal-fossil fuel to power and drive its economy and is hence ranked 13th in the world in terms of GHG emissions estimated at 400 million tons of CO₂ equivalent and from other gasses and noxious substances such as CH₄, N₂O, HFCs, PFCs, SF₆ contained and recognized within the ambit of Kyoto GHG emissions. With this overwhelming revelation supported by scientific evidence, coupled with the physical manifestations of the global warming catastrophes, no responsible government will sit on the fence and fail to take action. It is against this threat that the South African government has responded nationally and internationally to be part of and contribute to the global collective fight against carbon emissions causing global climate change. Government's national policy initiatives on emissions reduction include, but are not limited to, implementing its National strategies to reduce GHG emissions through the White Paper on Renewable Energy of 2003 and the country is expected to derive 10 000GWh of energy from renewable energy by

2013 as part of the contribution to final demand. The government has also started implementing initiatives towards a final energy demand reduction of 10% in the residential sector by 2015 as part of the national climate change response strategy for South Africa (DEAT 2004). Government has continue to promote capacity building in Energy Efficiency and Renewable Energy programmes (DME 2004, 2005).

Even though the strategy to reduce carbon dioxide and the dangers of global climate change could prove very difficult if it is left to businesses alone, "government needs to play an active role and undertake a portfolio of efforts that are politically challenging because they require large expenditures today for uncertain benefits that accrue far into the future" (Victor 2008:1). Areas that the government can intervene in is to partner with businesses and encourage them to invest in "new technologies and knowledge that will be needed for achieving cost-effective and deep cuts in emissions; and preparing for a changing climate through investments in adaptation and climate engineering" (Victor 2008:1).

On the international level, South Africa ratified the UNFCCC in November 1997 and ratified the Kyoto protocol on 31 July 2002. As a Non-Annex I member this means that in terms of article 3 of the Kyoto protocol South Africa is not subject to quantified emission limitations or to reduction commitments, but still needs to act responsibly. Therefore, the country has moral, scientific and administrative obligations to continue to formulate and implement measures to mitigate climate change (Halvorssen 2007).

The government is promoting innovations, particularly in Research and Development, with a significant investment in the development and demonstration of new and better technologies, promotion of energy efficiency, and involvement in saving energy electricity (Kaygusuz 2012). The government is also involving various stakeholders and role players in the fight against climate change. These strategies are important and are promoting economic development and, at the same time, a clean environment and sustainable development. Economic development has been described as a continuous increase in the economic standard of living of a country's population. It is normally accomplished by doing things to improve the country's future production potential such as building more factories, educating more people, improving its technolo-

gy etc. Economic growth is the increase over time in the capacity of an economy to produce goods and services and, ideally, to improve the well-being of its citizens.

INCORPORATION OF SUSTAINABILITY INTO THE BUSINESS MIX

South Africa is confronted with many socio-economic challenges because it is a poor country but seeks to grow; it faces rising demands for energy and, in particular, electricity. It uses its naturally endowed large coal supplies that dominate its power generation to meet this demand (Kohler 2006). However, the country wants to intensify its modern industrial base and provide for socio-economic goods and services to its citizens (Pachauri 2008). However, the Academy of Sciences for the Developing World (TWAS 2008: 5) has warned that “aspects of this challenge demand urgent attention, the first because access to reliable, affordable and socially acceptable energy services is a pre-requisite to alleviating extreme poverty and meeting other societal development goals. Second because emissions from developing countries are growing rapidly and are contributing to environmental problems, such as climate change and poor air quality, that put the health and prosperity of people around the world, but especially people in poor countries, at grave risk.”

The South African government has also joined other responsible governments of the world to promote sustainable development by establishing institutions and policy ideas. Programmes and instruments have been established and are in force; many more have been conceived and are on policy agendas. South Africa has also incorporated the international initiatives of the UN's Agenda 21, a global action plan for sustainable development in the 21st Century that emerged from the 1992 Earth Summit in Rio. The overall objective of this is to reduce the country's carbon emissions (Harrison 2006).

