



FACTSHEET ON THE ENERGY MARKET SOUTH AFRICA

2nd edition. This edition updates key statistics, where available, and highlights important developments in the energy market since September 2021.

Overview

South Africa is a middle-income emerging market with an abundant supply of natural resources and well developed financial, legal, communications, energy and transport sectors.

General indicators of South Africa's energy sector

Data current as of	2021
Population (million) ¹	60
GDP (PPP) (current US\$) ¹	US\$865.82 bn
GDP per capita (PPP) (current US\$) ¹	US\$13 359
Total primary energy demand (Mtoe) ^{2,3}	128.534
Electricity final consumption (TWh) ⁴	206 (FY2021)
Nominal ⁵ capacity (GW) ⁴	50.3 (FY2021)
Percentage renewables nominal capacity (not including hydro) ⁴	10% (FY2021)
Energy intensity (ktoe/\$)	148 (calculated)
Average consumption of electricity per household (kWh / HH / annum) ⁶	3 319
Percentage of population with access to electricity ¹	84.4% (2020)

Energy context

The South African energy sector is dominated by coal, which contributed around 74% to the country's total primary energy supply in 2018⁷. Coal also powers 81.4% of electricity generation in the country⁸. Imported crude oil contributes 14% of primary energy and is largely used to provide for automotive fuels. Apart from coal and oil, primary energy is sourced from biomass such as wood and dung, natural gas, hydropower, nuclear power, solar power and wind.

The country is facing severe electricity supply constraints that are managed by rotational power outages and load curtailment; loadshedding was implemented for 1 169 hours during 2021, curtailing power usage by 2 521 gigawatt hours during the year⁸. The first six months of 2022 had already seen 2 276 gigawatt hours cut – 90% of the total in 2021⁹.

In July 2022, President Cyril Ramaphosa addressed the nation to report on various interventions the government is pursuing to address the electricity crisis. The impact of these interventions is already reflected in recent developments.

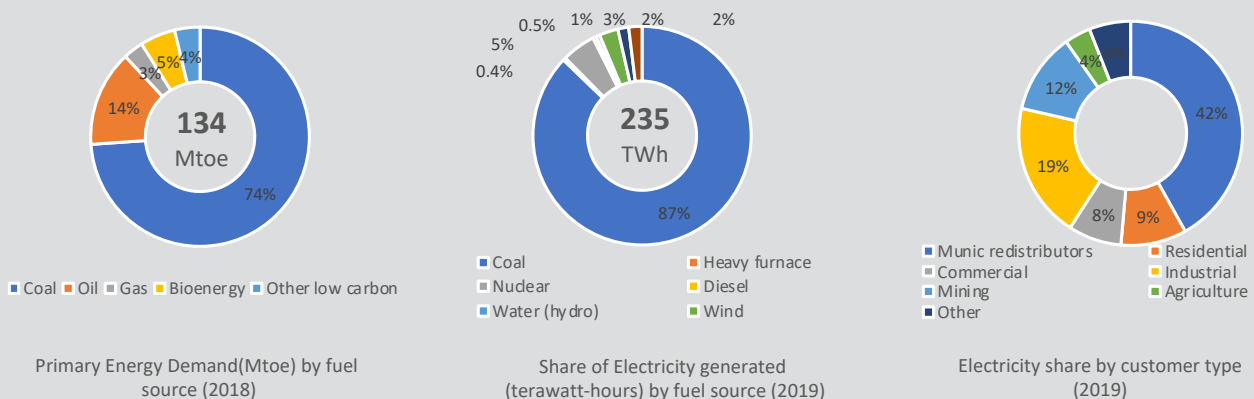


Figure 1. South African primary energy mix (IEA)¹⁰, electricity generation by fuel source and electricity share by customer (StatsSA)¹¹

Policy context

A comprehensive policy and regulatory framework guide the energy sector in South Africa (Figure 2). The dominance of fossil fuels is set to change as the country gives effect to the policy decision to diversify the energy mix as articulated in the 1998 White Paper on Energy Policy.

