

# Energy and Water



## Energy

The Department of Energy (DoE) is mandated to ensure the secure and sustainable provision of energy for socio-economic development. This is achieved by developing an integrated energy plan, regulating the energy industries, and promoting investment in accordance with the integrated resource plan. The department's strategic goals are to:

- ensure that energy supply is secure and demand is well managed
- facilitate an efficient, competitive and responsive energy infrastructure network
- ensure that there is improved energy regulation and competition
- ensure that there is an efficient and diverse energy mix for universal access within a transformed energy sector
- ensure that environmental assets and natural resources are protected and continually enhanced by cleaner energy technologies
- implement policies that adapt to and mitigate the effects of climate change
- implement good corporate governance for effective and efficient service delivery.

The DoE places emphasis on broadening electricity supply technologies to include gas and imports, as well as nuclear, biomass and renewable energy resources (wind, solar and hydro), to meet the country's future electricity needs and reduce its carbon-dioxide (CO<sub>2</sub>) emissions.

Goals beyond 2020 include contracting more than 20 000 megawatts (MW) of renewable energy, including an increasing share from regional hydro-electricity.

About 11 000 MW of Eskom's older coal-powered stations will be decommissioned, but close to 6 000 MW of new coal capacity will be contracted – part of it from other southern African countries.

South Africa has committed to attain substantial reductions in CO<sub>2</sub> emissions by 2025. The country supports research, technology development and special measures aimed at environmentally sustainable economic growth.

## National Energy Efficiency Strategy

The National Development Plan (NDP) envisages that by 2030 South Africa will have an adequate supply of electricity and liquid fuels to ensure that economic activity and welfare are not disrupted, and that at least 95% of the population will have access to grid or off-grid electricity.

The plan proposes that gas and other renewable resources like wind, solar and hydro-electricity will be viable alternatives to coal and will supply at least 20 000 MW of the additional 29 000 MW of electricity needed by 2030.

Other recommendations in the plan include diversifying power sources and ownership in the electricity sector, supporting cleaner coal technologies, and investing in human and physical capital in the 12 largest electricity distributors.

## **National Strategic Fuels Stock Policy**

The Energy Security Master Plan for Liquid Fuel identified a number of capacity constraints and challenges faced by the petroleum sector in meeting the energy demand. The National Strategic Fuels Stock Policy sets out the framework for the storage of fuel stock by government and the industry. It aims to ensure uninterrupted supply of petroleum products throughout South Africa by providing adequate strategic stocks and infrastructure such as storage facilities and pipeline capacity. Strategic stocks are to be used during declared emergencies. The Minister of Energy will have the power to decide when a shortage of fuel and oil is at such a level to warrant an emergency.

## **National Liquid Petroleum Gas (LPG) Strategy**

The LPG Strategy's main objectives are to provide access to safe, cleaner, efficient, portable, environmentally friendly and affordable thermal fuel for all households, and to switch low-income households away from the use of coal, paraffin and biomass to LPG.

The strategy highlights strategic options that could be adopted for the orderly development of the LPG industry in South Africa to make LPG an energy carrier of choice for thermal applications.

The domestic LPG price is regulated through the DoE by the Minister of Energy.

## **National building standards**

Energy-efficient regulations for new buildings form part of the deliverables of South Africa's National Energy Strategy to strengthen standards and regulations for energy efficiency.

The energy-efficient regulations apply to residential and commercial buildings, places of learning and worship, certain medical clinics and other categories of building.

The regulations make it compulsory for all new buildings to be designed and constructed to a standard that makes it possible for the user to minimise the energy required to meet the functional requirements. This will save energy significantly, which will relieve pressure on the electricity supply grid.

In addition to temperature regulations, all buildings will also have to be fitted with renewable-energy water-heating systems such as solar systems, which also have to comply with South African national standards.

## Role players

### Sasol

Sasol is an international integrated energy and chemical company that develops and commercialises technologies, and builds, and operates world-scale facilities to produce a range of product streams, including liquid fuels, high-value chemicals and low-carbon electricity.

Sasol continues to advance its upstream oil and gas activities in West and Southern Africa, the Asia Pacific region and Canada. In South Africa, Sasol refines imported crude oil and retail liquid fuels through its network of some 400 service stations and supply gas to industrial customers. It also supplies fuels to other licensed wholesalers in the region.

