



## Energy and water

Putting clean and affordable water and energy within everyone's reach is a key national goal. At the same time, planning ensures that these key drivers of economic growth are delivered reliably and cost-effectively to industry, commerce and agriculture.

The Department of Minerals and Energy's Energy Policy is based on the following key objectives:

- attaining universal access to energy by 2014
- accessible, affordable and reliable energy, especially for the poor
- diversifying primary energy sources and reducing dependency on coal
- good governance, which must also facilitate and encourage private-sector investments in the energy sector
- environmentally responsible energy provision.

Current estimates suggest that R107 billion will be needed between 2005 and 2009 to meet the country's growing energy needs. Eskom will invest R84 billion over the next five years. The balance of R23 billion is reserved for independent power-producer entrants.

The refurbishment of three power stations – Camden in Ermelo, Grootvlei in Balfour and Komati in Middelburg – will add 3 800 megawatts (MW) to the system.

Eskom is expected to spend about R12 billion (nominal rand) on recommissioning these stations, representing about 40% of the cost of a new station. About 10% of the costs will go towards improving environmental performance such as particulate emissions and water controls.

### Energy in South Africa

Energy comprises about 15% of South Africa's gross domestic product, creating employment for about 250 000 people. The total electricity sales by Eskom in 2003 grew to 196 980 gigawatt/hour.

The peak demand on the integrated system totalled 31 928 MW. High liquid-fuel sales figures demonstrate the growth of the South African economy and the importance of energy as a key driver of the country's economy.

This energy intensity is above average, with only 10 other countries having higher commercial primary energy intensities. It is largely a result of the economy's structure, dominated by large-scale, energy-intensive primary mineral beneficiation and mining industries.

## Power sources

### Coal

In 2005, South African mines produced 245 million tons (Mt) of coal. Of this figure, 174 Mt was used locally, at a value of R14,69 billion, with export sales totalling 71,4 Mt, at a value of R21,17 billion.

South Africa has around 28,6 billion t of recoverable coal reserves, making its coal reserves the world's seventh-largest.

One of the many approaches that the Department of Minerals and Energy has taken to address energy poverty is integrated energy centres (IECs) – one-stop energy shops owned and operated by community co-operatives and organised as community projects.

The IECs provide a bouquet of energy services; making energy easily available, promoting awareness of the different energy sources and services, providing capacity-building and local empowerment and development through energy provision.

By mid-2006, IECs had been established in Greytown, KwaZulu-Natal; Matatiele, Eastern Cape; Kgalagadi and Moshaweng both in Kuruman, Northern Cape; and Mutale in Limpopo.

The Minister of Minerals and Energy has approved the IEC Strategy and action plan that will facilitate the roll-out of sustainable IECs in the poverty nodal areas as well as district and local municipalities.

The Department of Minerals and Energy is giving priority to rolling out the Basa Njengo Magogo Programme that entails the top-down ignition of coal fire, which has shown to reduce smoke by 80% to 90% in laboratory test conditions and means that less coal is burnt and less carbon dioxide emitted.

## **Nuclear**

Eskom Koeberg Nuclear Power Station's two reactors outside Cape Town supply 1 800 MW to the national grid when both operate at full power, contributing about 6% of South Africa's electricity.

The National Nuclear Regulator is the prime safety regulator and is responsible for protecting persons, property and the environment against nuclear damage by establishing safety standards and regulatory practices. It exercises regulatory control related to safety over the siting, design, construction and operation of nuclear installations and other actions.

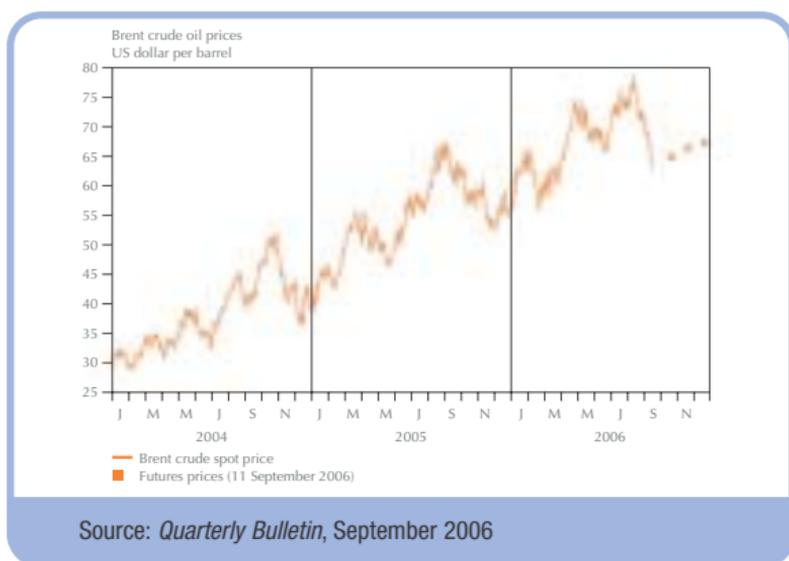
The Nuclear Energy Corporation of South Africa (Necsa) undertakes and promotes research and development in the field of nuclear energy, radiation sciences and technology, medical isotope manufacturing, nuclear liabilities management, waste management and decommissioning. It is a public entity reporting to the Minister of Minerals and Energy.