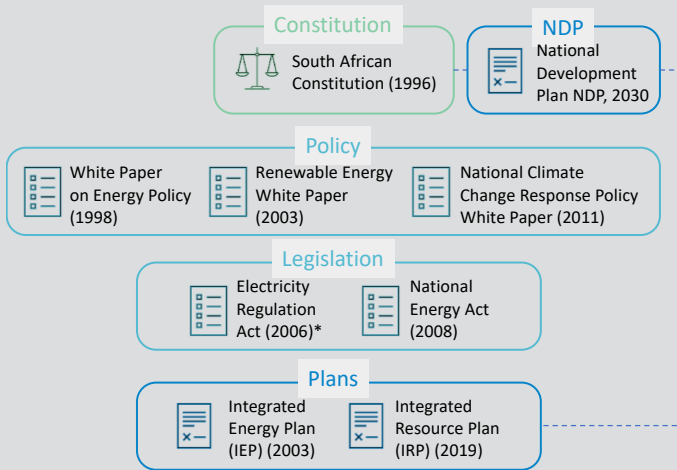


Figure 1. Broad policy context for energy in South Africa (adapted from *State of Renewable Energy in South Africa, 2017*)

This diversification is already evident in the energy sources used for electricity production since 2013 (Figure 3). Data for 2021 is not yet available from Statistics South Africa¹¹, but indicative data from the Council for Scientific and Industrial Research (CSIR) show that coal contributed 81.4% and renewable energy sources 7.4% to the electricity mix⁸.

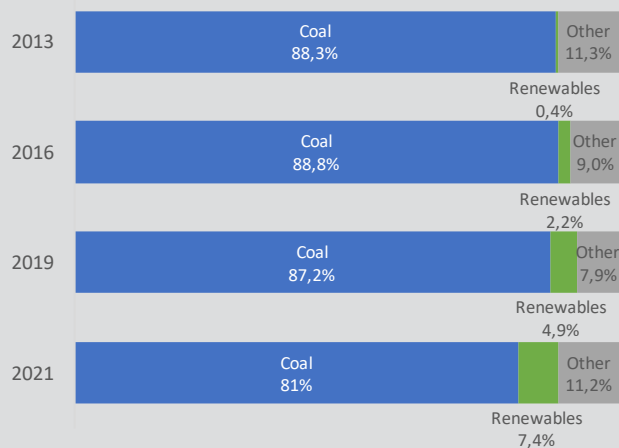


Figure 3. Changing electricity mix, 2013–2021 (StatsSA, CSIR)

Key role players in the energy sector

The Department of Mineral Resources and Energy (DMRE) is the custodian of all energy policies and energy security in South Africa. The National Energy Regulator of South Africa (NERSA) regulates the energy sector in the context of national policy and planning. NERSA is responsible for the licensing and registration of new energy infrastructure; the regulation of electricity and hydrocarbons infrastructure tariffs and pricing; promoting competition; and compliance monitoring and dispute resolution.

Eskom is the state-owned electricity utility. It owns most of the electricity generation, transmission, and distribution infrastructure. Until 2020, the utility was the sole entity responsible for entering into power purchase agreements (PPAs) for new generation capacity from independent power producers (IPPs). Since the end of 2020, significant steps were taken to further open the electricity market, with amended regulations that allow municipalities to establish new generation capacity (New Generation Regulations, amended 2021) and an increase in the licensing threshold for embedded generation from 1 MW to 100 MW (amendment to Schedule 2 of the Electricity Regulation Act).

Responding to the electricity crisis interventions announced by the President in July 2022, the Minister of Energy published a complete licensing exemption and regulation notice for public comment on 2 September 2022¹². If successfully adopted, the country may see additional market entrants and embedded generation capacity.

The DMRE's Independent Power Producers Procurement Programme (IPPPP) was established at the end of 2010 to enhance South Africa's electrical power generation capacity and invite private sector investment in the sector. The IPP Office was established with the primary mandate to secure electricity from renewable and non-renewable energy sources from the private sector.

Plans guiding the energy sector

South Africa's National Development Plan 2030 envisages that adequate investment in energy infrastructure will promote economic growth and development. The Integrated Energy Plan (IEP 2003) provides a roadmap of the future energy landscape for South Africa, guiding future energy infrastructure investments and policy development for electrical power, gas and liquid fuels.

