



Official Guide to **SOUTH AFRICA** 2021/22

MINERAL RESOURCES AND ENERGY



The Department of Mineral Resources and Energy (DMRE) is mandated to ensure the transparent and efficient regulation of South Africa's mineral resources and minerals industry, and the secure and sustainable provision of energy in support of socio-economic development.

Several Acts regulate the mining, minerals and energy sectors. Key among these are the:

- **Petroleum Products Act of 1977**, which regulates the petroleum industry at the manufacturing, wholesale and retail levels;
- **Mine Health and Safety Act of 1996**, which governs mine health and safety;
- **Mineral and Petroleum Resources Development Act of 2002**, which provides the regulatory framework for equitable access to and the sustainable development of mineral resources and related matters;
- **Electricity Regulation Act of 2006**, which establishes a national regulatory framework for the electricity supply industry, including registration and licensing; and
- **National Energy Act of 2008**, which empowers the minister to plan for and ensure the security of supply for the energy sector.

Over the medium term, the department aimed to continue focusing on transforming mining and energy resources, rehabilitating mines and the environment, extending access to electricity, enhancing energy efficiency, and managing nuclear energy in accordance with international commitments.

This focus is intended to ensure that South Africa has an adequate supply of electricity and liquid fuels to maintain economic activity and prevent economic disruptions, and to give effect to a mining sector that prioritises the welfare of its human resources and the environment.

The department's regulatory and oversight work is labour intensive. It requires inspections to be conducted to ensure that mining companies and petroleum licence holders comply with legislative requirements, and that electricity connections are verified through the integrated national electrification programme.

Transforming mining and energy resources

As the department seeks to accelerate transformation within the mining sector over the MTEF period, it will aim to monitor and enforce compliance with the mining charter. This is expected to be done by conducting 636 social and labour plan verification inspections and economic verification audits on 1 275 mines.

The department's objective of inspecting 4 500 petroleum retail sites and issuing mining rights or permits to a targeted 360 historically disadvantaged South Africans over the period ahead is intended to enforce compliance with regulatory standards and transformation imperatives in the petroleum sector. To address backlogs in the processing of mining licence applications and to improve efficiency, the department plans to invest in a new IT system.

Rehabilitating mines and the environment

To protect the health and safety of mine employees and people in surrounding communities over the medium term, the department aims to rehabilitate nine mines and seal 120 shafts/holings, and conduct 3 825 environmental verification inspections.

Extending access to electricity

Ensuring that all South Africans have access to electricity is a key government priority. The department oversees and manages the financing and implementation of the integrated national electrification programme, manages and coordinates technical audits, and manages annual planning processes such as electrification infrastructure plans. It was expected to review procurement programmes for independent power producers in 2022/23.

Enhancing energy efficiency

The energy efficiency and demand-side management grant enables municipalities to upgrade municipal infrastructure that is not energy efficient, such as replacing street and traffic lights with greener technology.

Managing nuclear energy

Funds have been earmarked in the 2022/23 financial year for preparatory work to procure a multipurpose reactor to replace the 55-year-old SAFARI-1 research reactor, which is approaching the end of its useful life. The reactor is used for research and development, and to manufacture medical isotopes.

Role players:

- **Mine Health and Safety Council:** It was established in terms of the Mine Health and Safety Act of 1996, and is listed as a schedule 3A public entity in terms of the Public Finance Management Act (PFMA) of 1999. It is mandated to advise the Minister of Mineral Resources and Energy on occupational health and safety at mines, develop legislation, conduct research, and liaise with other statutory bodies. The council was expected to continue focusing on improving the safety of mineworkers by offering programmes to promote safety awareness, and improve occupational health and safety for workers.
- **Council for Mineral Technology Research (Mintek):** Mintek's mandate, as set out in the Mineral Technology Act of 1989, is to maximise the value derived from South Africa's mineral resources through, among other things, research and development, technology transfer, and the creation of an enabling environment for the establishment and expansion of mineral industries. To this end, Mintek develops appropriate, innovative technology for transfer to industry, and provides the industry with test work, consultancy, analytical and mineralogical services.