Necsa's reactor-produced radioisotopes are exported to more than 50 countries.

The research reactor at Pelindaba, Safari-1, is the most commercialised such reactor in the world with International Organisation for Standardisation 9001 accreditation. It earns South Africa foreign revenue worth millions of rands.

## Fact:

In May 2006, Eskom announced the R1,5-billion refurbishment of the Kriel Power Station in Mpumalanga. The project is set to give the station another 25 years of reliable and safe operation.



## Liquid fuels

According to the South African Petroleum Industry Association, sales of all major petroleum products in South Africa from January to September 2006 totalled 17 959 million litres (mℓ), which was 2,7% more than the 17 481 mℓ sold from January to September 2005.

About 36% of the demand for fuel is met by synthetic fuels (synfuels) produced locally, largely from coal and natural gas. The rest is met by products refined locally from imported crude oil. South Africa imports about 60% of its crude oil.

The petrol price in South Africa is linked to certain international petrol markets in United States (US) dollars. This means that the domestic price is influenced by supply and demand for petroleum products in the international markets, combined with the Rand/Dollar exchange rate.

PetroSA is responsible for the exploration and exploitation of oil and natural gas, as well as producing and marketing synthetic fuels produced from offshore gas at the world's largest commercial gas-to-liquids plant in Mossel Bay.

The upgrade would include the world's largest control and instrumentation refurbishment to be carried out in a fossil utility, extending the lifespan of the power station to 2028.

The Pebble-Bed Modular Reactor was transferred to the Department of Public Enterprises in March 2006.

Given the increasing demand for energy and the need to combat global warming, nuclear energy is re-emerging as an attractive alternative. There are 30 nuclear plants being built in 12 countries and over 50 more being planned.

The Department of Minerals and Energy will support the construction of a demonstration power plant and pilot fuel plant, and facilitate the timely processing of the environmental impact assessment.

## **Sasol**

The Sasol group of companies comprises diversified fuel, chemical and related manufacturing and marketing operations, complemented by interests in technology development, oil and gas exploration, and production.

Its principal feedstocks are obtained from coal, which the company converts into value-added hydrocarbons through Fischer-Tropsch process technologies.

## **Indigenous oil, gas resources and production**

The EM gasfield complex off Mossel Bay started production in the third quarter of 2000, and will ensure sufficient feedstock to PetroSA to maintain current liquid-fuel production levels at 36 000 barrels (bbls) of petroleum products a day until 2009.

PetroSA's gas-to-liquid plant supplies about 7% of South Africa's liquid-fuel needs.

PetroSA's new oilfield, Sable, situated about 150 km south off the coast of Mossel Bay, is expected to produce 17% of South Africa's oil needs.

The field, which came into operation in August 2003, was initially projected to produce 30 000 to 40 000 bbls of crude oil a day and 20 million to 25 million bbls in the next three years.

The Integrated National Electrification Programme (INEP) remains the flagship of the Department of Minerals and Energy.

In 2005/06, some R1,39 billion was spent on electrification, with R84 million allocated to non-grid electrification.

Eskom continues to exceed its electrification targets. For the year to 31 March 2006, Eskom had electrified 135 868 additional homes, exceeding its target of 85 000. By mid-2006, it had electrified 3 346 425 homes since the inception of the INEP.

## **Eskom**

Eskom generates about 95% of South Africa's electricity. It is among the top 11 utilities in the world in terms of generation capacity and among the top seven in terms of sales. Eskom was incorporated as a public company on 1 July 2002.

Eskom does not have exclusive generation rights, but does enjoy a practical monopoly on bulk electricity. It also operates the integrated national high-voltage transmission system and supplies electricity directly to large consumers and some residential consumers.

## **Restructuring of the electricity distribution industry**

The Ministry of Minerals and Energy launched South Africa's first regional electricity distributor (RED 1) on 4 July 2005 in Cape Town. RED 1 will pave the way for five other REDs, following the amalgamation of the distribution function of Eskom with that of 187 municipalities already distributing electricity.

