

keeping your LIGHTS ON

As part of its commitment to reduce greenhouse gas emissions, Eskom is investing in wind power.

The provision of reliable and affordable electricity for all South Africans remains Eskom's primary aim, but at the same time it is acutely aware that electricity provision has environmental consequences that must be managed to ensure that the country's development is sustainable.

Eskom is among the top seven utilities in the world in terms of generation capacity, and among the top nine in terms of sales. It generates more than 95 per cent of South Africa's electricity and supplies more than 50 per cent of Africa's power demands. As one of the world's leading utility companies, Eskom recognises the proactive role it must play in pursuing a sustainable energy strategy that contributes to reducing greenhouse gas emissions and responds to the effects of climate change.

Compared to the costs of electricity internationally, South Africans pay some of the lowest tariffs in the world. This is

thanks to the fact that 88 per cent of their electricity comes from coal-burning generators – and the country's coal reserves are abundant (an estimated 53 billion tonnes) and cheap. Another 10 per cent is generated by gas and crude oil.

Therein lies the rub. Burning fossil fuels produces the greenhouse gas carbon dioxide, a major contributor to what has been loosely termed 'global warming' (the other two culprits being methane and nitrous oxide). However, global climate change is a more complex problem that involves detrimental disruptions to the world's weather and climate patterns. South Africa's booming economy is energy intensive and,

although it helps that its energy is cheap, it does make the country one of the world's highest per capita contributors to greenhouse gas emissions.

Eskom is committed to accelerating efforts to address this. Its response to climate change is multifaceted and encompasses strategies to reduce emissions as well as to adapt to the impacts of a changing climate. In keeping with government development strategies, Eskom's future expansion will seek to supply approximately 70 per cent of the country's power requirements, with the balance coming from independent power producers. It will roll out over R150-billion worth of capital expenditure during the next five years.

POLICY DEVELOPMENT

The utility acknowledges that, at an international level, the progress in implementing and even formulating effective strategies has been slow, but recent developments are encouraging. Eskom has been active in the climate policy arena for over a decade, including participation in various national and international initiatives, notably the Combat Climate Change (3C) Initiative launched in January 2007.

3C consists of 18 major corporations, including power companies (Eskom, Duke Energy, Endesa, PG&E, Suez, Vattenfall) and manufacturers of power-generating equipment (ABB, Alstom, GE, Siemens), that aim to demonstrate leadership by demanding an integration of climate issues into the world of markets and trade.

Swedish energy company Vattenfall is coordinating the 3C Initiative. As they say in their initial report: 'Curbing climate change is about combining technology, finance, and policy in a wise way. If that is done worldwide, a carbon dioxide market will follow. Technology is not an unsolvable problem, given time and incentives, neither is financing. The real challenge is policy.'

Eskom is also active in the World Business Council for Sustainable Development (WBCSD) and its sustainability strategy acknowledges the guiding principles adapted from the WBCSD's 'Sustainability in the Electricity Utility Sector' and the United Nations Global Compact. The strategy, Eskom points out, 'is not a separate initiative, but is ingrained in the business planning and operations and is also integrated with all other strategic initiatives'. Eskom is co-chairman of the Electricity Utilities workgroup under the WBCSD, an important platform that allows dialogue with industry peers.

It is a member of the International Emissions Trading Association (IETA). On a national level, Eskom is a member of the National Committee on Climate Change and also participates in various business initiatives in the policy arena.

INITIATIVES

One of the primary focuses of the short- to medium-term initiatives is energy efficiency measures that can be quickly implemented and result in immediately measurable reductions.

Eskom implemented an internal energy-efficiency programme and has rolled out

a demand-side management programme with consumers to help reduce their demand and thus reduce all emissions. This programme will build on existing successes to reduce future emissions significantly through a nation-wide deployment.

'Our aim is to reduce the quantity of greenhouse gases emitted per megawatt of electricity generated'

VALLI MOOSA, CHAIRMAN OF THE BOARD, ESKOM

Climate modelling shows that South Africa will be vulnerable to an increase in the number and severity of droughts. For Eskom, a short-term adaptation measure includes the consideration of dry cooling in the new power stations, which will reduce water consumption by approximately 90 per cent. However, adaptation issues, such as water availability, often involve trade-offs. For example, dry-cooling technology results in a loss of the plant's efficiency that can lead to higher greenhouse gas emissions.