- **Council for Geoscience (CGS):** The CGS was established in terms of the Geoscience Act of 1993 to promote the search for and exploitation of any mineral in South Africa. It is mandated to generate, compile, curate and publish world-class geoscience knowledge products, provide geoscience-related services to the South African public and industry, and render advisory services related to geohazards and geo-environmental pollution.
- **South African State Diamond and Precious Minerals Regulator (SADPMR):** The SADPMR was established to administer the Diamonds Act of 1986 (as amended) and the Precious Metals Act of 2005. The Diamond Exchange and Export Centre (DEEC) was established by the SADPMR in terms of Section 59(b) of the Diamonds Second Amendment Act of 2005 and started operating on 14 January 2008. One of the core functions of the SADPMR is to facilitate the buying, selling, exporting and importing of diamonds through its DEEC, which is a secure and controlled environment where goods are offered to other licensees. It plays a vital role in ensuring that unpolished diamond tenders are facilitated fairly to the local market.
- **State Diamond Trader (SDT):** The mandate of the SDT, as defined in the Diamonds Amendment Act of 2005, is to buy and sell rough diamonds, and to promote equitable access to and beneficiation of the country's diamond resources. It is listed as a schedule 3B public entity in terms of the PFMA of 1999. The trader is mandated to conduct research, develop a client base, contribute to the growth of the local diamond beneficiation industry, and develop efficient means of marketing diamonds not suitable for local beneficiation. Over the medium term, the trader aimed to continue growing the local diamond beneficiation industry and increase the sale of rough diamonds to historically disadvantaged South Africans. The trader generates revenue from the sale of rough diamonds.
- **Sasol:** The international integrated chemicals and energy company 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.
- **Eskom:** It generates about 95% of the electricity used in South Africa and about 45% of the electricity used in Africa. It generates, transmits and distributes electricity to industrial, mining, commercial, agricultural and residential customers.
- **iGas:** It is the official state agency for the development of the hydrocarbon gas industry in southern Africa.
- **Petroleum Agency South Africa (PASA):** It promotes exploration for onshore and offshore oil and gas resources, and their optimal development.
- **Petronet:** It owns, operates, manages and maintains a network of 3 000 km of high pressure petroleum and gas pipelines, on behalf of government.
- **National Energy Regulator of South Africa (NERSA):** It is the regulatory authority for electricity, piped gas and petroleum pipelines.

- **National Nuclear Regulator (NNR):** It is responsible for safety standards and regulatory practices for the protection of people, property and the environment against nuclear damage.
- **Nuclear Energy Corporation of South Africa (NECSA):** It 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.
- **South African National Energy Development Institute:** It 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.
- **Central Energy Fund (CEF):** It is governed by the CEF Act of 1977 and the Companies Act of 2008. Its mandate is to research, finance, develop and exploit appropriate energy solutions to contribute to South Africa's security of energy supply. Through its subsidiaries, the fund is also mandated to finance and promote the acquisition of coal; exploit coal deposits; manufacture liquid fuel, oil and other products from coal; market these products; and acquire, generate, manufacture, market, distribute or research any other form of energy. The fund's subsidiaries are: the Petroleum Oil and Gas Corporation of South Africa (PetroSA); South African Gas Development Company; PASA; Oil Pollution Control South Africa; the Strategic Fuel Fund; African Exploration Mining Finance Corporation; ETA Energy; and CCE Solutions.
- **PetroSA:** It is a wholly state-owned company of the Government of South Africa and registered as a commercial entity under the South African law. It is a subsidiary of the CEF.
- **National Radioactive Waste Disposal Institute (NRWDI):** It was established in terms of the NRWDI Act of 2008 to manage the disposal of radioactive waste at the national level. The institute is responsible for the long-term care and disposal of radioactive waste in a safe, technically sound, socially acceptable, environmentally responsible and economically feasible manner. By mid-2022, the NRWDI had started with project development work for the establishment of the Centralised Interim Storage Facility for the storage of used nuclear fuel.