The Integrated Resource Plan (IRP) for electricity charts South Africa's long-term plan for electricity generation. It primarily aims to ensure security of electricity supply, minimize the cost of that supply, limit water usage and reduce greenhouse gas (GHG) emissions, while allowing for policy adjustment in support of broader socio-economic developmental imperatives. A process to review the current plan is underway with the expected completion date set for the end of 2023¹³.

Structure of the South African electricity sector

South Africa has a well-established electricity sector with a comprehensive power network that serves 85% of South African citizens¹. The country has experienced severe supply constraints in recent years, requiring urgent additions to the installed generation capacity.

Eskom, as the national power utility, is the dominant role player in the supply sector (Figure 4). Vertically integrated, it is responsible for approximately 90% of generation, all power transmission and approximately 60% of power

distribution in the country. The balance of generation is sourced by Eskom from neighbouring countries and independent power producers (IPPs), mostly producing from renewable resources. Municipalities (local government) are responsible for the remaining portion of electricity distribution in the country.

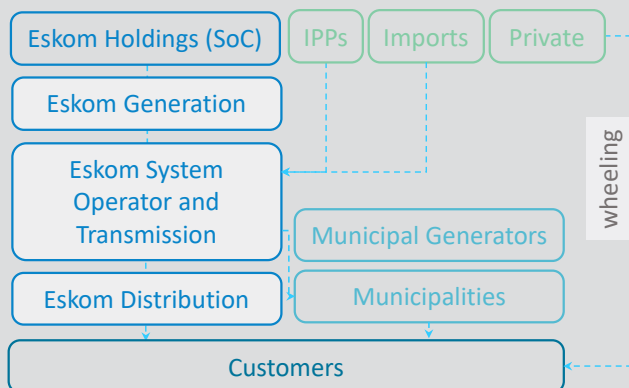


Figure 4. Structure of the electricity sector in South Africa¹⁴

A process of unbundling Eskom into three entities – Generation, Transmission and Distribution – was initiated in 2019 and is anticipated to be completed by December 2022¹⁵. Amendments are being introduced to the Electricity Regulation Act¹⁶ to support the sector unbundling.

The amended licensing threshold for embedded generation (amendment to Schedule 2 of the Electricity Regulation Act) has also invited customers to participate more actively in the sector. The number and size of customer-sited projects registered under the amended licensing conditions have increased sharply, with 479MW of new embedded generation capacity registered following the threshold increase to mid 2022. This compares to 188MW registered from 2018 to Q3 2021 (Figure 5). The majority (86%) of all embedded generation is from Solar PV¹⁷.

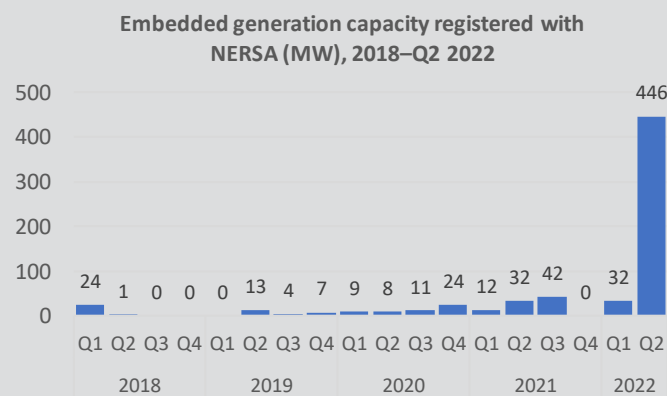


Figure 5. NERSA registered capacity (TIPS analysis)

Outlook for the South African electricity sector

The IRP 2019 was promulgated in October 2019¹⁸, replacing the IRP 2010 as the country's official electricity infrastructure plan. The IRP proposes an energy mix (Figure 6), with which to meet the country's electricity needs until 2030, calling for:

- 37 GW of new and committed capacity to be added between 2019 and 2030 from a diverse mix of