The essence of sustainable development is therefore acting responsibly in order to protect the environment (notably, but not only, the limitation of climate change) whilst maintaining economic development and acting against poverty (Lafferty 1996). The concept is about progression and processes leading to change and not a one size fits all or a fixed state of harmony. It can

be applied to suit a particular situation considering time and space. For example, even though developing countries are not under Kyoto obligation to reduce their carbon emissions, the concept of sustainable development mandates them to do so because it is reasonable and responsible not to aggravate the already clouded atmosphere (Thomas and William 2000). Pursuant to this, businesses are expected to incorporate the concept and apply it in their daily business operations and activities. Eskom is promoting sustainable development in all its operational activities.

Scientific reports and evidence have shown that human activities are, globally, causing environmental degradation, depletion of the ozone layer, as well as, causing climate change (Rowland 2000). While the developed nations are the culprits for bringing about these environmental calamities, the developing nations are also dubious beneficiaries of the results of these acts of environmental crises. However, the developed industrialized countries seem to be resolute and confront these problems through massive investment in and implementation of sustainable strategic interventions and innovations to mitigate and adapt to the bizarre weather events (Leggett 2006). These strategies are geared towards acting and behaving in sustainable ways. By so doing, the developed countries are promoting sustainable development and practices. However, the developing countries are not making enough effort to promote and incorporate sustainable development practices in the way and manner in which they use energy for growth. South Africa is no exception because of its massive use of coal-fossil fuel emitting carbon dioxide and causing global climate change. However, with regard to mitigation, the country is encouraging the role players to explore the use of sustainable alternative energy resources.

China, a developing country, is also a Non-Annex 1 country with no emissions restriction under the Kyotol protocol and therefore uses massive amounts of fossil fuels extensively to grow its economy. However, the central government of China has devoted significant attention to the deployment of renewable energy in order to maximize the major role renewable energy plays in helping the country meet its rising energy demand, improve its energy structure, reduce environmental pollution, stimulate economic growth, and create job opportunities (Koehn

2008). Its renewable energy industry and domestic market have grown significantly as a result of the Renewable Energy Law of 2005 and the Medium-and Long-Term Development Plan for Renewable Energy of 2007.

Sustainable development reflects a process that meets the needs of the present without compromising the ability of future generations to meet their own needs. Often called intergenerational equality, the idea is that we should share natural resources not just with people who are alive today but also with future generations of the earth's inhabitants. While we can use a certain amount of the planet's resources, we should never entirely deplete a natural resource. Sustainable development requires people to rely as much as possible on renewable resources which are replenishable by getting power from the sun rather than power from fossil fuels such as oil, coal, and natural gas, which take millions of years to form (Oyede 2012). Besides the careful stewardship of natural resources, sustainable development promotes the eradication of poverty and extreme income and wealth inequalities, the goal of full employment, the provision of access to quality and affordable basic services for all South Africans, and the fostering of a stable, safe, and just society (Serageldin et al. 1994).

ESKOM'S COMMITMENT TO REDUCE ITS CARBON FOOTPRINT

Eskom is committed to reduce its carbon emissions in its various operations and business activities. The parastatal has constantly and continually been advocating that the attitude of business as usual should progressively stop in view of the threats of climate change which, to some extent, is now becoming a reality in our daily life. Global climate change impact can be reduced if all the role players and stakeholders take responsibility, particularly businesses that are emitting carbon dioxide causing global climate change. In this regard, Eskom is committed to continue to development in a sustainable manner that will be beneficial to the economy and society.