### NERSA

NERSA's mandate is to regulate the electricity, piped-gas and petroleum pipelines industries. The mandate of NERSA include:

- issuing of licences and setting pertinent conditions;
- setting and/or approving tariffs and prices;
- monitoring and enforcing compliance with licence conditions;
- dispute resolution such as mediation, arbitration and the handling of complaints;
- gathering, storing and disseminating industry information;
- setting of rules, guidelines and codes for the regulation of the three industries;
- determination of conditions of supply and applicable standards; and
- registration of import and production activities.

## Eskom

Eskom generates, transmits and distributes electricity to industrial, mining, commercial, agricultural and residential customers and redistributors. Additional power stations and major power lines are being built to meet rising electricity demand in South Africa. Over five years, Eskom is projected to spend over R200 billion for the supply of coal.

The aim is for the utility to procure more than 50% of its coal from emerging black coal miners by 2018.



## Southern African Power Pool (SAPP)

The SAPP was created with the primary aim to provide reliable and economical electricity supply to the consumers of each of the SAPP members, consistent with the reasonable use of natural resources and the effect on the environment.

The SAPP allows the free trading of electricity between Southern African Development Community member countries, providing South Africa with access to the vast hydro-power potential in the countries to the north, notably the significant potential in the Congo River (Inga Falls).

## Other role players

- iGas is the official state agency for the development of the hydrocarbon gas industry in southern Africa.
- PetroSA is a government-owned oil and gas company
- The Petroleum Agency of South Africa promotes the exploration and exploitation of natural oil and gas, both onshore and offshore
- Petronet owns, operates, manages and maintains a net-

work of 3 000 km of high-pressure petroleum and gas pipelines, on behalf of the Government.

- National Energy Regulator of South Africa
- National Nuclear Regulator
- Nuclear Energy Corporation of South Africa
- South African National Energy Development Institute
- Central Energy Fund Integrated energy centres

## Energy resources

South Africa has very limited oil reserves. About 60% of its crude oil requirements are met by imports from the Middle East and Africa. The country produces about 5% of its fuel needs from gas, about 35% from coal and about 50% from local crude oil refineries. About 10% is imported from refineries elsewhere in the world.

South Africa has a sizeable capital stock and management capacity to produce fuel from gas.

## Electricity

Electricity demand is expected to double over the next 20 years as government implements its Programme of Action, including the Infrastructure Development Programme, to put the country's economy onto a higher growth path.

In December 2014, the departments of energy, cooperative governance and traditional affairs, public enterprises, national treasury, economic development, water and sanitation and Eskom as well as technical officials were overseeing the implementation of government's five-point plan to address the electricity challenges facing the country.

## Biofuel

South Africa set the beginning of October 2015 as the date from which fuel producers would have to blend diesel and petrol with biofuels. Fuel producers would be required to blend a minimum of 5% biodiesel in diesel and between 2% and 10% of bio-ethanol in petrol.

Biofuels are expected to reduce the country's reliance on imported fuel. The biofuels industry in South Africa, the continent's biggest agricultural producer, has been held back by an inadequate regulatory regime and concerns that biofuels would hurt food security and affect food prices.

Canola, sunflower and soya are feedstock for biodiesel, while sugarcane and sugar beet are feedstock for ethanol.

Maize, South Africa's staple food, will not be used in the production of biofuels to ensure food security and control high prices. The biofuels sector has strong linkages to agriculture, manufacturing and distribution, and has the potential to create substantial numbers of labour-intensive jobs in the agriculture sector in particular.

In addition, second-generation biofuel technology will also contribute to South Africa meeting its renewable energy targets sustainably.

## Hydropower

Energy from water can be generated from waves, tides, waterfalls and rivers and will never be depleted as long as water is available. South Africa has a mix of small hydro-electricity stations and pumped-water storage schemes.

Pumping uses some electricity, but this is done in off-peak periods. During peak hours, when extra electricity is needed, the water is released through a turbine that drives an electric generator. Peak hours are usually from 06:00 to 08:00 and 18:00 to 20:00.