Mining Qualifications Authority (MQA)

The MQA is a statutory body established in terms of the Mine Health and Safety Act of 1996 and is a registered Sector Education and Training Authority (SETA) for the mining and minerals sector in terms of the Skills Development Act of 1998, as amended.

It supports the objectives of the National Skills Development Plan 2020-2030, as guided by the Department of Higher Education and Training, and also supports the objectives of the Mining Charter in terms of the Minerals and Petroleum Resources Development Act of 1996.

The MQA is responsible for administering a number of skills development initiatives. Skills programmes and learnerships aim to develop a skilled and educated workforce whose skills are recognised and valued in terms of the National Qualifications Framework. This is to ensure that the mining and minerals sector has sufficient competent people who will improve health and safety, employment equity and increase productivity.

Reserves

Gold

The Witwatersrand Basin remains the world's largest gold resource and South African gold only accounts for 4.2% of global gold production, according to the Minerals Council South Africa. The large-scale gold mines operating in South Africa include the record setting TauTona Gold Mine, which extends 3,9 km underground. TauTona means "great lion" in Setswana.

Coal

South Africa's coal resources are contained in the Ecca deposits, a stratum of the Karoo Supergroup, and date from the Permian period between 280 and 250 Ma. In general terms, they are largely located in the north-eastern quarter of the country. The coal measures are generally shallow, largely unfaulted and lightly inclined, making their exploitation suitable for opencast and mechanised mining.

South Africa derives over 70% of its energy requirement (electricity and liquid fuels) from coal. According to the Minerals Council South Africa, South Africa has coal reserves sufficient to satisfy its needs for more than a century.

However the locus of production is gradually shifting away from the traditional Witbank or Emalahleni coalfield as collieries approach the end of their productive lives. Emphasis is being placed on exploring and developing the Waterberg coalfield as well as others in Limpopo.

Platinum group metals (PGMs)

South Africa is home to 75% of the world reserves of the PGMs, which include platinum, palladium, rhodium, iridium, osmium and ruthenium. These metals are extremely resistant to corrosion, hence they are used in a number of industrial processes, technologies and commercial applications. Consumer and industrial products made with platinum and other PGMs include flat-panel monitors, glass fibre, medical tools, computer hard drives, nylon and razors.

South Africa's Bushveld Complex hosts approximately 80% of PGM-bearing ore. In medical applications, PGMs are used in the manufacture of anti-cancer drugs, cardiac treatment, implants and dental applications. PGMs such as platinum, ruthenium and iridium are key components in fuel cell catalysts and electrolyzers for green hydrogen production.

Platinum

The Merensky Reef, stretching from southern Zimbabwe through to the Rustenburg and Pretoria regions, is the centre of platinum mining in South Africa. The durability, quality, and aesthetic appeal of silvery-white platinum and palladium has for centuries contributed to its appeal in jewellery manufacture.

Palladium

South Africa is the world's second-largest palladium producer. All of South Africa's production is sourced from the Bushveld Igneous Complex, which hosts the world's largest resource of PGMs. Palladium, together with platinum, is more abundant than any of the other PGMs.

Non-ferrous metals

Non-ferrous metals (including cobalt, copper, lead, nickel and zinc) do not contain iron and are generally more expensive than ferrous metals (contain iron). They are more malleable than ferrous metals, highly corrosion resistant, have low density, non-magnetic, and have good electrical conductivity, which makes their applications wide-ranging, from industrial usage to commercial and residential utilisation.

South Africa is home to most of the non-ferrous metals including titanium, although South Africa currently produces no titanium. The country contains 0.5% of global ilmenite and 0.09% of the world's rutile reserves, and is ranked 6th and 3rd globally in ilmenite and rutile reserve abundance. Titanium occurs primarily in seven minerals namely: anatase, brookite, ilmenite, leucoxene, perovskite, rutile, and sphene.

Chrome ore

According to the US Geological Survey of 2018, South Africa and Kazakhstan host 95% of the world's chromium reserves (shipping grade), at 200 000 tonnes and 230 000 tonnes, respectively. South Africa has 72% of the world's chrome resources.