Eskom has been active in the international and national climate change policy development process. As such, Eskom has aligned its medium to long term strategy and plans with South Africa's national climate change response policy development process (Winkler and Marquand

2009). As part of the South African delegation to the international climate change talks, Eskom plays an advisory role to ensure the appropriate development of the future climate change regime, taking into consideration growth, security of energy supply and the energy needs of South Africa, the Southern Africa region and Africa as a whole (Babette 2010). Eskom is being proactive in mitigating and adapting to climate change through its climate change response strategy. Although Eskom is supporting the South African national approach through its climate change strategy, referred to as the Eskom Climate Change Six-point Plan, there are other additional strategies apart from the six which are being implemented to achieve the aim of emission reduction. The six and others are discussed below.

Diversification of the Generation Mix to Lower-Carbon-Emitting Technologies

Considering that every technology has both positive and negative aspects, Eskom is making intensive efforts by improving its technology in order to cut down on its carbon emissions. Eskom has begun to decrease emissions by reducing the coal in the energy mix. The goal is therefore to reduce coal from the current 88% to 70% by 2025 and even further reductions beyond that. The capital expansion plan provides a unique opportunity to change the energy mix which is being achieved through renewables, and hydro components. The ambitious plan is to have an increase in the renewables component to at least 1 600 MW by 2025. Eskom is now using clean coal technology as part of its supply-side mitigation. While all these short term measures are currently being implemented, the long term projection is to ensure that when all the current plants reach the end of their life span, they will be replaced with more advanced and less carbon-emitting technologies.

Energy Efficiency Measures to Reduce Demand and Greenhouse Gas and Other Emissions

Eskom has launched various energy efficiency programmes as a short term measure because they can be implemented quickly and result in measurable emissions reduction. There is constant and robust engagement nationwide with consumers on how to reduce demand and save

energy. In the short-term, the target is to save 3 000 MW over the next six years and 8 000 MW by 2025.

Adaptation to the Negative Impacts of Climate Change

There have been various manifestations of the effect of climate change in the country. These are destroying agricultural products. For example, incessant and torrential rainfall causing floods and washing away farm products. There have also been reports of draughts. All these are due to the precarious nature of the climate and weather. These days, weather is really unpredictable and is impacting indigenous and local people because they are unable to predict weather events the ways they used to because of fluctuations. Consequent upon this, the poor are getting poorer and there is threat to food production. Eskom has embarked on short-term adaptation measures by considering dry-cooling for the plants at the newly constructed power stations, thus reducing water consumption by approximately 90%. As part of its sustainable adaptation strategy, Eskom has started to improve the resilience of their infrastructure and staff by incorporating adaptation issues into long-term planning and risk mitigation strategies. The implementation of Eskom's climate change strategy is progressing well. Workshops, discussions, interpretations and, most importantly, the learning-by-doing process of what adaptation to climate change means for Eskom are under way (Spalding-Fecher 2003).

Innovation Through Research, Demonstration, and Development

Eskom has identified that robust research activity is what is needed to develop and deploy new carbon reducing technologies that will result in real cuts in greenhouse gas emissions over the long term (Sarkar and Singh 2010). Eskom has a proud record of cutting edge research and development which does not duplicate, but rather builds on fundamental research programmes (Eskom's Climate Change Committee [ECCC] 2011).

The process of adaptation to climate change also relies on applied research. Eskom researchers are investing in applied research to further define thresholds, adaptive capacity, and vul-

nerability of Eskom systems, including future climate change impacts. Eskom researchers are not working alone; they are collaborating with tertiary institutions like the University of Cape Town, the University of KwaZulu-Natal, the University of Fort Hare and the Council for Scientific and Industrial Research (CSIR) to assist with the following:

- ♦ Identifying thresholds of vulnerable systems within Eskom, their adaptation measures, and costing of adaptation (Eskom Divisional Report [EDR] 2012).
- ♦ Development of a short-term forecasting tool for the selected study areas using modelling
- ♦ Modelling climate change future projections of rainfall, temperature, lightning and storms, etc.
- ♦ Assessing the impacts of climate change on the water resources in the Waterberg area (Bram Büscher 2009).
- ♦ Modelling the hydrology of four catchments in the Waterberg area and the Hartbeespoort pipeline.
- ♦ Modelling of summer convection (thunderstorms, lightning, and rainfall intensity and frequency) over Southern Africa (Centre for African Journalists (CAJ) 2011).

