



# Energy and Water

## Energy

The Department of Energy (DoE) has updated the country's plan for electricity – the Integrated Resource Plan (IRP2010). It is a 20-year projection of electricity supply and demand – about 42% of electricity generated in South Africa has to come from renewable resources.

The department has implemented certain parts of the IRP such as the introduction of the Independent Power Producers of which 2 600 MW in terms of bids in the Renewable Energy Independent Power Producers Programme (REIPPP) had been concluded by September 2013. The department concluded Window 3 of REIPPP in 2013/14. It will also focus on the small scale (less than 5 MW) distributed generation programme, which bodes well for rural development.

## 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.

Eskom concluded 11 power buy-back deals with ferrochrome and alloys producers for the period 1 December 2012 to 31 March 2013. The buy-backs were funded through an existing allocation for demand management programmes and were expected to have no impact on the tariff.

## National Strategic Fuels Stock Policy

The Energy Security Master Plan for Liquid Fuel 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.

Environmentalists have named Cape Town as the capital city as part of the global push to wean civilisation from fossil fuels.

The Earth Hour Challenge, part of the annual Earth Hour symbolic gesture to raise awareness of the impact of fossil fuel on the environment, is a partnership between the World Wide Fund (WWF) for Nature and the Local Governments for Sustainability. Earth Hour 2014 will be celebrated on 29 March and the WWF and other organisations have asked the public to switch off electricity consuming devices for an hour.

## National Liquid Petroleum Gas (LPG) Strategy

LPG is commonly used in mines to power smelting furnaces that are processing materials, such as platinum and vanadium, as well as domestically for cooking. The LPG Strategy that was submitted to Cabinet in 2011/12, mainly aims for 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.

## Role players

### Sasol

Sasol is an international integrated energy and chemical company that leverages the talent and expertise of more than 34 000 people working in 37 countries. The company 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.

### Eskom

Eskom generates, transmits and distributes electricity to industrial, mining, commercial, agricultural and residential customers and redistributors. In September 2013, President Jacob Zuma officially reopened Eskom's Grootvlei Power Station in Balfour, Mpumalanga, which will contribute towards meeting the country's energy demand requirements by providing maintenance space for other power stations.

## National Nuclear Energy Executive Coordination Committee (NNEECC)

The DoE undertook study tours to a number of key nuclear-energy jurisdictions ahead of a final nuclear decision, which government was intent on making before the end of 2013/14.

South Africa has opted for a phased decision-making approach under the direction of the NNEECC.

## 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).

## Others 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.
- 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. The DoE's Hydrocarbons and Energy Planning Branch is responsible for coal, gas,

liquid fuels, energy efficiency, renewable energy and energy planning, including the energy database.

The *White Paper on the Promotion of Renewable Energy and Clean Energy Development* (2002) commits South Africa to producing 5% of the country's energy supply from renewable energy sources by 2013.

## Alternative gas resources

In March 2014, government gave the go-ahead for shale gas exploration in the southern Karoo and elsewhere.

## Renewable and alternative fuels

The *White Paper on Renewable Energy* (2003) has set a target of 10 000 GWh of energy to be produced from renewable energy sources (mainly from biomass, wind, solar and small-scale hydro) by 2013.

## 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.

## Hydro power

The Bramhoek and Bedford dams have both been completed and the R23-billion Ingula Pumped Storage Scheme were implemented during 2013/14. By the end of 2013, 2 400 MW of capacity had been awarded to renewable projects.

## Solar power

The launch of the solar energy farm, the first renewable energy project in North West took place in May 2013. Located at Buffelspoort, RustMo1 Solar Farm is a 7 MW solar photovoltaic (PV) power generation facility. The project will supply

power to the Eskom grid. The farm will produce 244 643 MWh of energy over the 20-year contract period.

Commercial operations at the farm started in November 2013. The development of the farm was awarded to Momentous Energy, a South African black-owned development company.

By the start of 2014, other solar PV projects ranging from five to 340 MW earmarked for Brits; Christiana; Taung; Rustenburg; Vryburg; Mahikeng; Tswaing and Orkney were at various stages of the bidding and planning process for implementation.

Spanish company Abengoa, in partnership with the state-owned Industrial Development Corporation (IDC) and community trusts in Upington and Pofadder, is building Khi Solar One, a 50 MW solar tower plant near Upington, and KaXu Solar One, a 100 MW parabolic trough solar plant near Pofadder.

According to the Southern Africa Solar Thermal and Electricity Association, the two power stations will leverage investment of over R10 billion, and together will generate almost 500 GWh clean solar electricity a year.