The primary medium- to long-term strategy that will result in significant cuts in emissions is the diversification of the energy mix as well as increasing the efficiency (and thus decreasing emissions) of existing coal-fired plants. An increase in Eskom's nuclear technologies, together with more extensive deployment of renewable energy resources, will form the basis for long term and deep cuts in Eskom's greenhouse gas emissions.

Eskom tracks and monitors greenhouse gas emissions and continues to improve the accuracy and reporting of its carbon footprint. Emissions have increased over the last decade due to the increasing demand for electricity and the dominance of coal in the energy mix – Eskom currently burns more than 100 000 megatonnes of coal each year. However, as part of its strategy, Eskom aims to reduce the percentage of coal in the primary energy mix by 10 per cent by 2012.

Measures to reduce emissions include implementing a Demand Side Management (DSM) programme to influence the way electricity is used by consumers. The programme has incurred a carbon dioxide emissions saving of 289 kilotonnes over the last financial year.

A further initiative of the DSM was the launch of the first ever Outcomes-Based Education (OBE) energy efficiency school programme in 2002. This aimed to support teachers in the use of environmental issues for their programmes. It also provides learners with the necessary knowledge and skills to manage their own electricity use to reduce the costs to their households as well as the impact on the environment. ▶



A successful flare at the underground coal gasification pilot plant at the Majuba power station.

Increasing the amount of nuclear power generated is a cornerstone of Eskom's climate change strategy.



Climate Change Strategy

Eskom's Climate Change Strategy outlines a comprehensive range of voluntary climate change initiatives that have been proactively developed. The strategy proposes immediate- and long-term (post-2012) action to reduce these emissions and adapt to the negative impacts of a changing climate. The strategy ensures that climate change considerations are included in investment decisions, for example, taking into account future carbon prices.

Eskom's strategy was peer-reviewed in 2006 by an internationally respected company and was judged to be an above-average plan for tackling climate change, even when compared with utilities in

developed countries. Eskom says that as the dynamics of the climate change debate evolve, its strategy will likewise be updated and revised.

ADAPTATION

Adaptation is the process by which countries and industries cope with the consequences of climate change. Coping mechanisms are of special importance to Eskom as extreme weather events severely affect the performance of wet-cooled power stations, transmission and distribution infrastructure, line and thermal efficiency (the national grid consists of more than 325 000 kilometres of power lines) and the operation of hydroelectric plants.

MITIGATION & DIVERSIFICATION

Eskom's initial strategy is to increase efficiency in the use of electricity primarily through its DSM programmes. Diversification entails a long-term effort to harness a variety of new and existing technologies. Eskom recognises that it will be dependent on coal for the foreseeable future, but it has technology roadmaps that identify new technologies and predict when they will be ready for implementation. The coal technology roadmap was the first to be initiated.

Eskom is in the process of constructing open-cycle gas turbines in Atlantis and Mossel Bay, of which 1 050 megawatts will be commissioned by mid-2007.

Pending licensing approvals, it also plans to build a 100-megawatt wind facility in the near future at Klipheuwel in the Western Cape and will shortly upgrade the Gariep hydroelectric power station, increasing its output by approximately 80 megawatts. Feasibility studies continue with regard to other renewable energy and gas plant initiatives.

Gas-fired generation and renewable energy options will make important contributions to the reduction of carbon dioxide emissions, especially at peak periods, but these options cannot meet the base-load demand that is currently satisfied by coal. In the next 10 years, Eskom intends to increase the nuclear component of the energy mix as well as accelerate the deployment of renewable energy technologies and progressively harness cleaner coal technologies. Nuclear technologies such as PBMR will play an important role in achieving diversification of the energy mix away from coal, which will contribute to the reduction of greenhouse gas emissions. Eskom intends commissioning approximately 1 600 megawatts of renewable energy by 2025.

MARKET-BASED MECHANISMS

Eskom is optimistic about the role of market-based mechanisms in stimulating investment and technology transfer in developing countries. For this reason, Eskom continues to support the Clean Development Mechanism (CDM). CDM has been developed by the Kyoto Protocol that allows industrialised countries with emissions targets to invest in emission-reducing projects in developing countries as an alternative to tackling more costly emission reductions in their own countries. However, an important aspect for business is more certainty in the carbon-trading market after 2012.

