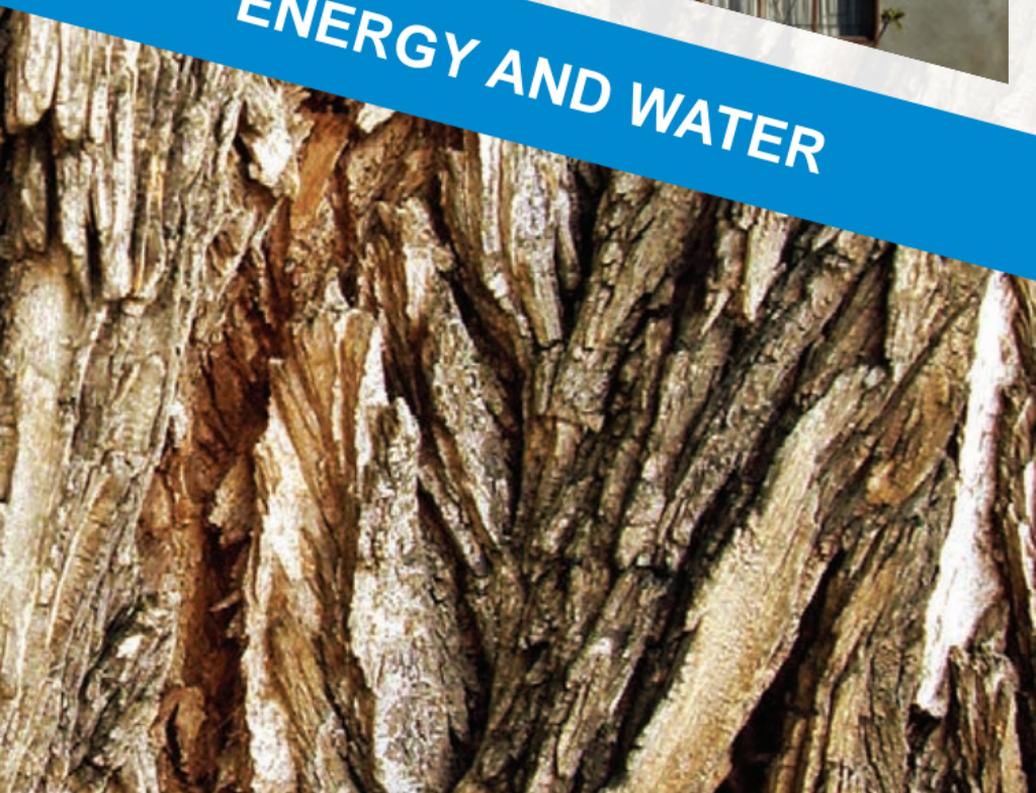


ENERGY AND WATER



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

- ensure energy security
- achieve universal access and transform the energy sector
- regulate the energy sector
- effective and efficient service delivery
- optimal utilisation of energy resources
- ensure sustainable development
- promote corporate governance.

Integrated Resource Plan (IRP)

In October 2010, the Inter-Ministerial Committee on Energy approved the draft IRP, a 20-year blueprint that indicates that the country is planning to commit to 14% nuclear power as part of its future energy mix.

According to the draft plan, South Africa's electrical energy will, by 2030, comprise 48% baseload coal, 14% baseload nuclear, 16% renewable energy, 9% peaking open cycle gas turbine, 6% peaking pump storage, 5% mid-merit gas and 2% baseload import hydro.

The objective of the IRP is to develop a sustainable electricity investment strategy for generation capacity and transmission infrastructure for South Africa over the next 25 years. The investment strategy includes implications arising from demand-side management and pricing, and capacity provided by all generators (Eskom and independent power producers).

The IRP is intended to:

- improve the long-term reliability of electricity supply through meeting adequacy criteria over and above keeping pace with economic growth and development
- ascertain South Africa's capacity investment needs for the medium-term business planning environment
- consider environmental and other externality impacts and the effect of renewable energy technologies
- provide the framework for ministerial determination of new generation capacity (inclusive of the required feasibility studies) as envisaged in the new generation capacity regulations.

Energy in South Africa

Energy creates jobs for about 250 000 people. Eskom generates around 95% of the electricity used in South Africa and exports to countries in Africa.

In April 2010, President Jacob Zuma launched the national Solar Water-Heating Programme at Winterveldt, outside Pretoria.

The launch was in line with government's target of installing at least one million solar water heaters by 2014 to reduce the water heating load on the national grid.

Some of the objectives of the programme are to offset rising electricity costs for residential households through savings on water heating and to contribute to the reduction of South Africa's carbon footprint.



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 with dominating large-scale, energy-intensive primary mineral beneficiation and mining industries.