According to Abengoa, the two plants will reduce South Africa's carbon-dioxide emissions by about 498 000 tons a year, while creating between 1 400 and 2 000 construction jobs and about 70 permanent operation jobs, as well as numerous indirect jobs to fulfil the needs required by the plant and its construction.

## Wind power

In November 2013, construction of the wind turbine manufacturing facility was well on its way to being completed at the Coega IDZ. The Wind Tower Factory Project, which was more than 60% complete by the start of 2014, is a joint initiative between the DCD Group, the IDC and the Coega Development Corporation.

## Hybrid systems

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

The nuclear sector in South Africa is mainly governed by the Nuclear Energy Act of 1999, and the National Nuclear Regulator Act of 1999. The DoE administers these Acts.

South Africans achieved a massive 629 MW average reduction on their electricity usage during Earth Hour in March 2013. The campaign encourages individuals and businesses to lead energy-smart lifestyles, to save power, save the planet and save money.

In March 2014, the Nuclear Energy Corporation of South Africa signed a skills development and training agreement with two Chinese state nuclear energy corporations, the China General Nuclear Power Corporation and the State Nuclear Power Technology Corporation.

The agreement will create opportunities for young South Africans to further their studies in nuclear energy and other specialised areas of energy at Chinese universities, with funding of up to 95% from Chinese institutions.

## **Programmes and projects**

### **Wind resource map**

The DoE launched the country's first Large Scale High Resolution (250 m) Wind Resource Map in July 2013.

It is expected that the map is going to be a useful instrument in government's planning for the efficient use of the country's wind resources.

The data is based on the Verified Numerical Wind Atlas for South Africa (WASA), which was launched in March 2012.

The purpose of the WASA is to improve knowledge and the quality of resource assessment methods and tools, to make available this knowledge and tools free of charge for planning and development of wind farms and off-grid electrification, and to build capacity of local institutions to do wind resource measurements.

### **Integrated resources plan (IRP)**

At the Africa Energy Indaba in February 2013, the Minister of Energy said South Africa intended to introduce nuclear power to lower carbon emissions.

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

South Africa is a member of the International Atomic Energy Agency and had signed up for stress tests to ascertain whether its reactors were vulnerable to natural causes like tsunamis.

As a member of the agency, the country had to meet several milestones.

In September 2013, the DoE launched the public-consultation phase for the formulation of an Integrated Energy Plan for South Africa, which it says should be published during the course of 2014.

In July 2013, Cabinet endorsed a draft Integrated Energy Planning Report, which provides the basis for the current set of consultations.

### **Renewable Energy Independent Power Producers Procurement Bidding Programme**

By 2014, under the REIPPP the department was about to enter Window 3 having already selected bidders for a total of 2 614 MW to be added to the country's power grid by 2016.

By March 2013, the department had installed 335 000 solar water systems out of a target of one million by the end of 2014.

By May 2013, South Africa had signed agreements with preferred bidders in Window 2 of the REIPPP that would contribute to the country's energy mix and job creation.

According to the IRP2010, projection on electricity supply and demand, about 42% of electricity generated in South Africa has to come from renewable resources.

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

### **Integrated National Electrification Programme (Inep)**

A total of 181 004 connections had been made during 2013/14, which was ahead of Inep's target of 180 000. There were still 3,3 million households without electricity, with 75% of these in the Eskom supply area, and 25% in municipal supply areas.

The total number of planned connections for 2013/14 was 276 703.

The department received an increase of R400 million in its funding allocation, which accounted for the higher number of connections projected. The total allocation for 2013/14 was R3,547 billion.

The United Nations declared 2013 the International Year of Water Cooperation.

The objective was to raise awareness, both of the potential for increased cooperation and the challenges facing water management in light of the increase in demand for water access, allocation and services.



According to *The General Household Survey 2012 Report*, 90,8% of South African households had access to piped water while the percentage of households with no toilets or bucket toilets decreased from 12,3% in 2002 to 5,3% in 2012.

## **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 affairs**

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.

## **Policies and strategies**

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

In July 2013, the Minister of Water and Environmental Affairs released the NWRS2, which sets out the vision and strategic actions for effective water management.

### **Water for Growth and Development (WfGD)**

The WfGD Framework points to the relationship between the availability of water and the many forms of economic activity that depend on the available supply of water of specific levels of quality. The department's position is that the country's economic growth target cannot be achieved at the expense of the ecological sustainability of water resources or meeting people's human needs.

### **Raw Water Pricing Strategy**

The strategy will enable the Department of Water Affairs (DWA) to have sound water-pricing policies, cost-reflective tariffs for the entire water value chain in South Africa and a good funding framework for infrastructure.