The Eskom Asset Information Management team has joined the process of informing the adaptation to climate change strategy process by conducting surveys focusing on a range of questions (Raubenheimer and Younge 2011), including these:

- ♦ What weather data is Eskom already monitoring across all operating units and strategic functions? (van Wyk et al. 2008).
- ♦ Which business processes and Eskom operations are affected by weather phenomena and will benefit from appropriate weather data integration? (CAJ 2011).
- ♦ Which aspects of weather do we need to monitor in real time to warn about extreme weather events for situational awareness and response purposes in the control rooms and customer nerve centre?
- ♦ Which aspects of weather data do we need to gather in a long-term climate data warehouse for research and analysis purposes? (Winkler 2010).

Similarly, Eskom is also using lower carbon technologies to drive its emission reductions strategies, hence the parastatal has now initiated

ed a number of projects aimed at capitalising on its inherent strengths, building local capacity and associated industries that will suit the local conditions (Hallowes and Butler 2003 [PDF]). Some of the successful projects to achieve this aim are the underground coal gasification pilot which can improve efficiency, reduce environmental impacts, and possibly provide a mechanism for the sequestration of CO₂; the System Johansson Gasifier biomass pilot for small-scale applications; the pebble-bed modular reactor, which is an inherently safe, modular nuclear technology; and the 100 MW solar thermal plant which may overcome the barrier of intermittency and generate a local industry (Abbasi and Abbasi 2010).

Investment Through Carbon Market Mechanisms

By virtue of Article 12 of the Kyoto Protocol, the Clean Development Mechanism allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing countries. If it is done successfully, it can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO₂, which can be counted towards meeting Kyoto targets. This is equated to an environmental investment and credit scheme of a kind. The project can come in different ways; it might involve, for example, a rural electrification project using solar panels or the installation of more energy-efficient boilers. The significance of this mechanism is that it stimulates sustainable development and emission reductions, while giving industrialized countries some flexibility in how they meet their emission reduction or limitation targets. Eskom is in support of the mechanism as it is seen as an opportunity to make technologies more accessible to the developing countries and, in turn, inviting sustainable investment. This is the reason why Eskom is encouraging the mechanism because it as a good vehicle to bridge some of the cost gaps, as well as, for the wide-scale deployment of low carbon emitting technologies. The gains from the mechanisms can be used to reduce the cost of energy and to promote energy efficiency.

Progress Through Advocacy, Partnerships, and Collaboration

At the local level, Eskom is supporting various initiatives of the government by partnering with and collaborating in the implementation and enforcement of strategies and measures on carbon emission reduction. In the international arena Eskom is very active in various talks and initiatives on emission reductions and will continue to play this active role because it views the problem of global climate change as a threat to humanity and to businesses (Bond et al. 2009).

Solar Power and Sustainable Geysers Roll Out by Eskom

Solar power is one of the most effective renewable energy sources available. By implementing it in water heating, Eskom can target one of the most power-intensive household activities for maximum power saving effect. With 93% of Eskom's electricity generated from coal-fired stations, this already implies a major environmental footprint (Hallowes and Butler 2003)). This also means an impact on water; a critical issue for South Africa where water scarcity is an important matter. For this reason, the new Medupi and Kusile power stations will use dry cooling technology. Eskom's relative water usage is 1.35 L/kWh sent out and the plan is to reduce this by 10.4% to 1.21L/kWh by 2015/16 (Makwana 2011).