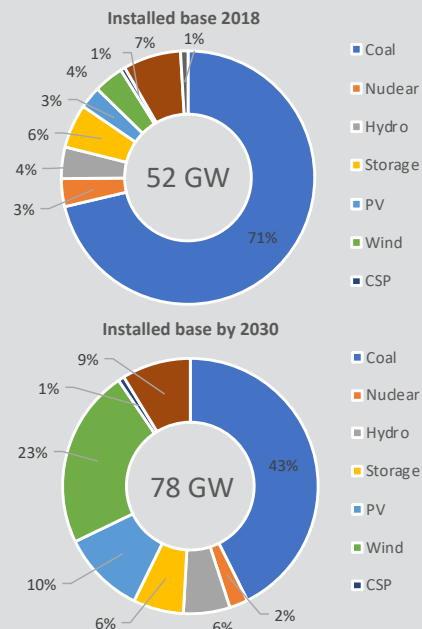


Figure 6. Projected electricity by source, 2030 (IRP 2019)²⁰

energy sources and technologies, as ageing coal plants are decommissioned¹⁹.

- A reduced share of electricity from coal – 43% of installed capacity – as the country transitions to a larger share of renewable energy.
- The addition of 22.8 GW of wind and solar by 2030 in relation to 2018, made up of 15.7 GW of wind, 6.8 GW of solar PV and 0.3 GW of concentrated solar power (CSP).
- Energy storage to contribute 5 GW, or 6%, to the installed capacity.
- Immediate supply constraints to be addressed by targeting the procurement of approximately 2 GW as a short-term measure to fill the supply gap until 2022; and
- Distributed or embedded generation for own use, anticipated to contribute 4 GW between 2023 and 2030.

As the country reduces its reliance on coal, the DMRE and Eskom are also developing a planning framework that will support a just transition²¹.

With the security and reliability of electricity supply being an imperative, the DMRE's strategic plan for 2020–2025 further notes the following priorities for the sector:

- Energy efficiency is critical for economic growth and reduced carbon emissions. Alongside embedded generation it is also key to alleviate the immediate energy supply constraints.
- Universal access to electricity is targeted by 2025.
- The complementary relationship between smart grid systems, energy efficiency, energy storage, and non-dispatchable renewable energy technologies based on wind and solar PV is recognized.

South Africa's potential for solar and wind energy

South Africa has favourable renewable resource conditions, in particular solar radiation and wind flows across the country and throughout the year (Figure 7).

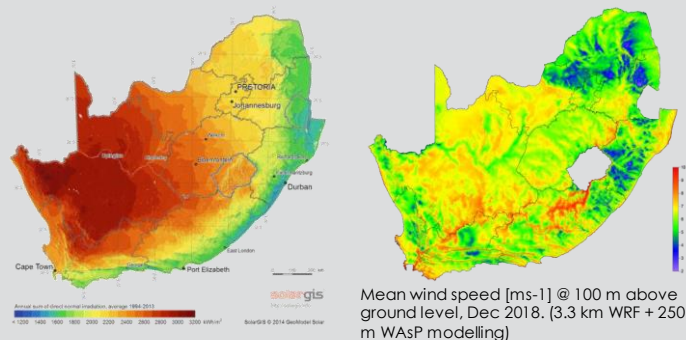


Figure 7. Solar map South Africa, Lesotho, and Swaziland, GeoModel Solar²² and Wind Atlas of South Africa, Large-Scale High-Resolution Wind Resource map, December 2018

In recognition of this potential, 6 323 MW of electricity capacity had been procured by December 2021^{23, 24} from 92 renewable energy IPPs through the IPPPP. Of this, 5 661 MW had already been successfully completed and connected to the national power network. A further 25 preferred bidders were announced on 28 October 2021 to develop 2 583 MW of wind and PV capacity. By July 2022, construction has also started on one of eleven risk mitigation projects identified to respond to the electricity supply gap.²⁵

On 11 September 2022 the government announced an amendment to the request for proposals under the REIPPPP Bid Window 6. Increasing the capacity to be procured under the current bid window from 2 600MW to 4 200MW. This increase is part of the urgent work of the National Energy Crisis Committee to address supply constraints and achieve

security of supply.²⁶ This single bid window will contribute almost two thirds of the wind and solar generation capacity procured since the inception of the REIPPPP in 2011. Preferred bidders are expected to be announced before the end of 2022, with financial close targeted by mid 2023.²⁷

Contact

Commissioned and published by: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Registered offices in Bonn and Eschborn, Germany

Project: South African-German Energy Partnership
Contact: Andreas Betz, Head of Secretariat
Secretariat-RSA-Energy-Partnership@giz.de
www.energypartnership.org.za

As at: Date

Printed by: (Printing agency – name and city)

Design: (name + city of the agency / graphic designer / Edelman GmbH, Berlin)

GIZ is responsible for the content of this publication.