Irrespective of the size of its installation, any hydropower development will require authorisation in terms of the National Water Act of 1998.

## Solar power

Most areas in South Africa average more than 2 500 hours of sunshine per year, and average daily solar-radiation levels range between 4,5 kWh/m<sup>2</sup> and 6,5 kWh/m<sup>2</sup> in one day. The southern African region and in fact the whole of Africa, is well endowed with sunshine all year round.

The annual 24-hour global solar radiation average is about 220 W/m<sup>2</sup> for South Africa. The solar resource is the most readily accessible in South Africa. It lends itself to a number of potential uses.

In November 2014, SolarReserve, a global developer of solar power projects and solar thermal technology, announced that the 96 MW photovoltaic (PV) Jasper solar power project is fully operational.

Jasper is located in the Northern Cape in a solar park that also includes the 75 MW Lesedi solar power project, which came online in May 2014.

In addition to helping South Africa meet its electricity needs, the Jasper Project will bring long lasting economic benefits to the region.

With over 325 000 PV modules, the Jasper Project will deliver 180 000 MW-hours of renewable electricity annually for South African residents.

The power generated is enough to power up to 80 000 households through a 20-year power purchase agreement with Eskom.

## Wind power

The R3-billion Jeffrey's Bay wind farm, located between the towns of Jeffreys Bay and Humansdorp in the Eastern Cape, was officially inaugurated in July 2014.

Built by a consortium led by British company Globeleq, the 138 megawatt (MW) wind farm is one of Africa's biggest - larger than the 120 MW Ashegoda windfarm that was unveiled by Ethiopia in October 2013, though not as big as the Tarfaya wind farm in south-western Morocco, which started producing energy in April and will eventually generate up to 300 MW of electricity.

The Jeffrey's Bay wind farm, comprising sixty 80-metre high turbines spread over 3 700 hectares, will supply enough clean, renewable electricity to power more than 100 000 homes a year, helping South Africa to avoid production of 420 000 tonnes of carbon dioxide annually.

The facility was built under the government's renewable energy programme for independent power producers, which aims to add 3 725 MW of wind, solar photovoltaic and concentrating solar power to South Africa's energy mix.

## Hybrid systems

Hybrid energy systems are a combination of two or more renewable energy sources such as photovoltaic, wind, micro-hydro, storage batteries and fuel-powered generator sets to provide a reliable off-grid supply.

There are two pilot hybrid systems in the Eastern Cape at the Hluleka nature reserve on the Wild Coast and at the neighbouring Lucingweni community.

## Nuclear

Government remains committed to ensure energy security for the country, through the roll-out of the nuclear new build programme as an integral part of the energy mix. Government remains committed to ensuring the provision of reliable and sustainable electricity supply, as part of mitigating the risk of carbon emissions.

The nuclear new build programme will enable the country to create jobs, develop skills, create industries, and catapult the country into a knowledge economy. For the medium to long-term electricity supply, the nuclear build programme was by mid-2015 at an advanced stage of planning and the procurement was expected to be concluded within the 2015/16 financial year.

## **Programmes and projects**

### **Renewable Energy Independent Power Producers**

#### **Procurement Bidding Programme**

The IRP 2010 – 2030 has noted that on projection on electricity supply and demand, about 42% of electricity generated in South Africa comes from renewable resources.

The creation of job opportunities, local content and community development are the essential ingredients of the programme.

### **Integrated Resources Plan**

The IRP 2010 – 2030 envisages 9 600 MW additional nuclear capacity by 2030. The IRP is a 20-year projection on electricity supply and demand.

### **Working for Energy Programme**

The Working for Energy Programme is a social programme mainly intended to provide energy services derived from renewable resources to rural and urban low income houses in a manner that facilitates job creation, skills development, community-based enterprise development and the emancipation of youth, women and people with disabilities thereby creating sustainable livelihoods. It is an integral part of the Expanded Public Works Programme.

## **Water and sanitation**

South Africa is the 30th driest country worldwide. Water is a critical element to sustainable socio-economic development and the eradication of poverty and should be at the core of the green economy in the context of sustainable development and eradicating poverty.

Water has a critical function in the South African economy where it contributes 60% towards agriculture and irrigation.

