

## ENERGY AND WATER

In May 2009, the Department of Minerals and Energy was divided into two separate departments namely, the Department of Mineral Resources and the Department of Energy.

The Department of Energy is responsible for ensuring exploration, development, processing, utilisation and management of South Africa's energy resources. As the country's economy continues to grow, energy is increasingly becoming a key focus.

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Government has embarked on various projects to ensure sufficient and effective energy supply during the 2010 FIFA World Cup™. It has allocated R136 million to improve electricity infrastructure around football stadiums.

The department's Energy Policy is based on the following key objectives:

- attaining universal access to energy by 2012
- ensuring accessible, affordable and reliable energy, especially for the poor
- diversifying primary energy sources and reducing dependency on coal
- practising good governance, which must also facilitate and encourage private-sector investments in the energy sector
- providing environmentally responsible energy.

Eskom will invest more than R300 billion in new-generation, transmission and distribution capacity up to 2013.

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

The South African National Energy Development Institute was established in 2009 to conduct energy research and development as well as implement energy-efficiency and renewable-energy programmes on behalf of government.



- Key elements of government's Energy Security Strategy include:
- Implementing an integrated energy modelling and planning approach to ensure coordination and enhanced integration of planning in dealing with future energy policy in support of achieving energy security.
  - Improving Transnet Freight Rail's operational efficiencies in servicing the liquid-fuels sector, by focusing on routes that allow for block trains/loads, and allocating additional capacity to the Durban-Gauteng Corridor.
  - Improving operational efficiencies at ports, especially during periods of increased demand for imported crude oil or refined

products in South Africa. This includes ensuring that back-of-port facilities are not used as part of refining operations.

- Promoting local refining as far as possible, with a particular preference for production from local resources, including those from South Africa's neighbouring states.
- Developing Transnet Pipelines' new multiproducts pipeline between Durban and Gauteng.
- Promoting energy efficiency and other demand-side initiatives in all sectors of the economy. This should be complemented by measures aimed at effectively managing interaction with the natural environment.

## Energy in South Africa

Energy creates jobs for about 250 000 people. Eskom's electricity sales totalled 224 366 GWh in 2008.

It generates around 95% of the electricity used in South Africa and exports to countries in Africa.

Coal, as the major indigenous energy resource, is relied on for the generation of most of the country's electricity and a significant proportion of its liquid fuels. Diversification of the primary energy mix, which comprises about 88% coal, is especially challenging.

## Power sources Coal

The majority of the country's primary energy needs are provided by coal. This is unlikely to change significantly in the next decade, due to the relative lack of suitable alternatives to coal as an energy source.

South Africa produces an average of 224 Mt of marketable coal annually, making it the fifth-largest coal-producing country in the world.

Eskom, together with Sasol, PetroSA, Anglo American and the South African National Energy Research Institute, is sponsoring the development of the South African Carbon Dioxide (CO<sub>2</sub>) Storage Atlas. The atlas will represent an early assessment, aimed at identifying areas and estimating the potential capacity for the geological storage of CO<sub>2</sub> in South Africa.



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The African Nuclear-Weapon-Free Zone Treaty came into force in August 2009, about 13 years after it opened for signature.



The treaty, which covers the entire African continent as well as its surrounding islands, ensures that nuclear weapons are not developed, produced, tested or otherwise acquired or stationed in any of the countries on the continent.

Among other things, the treaty supports the use of nuclear science and technology for peaceful purposes, and requires each party to conduct all activities for the peaceful use of nuclear energy under strict non-proliferation measures.

The coal-mining industry is highly concentrated, with five companies, namely Anglo Coal, BHP Billiton, Sasol Mining, Exxaro Coal, Kumba Coal and Xstrata Coal accounting for 90% of the saleable coal production. The eight largest mines account for 61% of the output.

## Nuclear

The Nuclear Energy Policy for South Africa aims to increase the role of nuclear energy as part of the process of diversifying South Africa's primary energy sources to ensure energy security.

Eskom is investing up to 20 000 MW on new nuclear capacity by 2025.

Eskom's Koeberg Nuclear Power Station's two reactors outside Cape Town supply 1 800 MW to the national grid when both operate at full power, thus providing about 6,5% 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.

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.

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

The Safe Illuminating Paraffin Stove Pilot Project was launched by the Minister of Energy, Ms Dipuo Peters, at Ezin-golweni Local Municipality, Port Shepstone, KwaZulu-Natal, in October 2009.