The 2013 review of the Raw Water Pricing Strategy addressed the issue of water scarcity and how best to use water pricing as a tool for driving more efficient water-use without having a negative impact on small-scale or under-resourced water users.

### Reuse Strategy

The DWA has developed a water reuse strategy to encourage informed decisions relating to water reuse. Reuse could be significantly increased with reuse of return flows in coastal cities, where it would otherwise drain into the sea. In coastal cities, water reuse and desalination compete as two options for water conservation.

Reuse is becoming increasingly acceptable and feasible owing to increasing shortages, improved purification technology and decreasing treatment costs. For example, membrane technologies, also used for desalination of seawater, have become more affordable and have improved. The reuse of treated waste water will have to be managed carefully to ensure public health safety.

### 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.

Government has implemented key projects to augment South Africa's water resources.

- The Trans-Caledon Tunnel Authority has procured funding to implement the Mokolo and Crocodile River West Water Augmentation Project's first two phases with a cost of about R2 billion, to deliver water to Eskom's new Medupi power station and other industries in the area, as well as domestic water to the Lephalale Local Municipality. The first water delivery is expected in 2014.
- In July 2013, the Bloemendal bulk water project, which helped address issues of water-borne diseases and water shortages in Delmas, in the Victor Khanye Local Municipality. The bulk water project is part of the government's drive to bring services to the people of the country. The project is designed to supply 25 Ml/d (potable water) and is sufficient to meet water demand in the service area up to 2026.

In October 2013, the winners of the 2013 Water Sector Awards on Water Conservation and Water Demand Management were awarded in recognition and acknowledgement of their initiatives in water conservation and water demand management per category:

- Agriculture: Lower Olifants River Water Users Association, Western Cape; Water Research Commission, Gauteng.
- Business: Sun City Resort, North West; Garden Court Hatfield, Gauteng.
- Industry, Mining and Power Generation: Richards Bay Minerals, KwaZulu Natal; Eskom, Gauteng; Optimum Coal Mine, Mpumalanga.
- Domestic or Local Government Local Municipalities: Emfuleni (Sasol and GIZ), Gauteng; Drakenstein, Western Cape; New Castle, KwaZulu-Natal.
- Metropolitan and District municipalities: City of Cape Town, Western Cape; Johannesburg Water, Gauteng; City of Tshwane, Gauteng.

The new project incorporates a 10 Mℓ reservoir located at midpoint of the new pipeline and is designed to improve system operation as well.

- In November 2013, President Zuma launched the Spring Grove Dam, in Mooi River, KwaZulu-Natal. Spring Grove Dam (or Mooi Mngeni Water Scheme) supplies water to the eThekweni Metropolitan Municipality and the uMgungundlovu District, Msunduzi Local, Ugu Local, Sisonke and iLembe local municipalities. It created 960 jobs when it was constructed. The R1 billion dam is part of government's infrastructure development plan that is also designed to create jobs, improve the quality of life and boost the economy.
- De Hoop Dam, officially opened in March 2014, will deliver water for domestic and agricultural use in the Greater Sekhukhune, Waterberg and Capricorn district municipalities. This will deliver water to three million Limpopo residents.

Various strategic projects of the DWA during 2013/14 included:

- The Bulk Water Schemes in the Xhariep District, namely Phase 2 of the Jagersfontein/Fauresmith and Rouxville/Smithfield/Zastron projects. Regional Bulk Water Schemes in the Masilonyana and Tokologo local municipalities in the Lejweleputswa district and the Moqhaka Local Municipality in the Fezile Dabi district.

- Regional Bulk Water Schemes in the Setsoto, Dihlabeng and Phumelela local municipalities, the Sterkfontein Dam Scheme and the Nketoana Regional Water Scheme Augmentation in the Thabo Mofutsanyana district.
- Significant progress with the refurbishment of water and wastewater treatment works during 2012, including those at Bethlehem and Saulspoort, Ficksburg, Vrededorst, Heilbron, the Matjhabeng and Moqhaka local municipalities.

### Programmes and initiatives

Water-related programmes and initiatives include:

- Integrated Water Resources Management
- National Water Resources Infrastructure Programme
- Regional Bulk Infrastructure Grant Programme
- Strategic integrated projects
- Dam Safety Rehabilitation Programme
- Support for resource-poor farmers
- Rainwater harvesting
- River Health Programme and interventions
- Water Allocation Reform Accelerated Community Infrastructure Programme
- Women in Water
- Water Conservation and Demand Management
- Enhanced Local Government Support Approach
- Freshwater Programme
- Monitoring programmes
- National Aquatic Ecosystem Health Monitoring Programme
- National Chemical Monitoring Programme
- National Toxicity Monitoring Programme
- Education and awareness
- Youth development and National Water Week.