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

About 77% of the country's primary energy needs are provided by coal. South Africa produces an average of 224 million tons (Mt) of marketable coal annually, making it the fifth-largest coal-producing country in the world.

About 25% of the production is exported internationally, making South Africa the third-largest coal-exporting country. The remainder of South Africa's coal production feeds the various local industries, with 53% used for electricity generation.

The key role played by coal reserves in the economy is illustrated by the fact that Eskom is the seventh-largest electricity generator in the world, and Sasol the largest coal-to-chemicals producer.

The coal-mining industry is highly concentrated, with 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.

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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 (CO₂) Storage Atlas. The atlas will represent an early assessment, aimed at identifying areas and estimating the potential capacity for geological storage of CO₂ in South Africa.



Nuclear

Cabinet approved the Nuclear Energy Policy for South Africa in June 2008. The policy 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. The policy will ensure reducing the over-reliance on coal.

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. It exercises safety-related regulatory control 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 reactor of its kind in the world with International Organisation for Standardisation 9001-accreditation. It earns South Africa foreign revenue worth millions of rands.

Liquid fuels

A key feature of the South African liquid fuels sector is the fact that most of the transport fuel is produced in the coastal areas but about 68% thereof is consumed in the inland region of Gauteng. This requires investments in the storage and

South African proposals and measures to reduce greenhouse gas (GHG) emissions:



- 2003 *White Paper on the Production of Energy by Renewables*. Targets established for 2013
- 2006 Treasury draft policy paper: *A Framework for Considering Market-Based Instruments to Support Environmental Fiscal Reform in South Africa*
- introduction of electricity levy, 2008
- Eskom's demand-side management programme to reduce electricity demand (from 2008)
- measures in the 2010/11 Budget: Supplementary depreciation allowance for investments by companies in energy-efficient equipment; increased levy on plastic shopping bags (4 cents, increased from 3 cents in 2009); proposed increase in the international air passenger departure tax (which was last raised in 2005/06)
- preferential tariffs for electricity produced with wind, solar, landfill gas, biomass, or hydro, beginning in March 2010
- planned second nuclear power station to come on line by 2020
- building regulations revised to require the installation of energy-efficiency equipment such as solar water heaters and efficiency lighting in new buildings
- an energy-efficiency measurement standard is to support the tax rebate for energy efficiency incorporated into the Income Tax Act, 1962
- new standard prescribing maximum energy consumption
- commitment by national government to support municipalities' efforts to upgrade the housing and building stock to prevent future negative impacts on climate change
- planned Department of Energy (with donor support) Industrial Energy-Efficiency Programme focusing on system optimisation
- Copenhagen commitment to reduce 2020 GHG emissions by 34% relative to no-policy change scenario
- installation of one million solar water heaters (target), beginning in March 2010
- new tax on vehicles varying by CO₂ emissions.

Source: *Organisation for Economic Cooperation and Development (OECD) Economic Surveys: South Africa*

distribution facilities for the supply of petroleum products at the point of need.

A new R15-billion pipeline to transport petroleum from Durban to Johannesburg is under construction for completion in the 2011/12 financial year.

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Through the construction of the new multi-product pipeline, Transnet Pipelines will increase fuel-carrying capacity by 8,7 billion litres per annum in 2011, by 12,2 billion litres per annum in the second phase of the of the project and by 26,2 billion litres in the ultimate fifth phase of the project. This investment is in direct aid of South Africa's security of supply of energy going into the future.

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.

The National Petroleum Gas and Oil Corporation of South Africa (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.

Oil and gas

South Africa has 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, liquid petroleum gas (LPG) 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).

Another major role player in South Africa's liquid fuels industry is the Central Energy Fund (CEF). Its mandate is to engage in acquiring, exploring, generating, manufacturing, marketing and distributing 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, which was established to procure and store crude oil and manage strategic crude oil stocks for South Africa. It trades and leases spare storage ullage and is involved in oil-pollution control.

In 2010, PetroSA concluded its feasibility study on a 400 000-barrels-a-day refinery at the Coega Industrial Development Zone in the Eastern Cape.



The proposed Mthombo oil refinery will save South Africa about R12,6 billion a year in energy costs once it is running and exporting oil across Africa.

The refinery is expected to result in employment for 27 500 people.

Construction on the refinery, which will be the biggest in Africa, is expected to start in 2012, with the refinery coming on stream by 2015.

- PetroSA, which owns and operates the gas-to-liquids plant at Mossel Bay. PetroSA is also involved in oil and gas exploration and production, and its offshore production platform supplies gas and condensates by gas pipeline to its onshore plant for conversion into a range of environmentally friendly transportation fuels and associated products for the domestic and international markets.
- The Petroleum Agency South Africa, which promotes and markets exploration in South African territory (both offshore and onshore for oil and gas), negotiates and monitors concessions and licences on behalf of government, and is the custodian of geological and geophysical data.
- iGas, which is a state-owned entity for the development of gas infrastructure in South Africa. iGas partnered Sasol and ENH of Mozambique in establishing the natural gas pipeline from Mozambique to South Africa.