The project aims to promote the use of safer illuminating paraffin appliances while addressing problems associated with harmful incidents caused by the use of illuminating paraffin in low-income households in South Africa.

The Government committed itself to promoting energy access and managing energy-related environmental and health impacts.

The research reactor at Pelindaba, Safari-1, is the most commercialised reactor of its kind in the world with International Organisation for Standardisation 9001-accreditation.

## Liquid fuels

Demand for petrol dropped by more than 10% in the third quarter of 2008 compared to the same period in 2007, while demand for diesel was down by more than 3%, as big industrial consumers scaled down operations because of the global economic slowdown.

The drop served as a buffer for South Africa, which has battled a capacity shortage in recent years, especially when refineries were forced to shut down unexpectedly.

Relief will come if the 400 000 barrels-per-day Coega oil refinery, built by the state-owned Petroleum, Gas and Oil Corporation of South Africa (PetroSA), comes on stream.

The petrol price in South Africa is linked to certain international petrol markets in United States dollar. This means that supply and demand for petroleum products in the international markets, combined with the Rand-Dollar exchange rate, influence the domestic price.

PetroSA is responsible for exploring and exploiting 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, about 400 km east of Cape Town.

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### Sasol

Sasol is an integrated energy and chemical company. It beneficiates coal, oil and gas into liquid fuels, fuel components and chemicals with the help of its proprietary Fischer-Tropsch processes.

It mines coal in South Africa and produces gas in Mozambique and oil in Gabon. Its chemical manufacturing and marketing operations span the globe.

In South Africa, Sasol refines imported crude oil and retail liquid fuels through its network of retail-convenience centres. Sasol also supplies fuels to other distributors in the region and gas to industrial customers in South Africa.

### Oil and gas

South Africa has very limited oil reserves and imports from the Middle East and Africa (Saudi Arabia, Iran, Kuwait, the United Arab Emirates, Yemen, Qatar, Iraq, Nigeria, Egypt and Angola) meet about 95% of South Africa's crude oil requirements.

Refined petroleum products such as petrol, diesel, residual fuel oil, paraffin, jet fuel, aviation gasoline, liquified petroleum gas and refinery gas are produced by:

- refining crude oil (oil refineries)
- converting coal to liquid fuels and gas to liquid fuels (Sasol)
- turning natural gas into liquid fuels (PetroSA).

The Central Energy Fund's (CEF) mandate is to engage in acquiring, exploring, generating, manufacturing, marketing and distributing

In June 2009, Sasol, South Africa's multinational fuel and chemicals company, opened a R70-million Fuels Application Centre in Cape Town, in the company's biggest intervention to test the impact of its fuels on vehicle performance and greenhouse-gas emissions.

The centre is one of a handful of such test facilities in the world, and the first of its kind in southern Africa. It is an extension of the existing fuels research facility situated at the Sasol Research and Development facility in Sasolburg, in the Free State, and adds to the work done at the Sasol Advanced Fuels Laboratory at the University of Cape Town.



any energy form, especially oil and gas. It also engages in research relating to the energy sector. The CEF's diversified portfolio of activities is housed in the following active subsidiaries:

- the Strategic Fuel Fund Association
- PetroSA
- the Petroleum Agency South Africa
- iGas.

The wholesale and retail markets for petroleum products in South Africa are subject to a set of government controls. Government regulates wholesale margins and controls the retail price of petrol. The industry has entered into product-exchange agreements to serve different markets. Together, these controls provide for access to fuel throughout the country and protect consumers, while providing a reasonable return on investment to the oil industry and enhancing opportunities for employment.

The refiners and wholesale marketers move products from the refineries by coastal barge, rail, truck and pipeline to roughly 200 depots. From these, about 4 600 service stations and 100 000 direct consumers (mostly farmers) are served.

Refineries and Sasol produce LPG and illuminating paraffin (kerosene). Most LPG is used by consumers and the rest is used in refineries as fuel and/or is exported to neighbouring countries.

Limited natural gas reserves exist around the South African coast. PetroSA exploits the reserves off the coast of Mossel Bay, where the gas is converted at the Moss gas plant into liquid fuels.

Although gas usage has increased in recent years, the importance of gas in the South African energy economy is still small compared to other countries. Industry remains the largest customer.