One of the household appliances that consume huge amounts of energy, especially during the winter period in South Africa, is the geyser. Geysers are used to boil water required for bathing and other household usage especially in the morning when people have to prepare to go to work, school or attend to other issues. Consumers who are connected to the grids will usually switch on their geysers in order to perform these domestic chores. This causes electricity usage and consumption to escalate or increase, impacting on Eskom's plants and increasing the amount of the coal needed to power the plants. The effect of this is the massive emission of carbon dioxide causing global climate change. In the past three years or thereabout, Eskom has directly subsidised over 300 000 consumers who installed solar geysers in their homes and premises (Eskom 2012). Although most of these were imported, Eskom is now shifting fo-

cus to support local manufacturers and producers of heat pumps for existing geysers in order to increase the numbers produced for sale to people. Eskom is also developing the local renewable energy industry thereby creating job opportunities for various entrepreneurs (Eskom 2012).

Eskom is undertaking this project with funding from and in collaboration with the Department of Energy, whose integrated energy plan calls for power from renewable sources to make up about 3725MW of Eskom's total power capacity by 2018 (Eskom 2012).

According to Eskom (2012: 3), "the department has budgeted R4,7bn in direct support to local manufacturers. This will save Eskom the equivalent of 126MW, equivalent to three times the output of its smallest power station, the 42MW Collywobbles hydroelectric station in the Eastern Cape. To help stimulate the industry and create jobs, the company will insist on a minimum amount of locally produced components for the geysers. They will all be assembled inside the country." The Department funding intervention was aimed at stimulating research leading to the production of effective and efficient geysers and lowers the cost of production.

The purpose of the intervention of rolling out solar geysers to homeowners is to ensure that power is saved. In order to qualify for a refund, the homeowner who installs "solar geysers and wants to qualify for reimbursement must at present choose an SA Bureau of Standards approved solar geyser and have it installed by an Eskom approved agency, which issues them with a voucher that they take to Eskom for a refund. Eskom only pays consumers the equivalent of the power saved, which amounts to 25% on average of the purchase price of the instrument" (Eskom 2012: 2).

The change to direct producer subsidisation will take effect from next year, eliminating the red tape that forces consumers not only to purchase certain geysers but also to get their reimbursements from Eskom (Eskom 2012). As of now, the programme is progressing fairly well and having tremendous impacts on energy savings, improvement in the standard of living and reducing emissions. Through increase in production and roll out, the numbers of solar geysers installed will increase and, at the same time, benefit local industry (Eskom 2012).

Clean Electricity

Clean electricity is a fundamental solution to the challenge of climate change. Eskom has been working with its partners to develop a global electricity utilities initiative that will cut across political and geographical boundaries. The initiative will highlight the significant contribution that progressive electricity utilities can make, and demonstrate how early action is already having an impact (Dames 2012). Eskom has, therefore, explored a range of technology options, including efficiency opportunities for its new coal power plants planned for commissioning in the next few years. All of Eskom's plans in terms of new fuel source types, technology types and their capacity, will be guided by the Department of Energy's (DoE) electricity Integrated Resources Plan (IRP) 2010. The IRP, which is a recommended "policy-adjusted plan", is geared towards a low-carbon future and aligned with South Africa's long-term climate change mitigation scenarios. It allows greenhouse gas emissions to peak, plateau, and decline in line with government's climate change aspirations (Eskom Climate Change Series [ECCS] 2011).

CHALLENGES

Even though Eskom is trying its best to do business in a sustainable way by reducing the amount of coal used in generating energy and electricity, the company faces a lot of challenges in terms of meeting the demand side of electricity. This is attributable to many factors such as population and economic growth. More importantly, the drive to make modern electricity available to the rural remote areas in South Africa for poverty alleviation is one of the deliverables that must be met. Dames (2012), contends that Eskom faces the challenge of meet electricity demand and at the same time ensuring that the company safeguards the future. To achieve this is a very difficult task and the road ahead is strewn with obstacles. Consequently, Eskom, an electricity utility, is grappling with how to provide energy to growing populations and economies in a safe and sustainable way. Electricity consumption is increasing on a daily basis due mainly to various emerging economic breakthroughs and activities. This is a major challenge because the demand is more than supply. Consequently, in order to balance this, house-

holds and businesses will have to reduce demand and use energy efficiently. To keep the lights on, Eskom counts on the support of all South Africans in this regard (Zola 2012). In Eskom's case, these challenges are underlined by the company's developmental mandate. Providing reliable and affordable electricity is not only a commercial undertaking; it is also about creating a foundation on which South Africa can grow, helping to transform the lives of the large percentage of the population that lives in poverty.