The Department of Water and Sanitation's (DWS) leg-

islative mandate seeks to ensure that the country's water resources are protected, managed, used, developed, conserved and controlled by regulating and supporting the delivery of effective water supply and sanitation.

This entails adhering to the requirements of water-related policies and legislation, including constitutional requirements, that are critical in delivering on the right of access to sufficient food and water, transforming the economy and eradicating poverty.

### **National Water Resource Strategy (NWRS)**

The NWRS2 sets out the vision and strategic actions for effective water management. These included the security of water supply, environmental degradation, and pollution of resources.

The NWRS2 outlines the key challenges, constraints and opportunities in water resource management and proposes new approaches that ensure a collective and adequate response for the benefit of all people in South Africa.

This strategy moves towards the achievement and attainment of an inclusive sustainable and equitable economy.

The NWRS2 ensures that the management of national water resources contributes towards achieving South Africa's growth, development and socio-economic priorities in an equitable and sustainable manner over the next five to 10 years.

The strategy also responds to the priorities set by government in the NDP and National Water Act imperatives that support sustainable development.

### **Dams and water schemes**

The country has more than 500 government-owned dams spread across all nine provinces. They range in storage capacity from a volume of 5 500 million m<sup>3</sup> of water down to 0,2 million m<sup>3</sup> of water.

South Africa uses about 10 200 million m<sup>3</sup> of water a year from its major dams. The majority of water consumption can be attributed to drinking, irrigation, electricity, mining processes and industrial processes.

## **Role players**

### **Water boards**

The primary activity of water boards is to provide water services (bulk potable and bulk waste water) to other water

services institutions within their respective service areas.

They may perform other activities under conditions set out in the Water Services Act of 1997. There are nine water boards in South Africa.

### **Catchment management agencies (CMAs)**

The main responsibilities of CMAs are to manage water resources at catchment level in collaboration with local stakeholders, with specific focus on involving local communities in the decision-making processes, in terms of meeting basic human needs, promoting equitable access to water, and facilitating social and economic development.

### **Water-user associations (WUAs)**

WUAs are cooperative associations of individual water users who wish to undertake water-related activities at local level for their mutual benefit.

### **Water Research Commission**

The WRC has a vital role in water research by establishing needs and priorities, stimulating and funding research, promoting the transfer of information and technology, and enhancing knowledge and capacity building in the water sector.

It also focuses on water resources management, water-linked ecosystems, water use and waste management, and water use in agriculture.

### **Water Trading Entity (WTE)**

The DWS is responsible for the regulation of water use in South Africa by ensuring that water is allocated equitably and used beneficially in the public interest, and is also required to create a register of all water users in the country.

The National Water Act of 1998 provides for cost recovery on services rendered by the department to water users. It is against this background that the department created the WTE within its administration.



The main function of the WTE is development, operation and maintenance of specific water resources infrastructure and managing water resources in specific water management areas.

### **Trans-Caledon Tunnel Authority (TCTA)**

The TCTA is a State-owned entity (SOE) specialising in project financing, implementation and liability management. It is responsible for the development of bulk raw-water infrastructure. It also provides an integrated treasury management and financial advisory service to the DWS, water boards, municipalities and other entities that are linked to bulk raw-water infrastructure.

### **Komati River Basin Water Authority**

The Komati Basin Water Authority was established in terms of a treaty between South Africa and Swaziland. The aim of the authority is to manage the water resources of the Komati River basin sustainably. The authority is responsible for financing, developing, operating and maintaining the water resources infrastructure in the basin, comprising the Driekoppies Dam in South Africa and the Maguga Dam in Swaziland.

### **Water Tribunal**

The aim of the Water Tribunal is to hear appeals against directives and decisions made by responsible authorities, CMAs or water management agencies about matters such as the issuing of licences to use water. It is an independent body and can hold hearings anywhere in the country.

### **Strategic Water Partners Network – South Africa (SWPN-SA)**

SWPN-SA is one of South Africa's most innovative public-private civil-society sector partnerships.

The efforts of the SWPN-SA are integral to the NWRS, which the DWS released in 2012.

A cornerstone of the SWPN-SA is developing innovation that leverages the strength and expertise of the DWS, the South African private sector, civil society and expert organisations.