

Pocket Guide to South Africa 2016/17
Energy and Water



Energy

The National Development Plan (NDP) envisages that by 2030 South Africa will have an energy sector that promotes economic growth and development through adequate investment in energy infrastructure. The plan also 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 NDP 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.

Energy security is at the core of current and future industrial and technological advancement.

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, among others, are to ensure that the energy supply is secure and demand is well managed, and that there is an efficient and diverse energy mix for universal access within a transformed energy sector, and implement policies that adapt to and mitigate the effects of climate change.

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 emissions.

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

South Africa has committed to attain substantial reductions in carbon dioxide emissions by 2025. The country supports research, technology development and special measures aimed at environmentally sustainable economic growth.

Diversifying energy

The DoE continues to promote the optimal use of South Africa's renewable energy resources to ensure that the country's sustainable energy agenda is adhered to.

This includes expanding the independent power producers procurement programme. Renewable energy is an integral part of South Africa's low-emissions development strategy, and is vital to addressing the challenges of climate change, access to energy, and energy security.

To meet the needs of the economy without compromising government's commitment to sustainable development, the department is pursuing a balanced mix of energy that includes clean and renewable resources, as informed by the 2016 integrated resource plan. The plan has been released for public comment and is expected to be implemented over the medium term.

The newly developed Integrated Energy Plan optimises the relationship between the supply of electricity, gas and liquid fuels for meeting energy demand in the period up to 2050. Whereas detailed electricity supply options are outlined in the integrated resource plan, the integrated energy plan focuses on liquid fuels (mainly in the transportation sector), including addressing whether new oil refining capacity is required.

It also discusses piped gas, gas storage and liquefied natural gas infrastructure, considering regional gas options in terms of imports from Mozambique and Botswana, as well as local shale gas.

National Strategic Fuels Stock Policy

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. LPG is considered one of the safest, cleanest and most sustainable energy sources.

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 chemicals and energy company that leverages the expertise of over 30 300 people working in 33 countries.

It develops and commercialises technologies, and builds and operates world-scale facilities to produce a range of high-value product streams, including liquid fuels, chemicals and low-carbon electricity.

For over 65 years, Sasol has been a pioneer in the inventive monetisation of hydrocarbons. Using coal, crude oil and natural gas, along with the skills of our people and our technological advantage, it has become one of the world's largest producers of synthetic fuels and a global chemicals player.

Its vision is to grow profitably, sustainably and inclusively, while delivering value to stakeholders through technology and the talent of its people in the energy and chemical markets in Southern Africa and worldwide.

Sasol is listed on the Johannesburg Stock Exchange in South Africa and on the New York Stock Exchange in the United States of America.

Eskom

Eskom generates, transmits and distributes electricity to about five million customers in the industrial, mining, commercial, agricultural and residential sectors, and to redistributors.

Eskom sells electricity directly to about 3 000 industrial customers, 1 000 mining customers, 49 000 commercial customers, 84 000 agricultural customers and more than four million residential customers (of whom the majority are prepaid customers). Most of the sales are in South Africa, with other southern African countries accounting for a small percentage.

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 hydropower potential in the countries to the north, notably 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 network of 3 000 km of high-pressure petroleum and gas pipelines, on behalf of the Government.
- The **National Energy Regulator of South Africa** is the regulatory authority for electricity, piped gas and petroleum pipelines.
- The **National Nuclear Regulator** is responsible for safety standards and regulatory practices for the protection of people, property and the environment against nuclear damage.

- The **Nuclear Energy Corporation of South Africa** is responsible for undertaking and promoting research and development in the field of nuclear energy and radiation sciences. It is also responsible for processing source material, including uranium enrichment, and cooperating with other institutions, locally and abroad, on nuclear and related matters.
- The **South African National Energy Development Institute** is mandated to stimulate innovation in energy research and development, transform the gender and race profile of researchers in the sector, and improve South Africa's competitiveness in energy research internationally.
- The **Central Energy Fund** researches, finances, develops and exploits appropriate energy solutions across the spectrum of energy sources to meet South Africa's future energy needs.
- The **National Radioactive Waste Disposal Institute** is mandated to manage the disposal of radioactive waste nationally.

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. Between 2019 and 2025, the Gas-to-Power Programme is expected to procure 3 726 MW of capacity, stimulating the gas industry and associated infrastructure development.

Electricity

South Africa's household electrification programme has seen a significant number of households with access to electricity increase from 35% in 1994 to over 85% in mid-2017.

Eskom generates 95% of the electricity used in South Africa and 45% of the electricity used in Africa.

Unit 6, one of six generating units at the Medupi Power Station in Lephalale in Limpopo, was opened in August 2015 to contribute about 800 MW to the national grid.

Once completed in 2020, Medupi Power Station will add 4 764 MW to Eskom's grid and will be the world's largest coal-fired power station. This is also the fourth dry-cooled,

baseload station to be built in 20 years by Eskom, after Kendal, Majuba and Matimba power stations.