Electricity

Eskom generates, transmits and distributes electricity to industrial, mining, commercial, agricultural and residential customers and redistributors. The majority of sales are in South Africa and other countries of southern Africa account for a small percentage of sales. It generates about 95% of the electricity used in South Africa and about 45% of the electricity used in Africa.

South Africa is faced with a situation in which the demand for electricity continues to grow within a supply-constrained environment.

The Mass Electrification Programme, which started in the 1990s, as well as the ongoing rapid industrialisation in the country has put enormous strain on energy sources.

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The electricity demand is expected to double over the next 20 years as government implements its Programme of Action to take the country's economy on a higher growth path.

Government is ready to spend more than R800 billion on infrastructure in the next few years. This infrastructure programme will demand an enormous supply of energy. Reliable energy supply is also a critical factor in attracting foreign investment. Also critical and central to the country's developmental agenda, is the electrification of households in both rural and urban areas as part of improving the quality of life of people.

The estimated number of households with access to electricity increased from 4,5 million (50,9%) in 1994 to 9,4 million (74,9%) in 2010.

Energy efficiency

Government set a target of 15% energy efficiency for the industry and 12% nationally to be achieved by 2015.

The energy industry leads by example by committing to energy efficiency.

While the focus has been on energy-intensive industries, room has been created for other industries and the commercial sector to join the Energy-Efficiency Campaign, through the introduction of, among other things:

- efficient lighting and heating, ventilation and air conditioning and employee education
- efficient production processes and cogeneration in the industrial sector.

Government remains committed to the efficient use of available resources. It is also committed to broadening the energy mix, thereby moving away from being fossil-dominated to a more balanced combination, which places a high premium on the use of more efficient technologies and renewable-energy resources.

South Africa's radioisotope market is the world-leader in supply of Molybdenum-99 – a clear indication that it is among the world's best in the nuclear industry.



As a result of a worldwide shortage of medical isotopes, NTP Radioisotopes, a subsidiary of the Nuclear Energy Corporation of South Africa, has managed to increase group sales by more than 80% year-on-year, and unaudited finances show net sales of more than R700 million for the 2009/10 financial year.

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.

In May 2010, Sasol approved the construction of a R1,9-billion ethylene purification unit at its Sasol Polymers plant in Sasolburg.

The plant is expected to go on stream in the second half of 2013 and will be ramped up to full capacity by 2015, enabling the company to boost ethylene production by about 48 000 tons per year.

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 former Department of Environmental Affairs and Tourism, 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 Department of Energy playing a prominent role.

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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

The Department of Water Affairs continues to focus on meeting water targets; managing South Africa's scarce water resources for long-term sustainability; improving the regulatory and institutional environment; spearheading transformation in the water sector; and supporting the development of water-resources infrastructure. Ongoing key challenges include the department's role as a sector leader for water services.

The department adopted the Integrated Water Resources Management (IWRM) approach, which provides a more holistic approach to water management.

The IWRM requires intensive planning to ensure efficient, equitable and sustainable management of water resources and for coping with conflicting demands. The department developed two key strategic frameworks to guide it, namely the National Water Resource Strategy in South Africa of 2004, and the Water for Growth and Development Framework of 2008. The strategy seeks to achieve the reconciliation between the available water resources with growing requirements.

The Water for Growth and Development Framework guides actions and decisions that will ensure water security in terms of quantity and quality to support South Africa's requirements for economic growth and social development.

Major dams of South Africa

Dam	Full supply capacity (10 ⁶ m ³)	River
Gariep	5 341	Orange
Vanderkloof	3 171	Orange
Sterkfontein	2 616	Nuwejaarspruit
Nuwejaarspruit Vaal	2 603	Vaal
Pongolapoort	2 445	Pongolo
Bloemhof	1 264	Vaal



South Africa is supporting the security of its water supply by ensuring the completion of several major new water projects around the country by 2014.



The projects include the Mokolo Augmentation Project to supply water to the planned Medupi Power Station in Lephalele in Limpopo, and the Mooi-Mgeni Transfer Scheme Project, which will include the construction of the Spring Grove Dam around eThekweni/Durban and Umgungundlovu in KwaZulu-Natal.

The percentage of households with access to water infrastructure above or equal to the Reconstruction and Development Programme standard increased to 93,8% by March 2010. Although the rate of increase in the percentage of households with access to water is gradually slowing down, South Africa is likely to achieve the 2014 Millennium Development Goal of universal access to portable water.

More than 400 00 additional people received basic water supply last year.

Government will spend R2,6 billion on water services in 2011.