REDs will provide competitive electricity tariffs, and offer an efficient and reliable electricity service. Over the long term, these entities will enable access to electricity for all.

REDs will consist of Eskom Distribution and the local government authorities. They will buy electricity from power generators such as Eskom at wholesale prices determined by the National Energy Regulator.

## Energy and the environment

South Africa's per capita production of greenhouse gases is well above global averages and that of other middle-income developing countries.

The economy is carbon intensive, producing only US\$259 per ton of carbon dioxide emitted, as compared with US\$1 131 for South Korea, US\$484 for Mexico and US\$418 for Brazil.

About 950 000 households countrywide use coal, resulting in indoor air-pollution problems.

Fuel wood is the primary energy source of three million rural households. Studies have shown that fuel-wood users are exposed to even higher levels of particulate emissions than coal users.

To address this, the Department of Minerals and Energy is investigating improved woodstoves and other alternatives, such as solar cookers and biogas, as well as speeding up electrification.

Eskom is looking at harnessing biomass as a grid-supply option, while also planning to pilot a new technology aimed at providing rural power in a remote area in the Eastern Cape. This technology, called a gasifier system, will use waste from a rural sawmill to provide electricity to power the creation of business ventures in the area. The system was expected to be installed in 2005.

## Water

South Africa is largely a semi-arid, water-stressed country. The country's average rainfall of about 450 mm a year is well below the world average of about 860 mm a year. To overcome the problem of variable river flows, many large storage dams have been built.

By March 2006, 165 of the 170 water-service authorities provided Free Basic Water (FBW). In total, 36 million people received FBW of which 15,5 million people were indigent (defined as households with less than R800 income per month).

Some 2,3 million people have been reached through the health and hygiene programme.

Dams experience high evaporation rates, further reducing available water, as do commercial afforestation and sugar-cane farming.

The total net abstraction of water from surface-water resources amounts to about 10 200 million m<sup>3</sup> per year for the whole of South Africa, after allowing for the re-use of return flows. This represents about 20% of the total mean annual run-off of 49 200 million m<sup>3</sup> per year (all standardised to 98% assurance of supply). A further 8% is estimated to be lost through evaporation from storage and

The European Union (EU) has committed about R1 billion to support South Africa's water- and sanitation-provision programmes between 2007 and 2013.

Since 1994, the EU, through its European Programme for Reconstruction and Development, has donated more than R1,6 billion to water and sanitation projects in South Africa.

The Government has set itself the target of halving the water and sanitation backlog by 2008 and 2010 respectively.

The first phase of government's water- and sanitation-provision programme – dubbed Masibambane – was implemented between 1994 and 2004. The second phase is still being implemented, with nearly R22,5 billion committed.

The EU's new grant has been secured for the third phase, scheduled to begin in 2007.

The programme embraces infrastructure provision, capacity-building in local government, health and hygiene, environmental management and monitoring and evaluation.

### Major dams in South Africa

Dam	Full supply capacity (10m <sup>3</sup> )	River
Gariep	5 341	Orange
Vanderkloof	3 171	Orange
Sterkfontein	2 616	Nuwejaarspruit
Nuwejaarspruit Vaal	2 603	Vaal
Pongolapoort	2 445	Pongola

Source: Department of Water Affairs and Forestry

conveyance along rivers, and 6% through land-use activities. As a national average, about 66% of the natural river flow (mean annual run-off) therefore still remains in the country's rivers.

### **Water policy**

Cabinet approved the first edition of the National Water Resource Strategy (NWRS) in September 2004. The NWRS describes how South Africa's water resources will be protected, used, developed, conserved, managed and controlled in accordance with the requirements of the National Water Policy, 1997 and the National Water Act, 1998, which are founded on government's vision of a transformed South African society in which every person has the opportunity to participate in productive economic activity and lead a dignified and healthy life.

One of the most ambitious binational water projects ever is the Lesotho Highlands Water Project between South Africa and Lesotho.

The first phase, which was completed in 1998, consisted of the construction of three dams, various tunnels and a hydroelectric plant.

Since its inception, the Working for Water Programme has invested more than R2,5 million to clear invasive alien vegetation, establishing programmes in over 300 areas. About 20 000 short-term jobs have been created annually in the process, providing employment opportunities for local community members, with a special focus on securing opportunities for the marginalised, such as women, youth and people with disabilities.

By participating in the programme, workers are not only given the opportunity to develop new skills. They also have access to HIV and AIDS projects, childcare facilities and primary-healthcare initiatives.

The programme is administered through the Department of Water and Forestry and works in partnership with local communities, to whom it provides jobs, and also with government departments, provincial departments of agriculture, conservation and environment, research foundations and private companies.