PARTNERSHIPS & ENGAGEMENT

Eskom's engagement in climate change initiatives shows its determination to shape the agenda for future environmental policies that is pragmatic and, at the same time, results in a sustainable community. These initiatives include a partnership with WWF-SA to stimulate renewable energy industry research outside Eskom and the commitment to stimulate energy efficiency through signing the South African National Business Initiative's Energy Efficiency Accord.

New developments

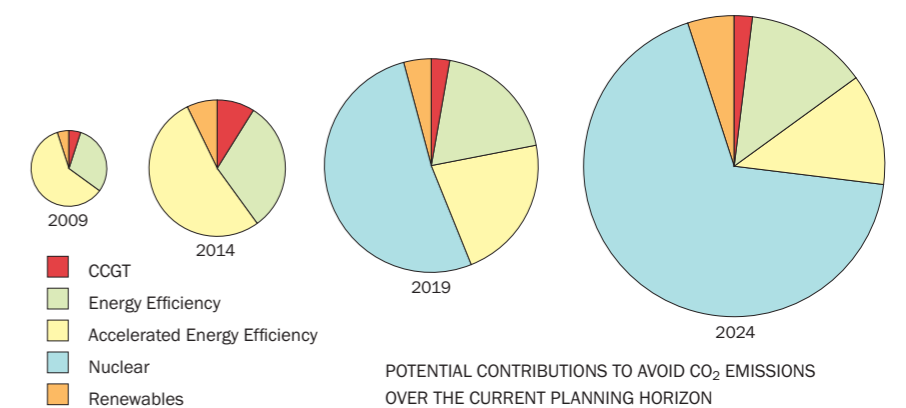
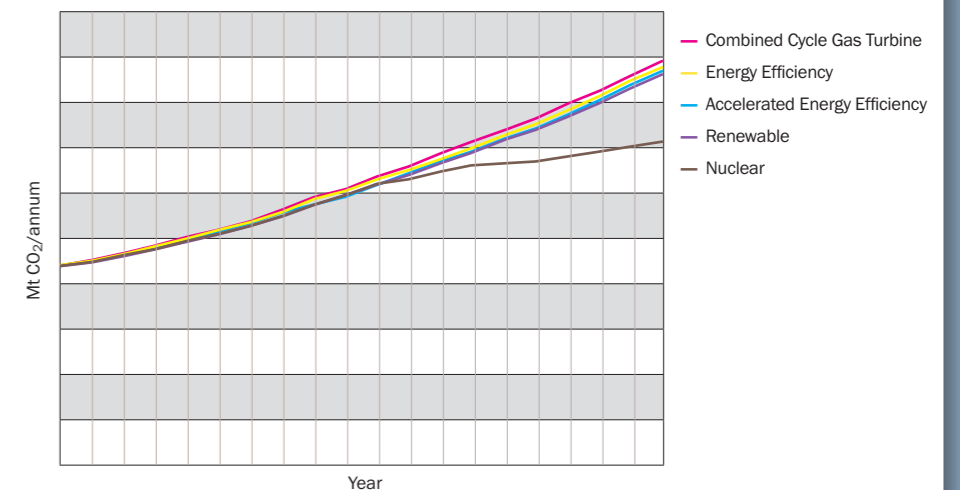
Eskom's coal technology roadmap will try to determine whether and when it can expect viable clean-coal technologies, such as an integrated and underground gasification combined cycle, a process that gasifies coal before it is burned, cutting down on the quantities of pollutants going up the smokestack. This process produces syngas, which can be used directly as a fuel or in boilers and gas turbines. It is also looking at carbon capture and storage as well as supercritical boilers, which operate with exceptional efficiency.

Eskom has modelled the potential contributions of demand and supply side initiatives to future carbon dioxide emission reductions on possible scenarios as illustrated in the figure below.

The first graph indicates a baseline (200Mt-line) with a high percentage of coal in the mix (88 per cent). The plotted lines indicate the potential contribution of emission reduction by various technologies. The four corresponding pie charts depict the projected annual emission reduction, which could be achieved through this particular diversification strategy.

As indicated in the graph, Eskom's overall carbon dioxide emissions will increase over the medium term, but the rate of increase will be reduced due to energy inefficiency and with the diversification of the mix. The main contributor to emissions reductions will be the introduction of additional nuclear plants.

POSSIBLE INCREMENTAL REDUCTIONS IN PROJECTED CO₂ EMISSIONS TO 2024



POTENTIAL CONTRIBUTIONS TO AVOID CO₂ EMISSIONS OVER THE CURRENT PLANNING HORIZON

These pages were written and paid for by Eskom.