On behalf of the Federal Ministry for Economic Affairs and Climate Action (BMWK)

Footnotes: 1. The World Bank 2021, 'Historical Data Sets and Trends Data'. data.worldbank.org. 2. The tonne of oil equivalent (toe) is a unit of energy defined as the amount of energy released by burning one tonne of crude oil. 3. Enerdata. <https://www.enerdata.net/estore/energy-market/south-africa/> 4. Eskom Annual Integrated Report 2021. 5. Nominal = Available to the grid, including Eskom and IPPs. The difference between installed and nominal capacity reflects auxiliary power consumption and reduced capacity caused by the age of the plant. 6. IPP Office. IPPP Quarterly Report, 31 March 2021. 7. IEA, South African primary energy demand and GDP in the Stated Policies Scenario, 2010-2040, IEA, Paris <https://www.iea.org/data-and-statistics/charts/south-africa-primary-energy-demand-and-gdp-in-the-stated-policies-scenario-2010-2040>. 8. Pierce, W. Ferreira, B. 2022. Statistics of utility-scale power generation in South Africa in 2021. CSIR Energy Centre. v1.0. Apr 2022. <https://www.csir.co.za/csir-statistics-on-power-generation-south-africa-2021>. 9. <https://www.engineeringnews.co.za/article/avoid-the-renewable-energy-pitfalls-with-powerpulse-2022-08-18> 10. StatsSA, 2021. Electricity, gas and water supply industry, 2019 Report. Report no. 41-01-02 (2019). Released 2 September 2021. Available at <http://www.statssa.gov.za/publications/Report-41-01-02/Report-41-01-022019.pdf>. 11. IEA, South African primary energy demand and GDP in the Stated Policies Scenario, 2010-2040, IEA, Paris <https://www.iea.org/data-and-statistics/charts/south-africa-primary-energy-demand-and-gdp-in-the-stated-policies-scenario-2010-2040>. 12. Government Gazette No. 46845 3 of 02 September 2022. 13. DMRE. July 2022. IRP2019 Review Process as presented to the PCC Energy Dialogue. 14. Adapted from the DMRE South African Energy Sector Report, 2019. 15. Select Committee on Public Enterprises and Communications, 26 May 2021. <https://pmg.org.za/committee-meeting/33068/>. 16. Government Gazette No. 45898, 10 Feb. 2022. 17. NERSA database Registered-Generation-Facilities-Database-June-2022.pdf available at www.nersa.org.za and analysis by Trade and Industry Policy Strategies (TIPS), <https://www.tips.org.za>. 18. Published in Government Gazette No. 42784 vol. 652 of 18 October 2019. 19. Coal-fired generation capacity of 11,017 MW planned for decommissioning by 2030. 20. 'Other' category included to force percentages to reflect as per IRP 2019. 21. DMRE Strategic Plan, 2020 – 2025 and Eskom Holdings, Integrated Report, 31 March 2020. 22. Developed in partnership between Centre for Renewable and Sustainable Energy Studies, University of Stellenbosch and Group for Solar Energy Thermodynamics (GSET) at UKZN (2014), www.sauran.net. 23. IPP Office. IPPP Quarterly Report, 31 March 2021. 24. Note that the 'Small projects' have been excluded from most recent IPP Office reporting, thus bringing the capacity procured and number of projects down from the data reported in the 2021 Factsheet. 24 <https://scatec.com/2022/06/02/scatec-signs-power-purchase-agreements-under-south-africas-rmipp/2022-06-02> 25. www.gov.za Media statements. 11 September 2022. Government Communication update on procurement process for renewable energy IPP procurement programme bid window 6. 26. https://www.engineeringnews.co.za/article/ipp-office-outlines-new-bid-window-6-timetable-as-it-awaits-key-nersa-and-eskom-approvals-for-upscaled-round-2022-08-22/rep_id:4136