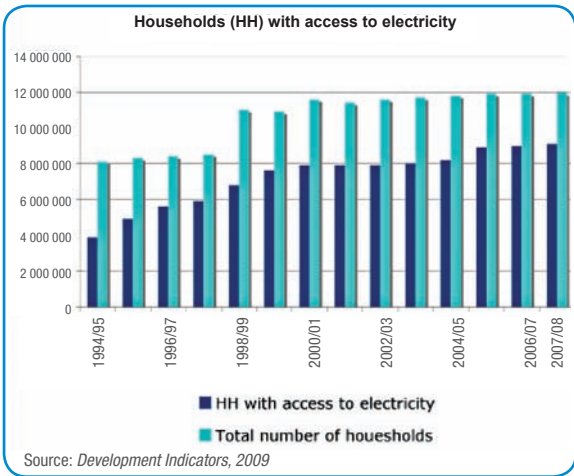
## **Electricity**

Eskom generates about 95% of electricity in South Africa and about 45% in Africa. About 88% of South Africa's electricity is generated in coal-fired power stations. Koeberg, a large nuclear station near Cape Town, provides about 6,5% of capacity. A further 2,3% is provided by hydroelectric and pumped storage schemes.

South Africa supplies two thirds of Africa's electricity.

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## Energy and the environment

South Africa is among the top 20 emitters of greenhouse gases (GHGs) in the world and is the largest emitter in Africa, largely because of the economy's dependence on fossil fuels. The National Climate Change Strategy, developed by the Department of Environmental Affairs, requires that government departments collaborate in a coordinated manner to ensure that response measures to climate change are properly directed and carried out with a national focus. The Department of Energy is expected to respond to and mitigate climate change.

South Africa is a developing country or a Non-Annex1 country. This means that within the international political and negotiation context, South Africa is not required to reduce its GHG emissions.

However, the South African economy depends greatly on fossil fuels for energy generation and consumption and therefore is a significant emitter due to relatively high values being derived from emissions' intensity and emissions per capita.

South Africa must therefore proactively move the economy towards becoming less carbon-intensive, with the Depart-



Project Mthombo is a modern world-class refinery that aims to provide the lowest-cost refined products sufficient to cater for the country's needs until 2030. Mthombo is expected to enable the economic introduction of globally competitive clean fuels, ensuring that South Africa meets new, best-practice standards that improve the environment and contribute towards maintaining the competitiveness of the vehicle manufacturing industry.



ment of Energy playing a prominent role. The department has introduced systems to access investment through the Clean Development Mechanism of the Kyoto Protocol. It has developed the *White Paper on Renewable Energy and Clean Energy Development*, together with an energy-efficiency programme, to support diversification in pursuit of a less carbon-intensive energy economy.

## Water

In 2009, following the appointment of a new administration, the former Department of Water Affairs and Forestry became the Department of Water Affairs.

In 2009, South Africa embarked on a number of programmes to conserve and diversify its water sources. These included desalinating sea water in coastal areas and increasing effluent recycling.

The department also adopted a “zero tolerance” on environment and water crimes. The campaign was expected to be strengthened by the commitment to return environmental courts.

Water is not only central but is also an excellent catalyst for development. It is for this reason that the Water Allocation Programme plays a pivotal role in supporting government's priorities in rural development and land reform.

In 2009, the department announced a framework that would ensure that South Africa's water resources were managed sustainably to meet future demands. Within the context of this strategy, the department embarked on programmes, to:

- diversify water mix, ensuring that other sources of supply, for example, desalination of sea water in coastal areas and strengthening effluent reuse, are explored

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As of March 2009, more than 10 million households (77%) had access to sanitation compared to about five million (50%) in 1994. Government has moved closer to attaining its objective of eradicating the bucket system in formally established settlements. In 1994, 609 675 households used the bucket system. In March 2009, 9 044 households were using the bucket system. The target date for universal access to sanitation is 2014.



- intensify public awareness about the value of water to instill a culture of responsibility and change of attitude and behaviour to water
- conserve water by curbing water loss by at least 20% in 2014
- act decisively against defaulters and punish wrongdoing
- strengthen the regulatory capacity and assist municipalities.

The Department of Water Affairs plans to spend about R30 billion between 2014 and 2017 on the continuing construction and establishment of the 15 mega water-resource infrastructure projects. This would increase the capacity of existing water-resources infrastructure to provide water to strategic installations such as the energy sector (Eskom), the industrial sector (Sasol), the mining sector and for domestic purposes.

Additional infrastructure programmes include an accelerated programme for the construction of the De Hoop Dam, the continued partnership with the Government of Lesotho for the implementation of the proposed Phase Two of the Lesotho Highlands Water Project and implementation of the project to augment supply of water to Lephale for use by Eskom and other petrochemical industries.

### Major dams in South Africa

Dam	Full supply capacity (10 m <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