Eskom has been criticised for its massive dependency on coal by continuing to build coal power stations despite scientific evidence that shows coal increases greenhouse gases that cause climate change (Clarke et al. 2002). Recently Eskom signed a R1.9-billion loan agreement with the World Bank to finance its renewable energy project, a wind power plant in the Western Cape and the solar power plant in the Northern Cape. Regardless of all the Eskom initiatives, Bond (2011) has also added his voice to those who criticize Eskom's efforts to reduce its carbon footprint. He opines that the source areas of the coal for Medupi are highly contaminated by mercury and acid mine drainage, with air, land, vegetables, animals and people's health at much greater risk (Bond 2011). Forty new coal mines in impoverished areas of Limpopo, Mpumalanga and KwaZulu-Natal provinces will be opened to provide inputs to Medupi and its successor, Kusile, as well as, for exports. This will create a few coal sector jobs (hence receiving endorsement from the National Union of Mineworkers, but a great many jobs in agriculture and tourism will be lost as a result of the invasive mining activity and downstream degradation. Medupi itself will be built in a water-scarce area where communities are already confronting extreme mining pollution and, even though an air-cooled model (Africa's first) was chosen, the cost of supplying an additional water-cooling supply amounted to hundreds of millions of dollars, given the long transport distances and pumping costs (Bond 2011).

As a result, when corrected for income and population size, South Africa's emissions are higher than even the energy sector of the US, by a factor of twenty. To deal with this legacy, the government adopted a Long-Term Mitigation Scenario (LTMS) in mid-2008, to great fanfare. The LTMS plans for absolute cuts in CO₂

to only start in the period 2030-5, after a post-2020 plateau. Meantime, the roll-out of at least a hundred billion dollars' worth of new coal-fired and nuclear plants ensued. And tellingly, the 2004 National Climate Change Response Strategy endorsed carbon trading, declaring 'up-front that CDM primarily presents a range of commercial viability.

CONCLUSION

Eskom has done a lot in working towards the reduction of carbon emissions in as far as their activities in production of energy electricity are concerned. The focus is to continue to act responsibly and drive sustainability which will allow for meeting emissions reduction targets set in all its operational activities and, at the same time, enable the adequate supply of electricity to all its customers. While it is not possible for Eskom to use 100% sustainable renewable energy at the moment, by gradually shifting through improved infrastructure and innovations in technology, the parastatal will progressively commence a responsible way to reduce its emissions. The numerous initiatives put in place and being implemented to improve efficiency and reduce emissions are a welcome stride.

RECOMMENDATIONS

By voluntarily taking steps in the right direction to reduce its carbon emissions, Eskom is promoting sustainability and economic development and growth. The parastatal should continue in this direction by improving on what it has started. Pursuant to this, considering numerous scientific reports that have predicted the consequences of carbon emissions, Eskom should strengthen its stand on progressive transition to other sustainable alternatives. There should therefore be an acceleration of diffusion of lower carbon technologies into the infrastructure of the parastatal. This requires a large injection of money; government is expected to provide major support to the parastatal to access both national and international funding to achieve this.

Various government interventions and initiatives in the form of white papers and policies on emissions reduction will achieve more if, over time, they are codified and go through the parliament for debate and are passed into law. It will

make implementation more certain and role players will know the limit or extent to which emissions are permitted. As of now, there is no limitation to what amount of carbon dioxide a company is allowed to emit under the policy and law. It is also suggested that government should give the parastatal and other similar companies full financial and technical support in their bids to restructure their operations and infrastructure. Government also has a responsibility to restructure the existing infrastructure to accommodate the new methods of generating and transmitting power and electricity to various consumers.

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