Unit 5 is due for commercial operation in March 2018; Unit 4 in July 2018; Unit 3 in June 2019; Unit 2 in December 2019, and Unit 1 in May 2020.

At Kusile Power Station in Mpumalanga, Unit 1 is due for commercial operation in July 2018; Unit 2 in July 2019; Unit 3 in August 2020; Unit 4 in March 2021; Unit 5 in November 2021, and Unit 6 in September 2022. Once completed, Kusile will be the fourth-largest coal-fired power station in the world.

Biofuel

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 hydroelectricity stations and pumped-water storage schemes.

The Grand Inga Hydro-electrical Project, in partnership with the Democratic Republic of Congo, was expected to generate over 48 000 MW of clean hydro-electricity. South Africa was expected have access to over 15 000 MW.

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/m² and 6,5 kWh/m² in one day. The southern African region, and in fact the whole of Africa, has sunshine all year round.

The annual 24-hour global solar radiation average is about 220 W/m² for South Africa.

Wind power

A study by the Council for Scientific and Industrial Research found that the wind and solar power capacity operational during 2015 showed an R800 million net benefit to the economy achieved during that year, followed by a further marked increase in the first six months of 2015, helping to save more than an additional R4 billion in costs to the economy.

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 has committed itself, by means of its Nuclear Energy Policy and Integrated Resource Plan (IRP), to an energy mix consisting of coal, gas, hydro, nuclear, solar and wind.

The nuclear new build programme will enable the country to create jobs, develop skills, create industries, and catapult the country into a knowledge economy. 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.

Eskom operates the Koeberg Nuclear Power Station near Cape Town, the only nuclear power station in South Africa and the entire African continent, which supplies power to the national grid.

Programmes and projects

Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)

The programme seeks to procure energy from small scale IPPs, with projects that generate between one MW and five MW of energy from solar, wind, biomass and landfill gas projects.

Through the REIPPPP, the DoE is targeting the procurement of 13 225 MW from IPPs by 2025.

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

The Department of Water and Sanitation's (DWS) legislative mandate seeks to ensure that the country's water resources are protected, managed, used, developed, conserved and controlled in a sustainable manner for the benefit of all people and the environment.

The DWS is mandated to develop a knowledge base and implement effective policies, procedures and integrated planning strategies both for water resources and services.

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.

In 2016, Cabinet approved the Sanitation Policy, whose pillars include planning, institutional arrangements, participation and ownership, skills and capacity, financial and economic aspects, as well as the sustainability of sanitation services.

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 of 1998 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 m³ of water down to 0,2 million m³ of water.

South Africa uses about 10 200 million m³ 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.

Augmentation schemes

By mid-2017, the following augmentation schemes were underway to support water security in South Africa:

- The Raising of the Clanwilliam Dam Wall and Irrigation Scheme (Western Cape) to increase water storage capacity for emerging black farmers and unleashing the economic potential of the area.
- The Raising of Tzaneen Dam (Limpopo) will see construction for the raising of the dam wall, commencing by July 2017.
- The Lower Thukela Regional Bulk Water Scheme (KwaZulu-Natal) was expected to be completed in December 2017. This scheme will supply additional water to the coastal and inland areas of KwaDukuza LM and Mandeni LM.
- Mogalakwena Bulk Water Supply (Limpopo) will benefit 94 000 people and mines in the Waterberg area. The project aims to deliver water to Mokopane town and surrounding villages.
- The Namakwa Bulk Water Supply Scheme (Northern Cape) will benefit 11 500 households in the Namakwa Region.
- The Hoxane Water Treatment Works (Mpumalanga) has seen the completion of phases 1 and 2. Phase 3 will provide an additional 27 million litres per day of purified water for the benefit of emerging black farmers.
- Phase 2 of the Mokolo Crocodile West Augmentation Project (Limpopo) comprises a 160-km pipeline to transfer water from the Crocodile River West near Thabazimbi to the Lephalale area. This project will support electricity generation for the country.

Bucket Eradication Programme

In keeping with the aspirations of the NDP, steady progress is being made towards eradicating the bucket toilet system in both formal and informal areas across South Africa.

Nationally, the percentage of households without sanitation, or who used bucket toilets decreased from 12,3% to 4,2% between 2002 and 2016.

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 15 water boards in South Africa, with the three largest being Rand Water in Gauteng, Umgeni Water in KwaZulu-Natal and Overberg Water in the Western Cape.

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 (WRC)

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 (SWPN)

The SWPN is a dynamic and cutting-edge partnership between the DWS, the private sector and civil society working collectively to close a 17% gap between water supply and demand that is anticipated to manifest by the year 2030 in South Africa.

The partnership strives to contribute to efficient, equitable and sustainable water supply and access to water for all

South Africans through the identification and application of innovative and cost effective solutions and programmes.