Copper

Palabora, a large copper mine, smelter and refinery complex managed by the Palabora Mining Company in Limpopo is South Africa's only producer of refined copper. Useful by-product metals and minerals include zirconium chemicals, magnetite and nickel sulphate as well as small quantities of gold, silver and platinum.

Substitutes for copper include aluminium which is used in power cables, electrical equipment, automobile radiators, and cooling and refrigeration tubing. Titanium and steel are also substitutes used in heat exchangers. Optical fibre substitutes for copper are used in telecommunications applications, and plastics substitutes for copper are used in water pipe, drainpipe and plumbing fixtures.

The Ga-Ramokoka Carbonatite Complex in North West hosts numerous minerals that span an estimated tonnage of Rare Earth Elements at 470 thousand tonnes, phosphates at 300 thousand tonnes and copper 30 thousand tonnes. The potential value of a suite of minerals in the carbonatite is estimated at R1.4 billion.

Manganese

South Africa hosts the largest known deposit of manganese and the country is a leading producer of manganese globally. According to the Minerals Council South Africa, manganese prices have been under pressure because of a strong increase in supply coupled with subdued demand out of China which is the core market for South African producers.

Diamonds

According to the Minerals Council South Africa, the country ranks among the top 10 diamond producers globally, producing 10% of the world's diamonds. In 2021, South Africa produced 9.7 million carats of diamonds, an increase of 14.8% compared to 2020.

The underground mining and recovery of diamonds continues to this day in the vicinity of Kimberley, the site of the early main discoveries in the 19th century.

It is, however, on limited scale with a major focus on reprocessing old tailings dumps to recover diamonds left behind by older recovery processes. The Venetia mine in Limpopo owned by De Beers is South Africa's largest diamond producer.

The Finsch mine in the Northern Cape, part of the Petra Diamonds group, is South Africa's second largest diamond producer and operates exclusively as an underground mine using conventional sub-level caving methods.

Industrial minerals

South Africa boasts a substantial industrial mineral endowment. This category of minerals generally does not get a lot of attention despite its notable size and potential.

Geology

South Africa has a long and complex geological history dating back to many years. The preservation of so much Archaean geology, dating back more than 2 500 million years, has resulted in the Archaean Witwatersrand Basin, as well as several greenstone belts, being preserved.

Energy

South Africa continues to pursue an energy mix as espoused in the country's energy blueprint, the Integrated Resource Plan (IRP). Even though South Africa and the rest of the world are increasingly under pressure to mitigate against

climate change, South Africa's energy capacity is largely dependent on fossil fuels such as coal and petroleum.

Although the country has vast reserves of coal and petroleum resources that it continues to exploit, it has begun investing in clean technologies to ensure transition from a high to low carbon economy, while ensuring security of energy supply.

Liquefied Petroleum Gas (LPG) Rollout Strategy

The LPG Rollout Strategy provides a framework for the expansion of the use of LPG gas in South Africa, with special emphasis on the household sector. It also seeks to ensure optimal contribution of LPG in addressing the country's electricity and other energy supply challenges.

The objectives of the strategy, among others, is to promote national access to safer, cleaner, more efficient, environmentally friendlier and affordable thermal fuel for households; and to encourage households to switch from the use of biomass, coal, electricity and illuminating paraffin to LPG for thermal purposes. LPG also contributes to the green economy of government, which is aimed, among others, at reducing greenhouse gas emissions.

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.

Electricity

The DMRE has implemented various intervention measures on energy security and supply. However, loadshedding is commonplace, adversely impacting mining production and the economy broadly. To meet the commitment for universal access to electricity, 166 000 households were electrified during the 2021/22 financial year.

The department planned to connect an additional 640 000 households to the grid; and a further 45 000 households with non-grid technology (solar home systems) in the next three years.

Energy efficiency is important, with more than 200 municipalities participating in the Energy Efficiency and Demand Side Management grant programme.

By mid-2022, NERSA had registered 553 projects that are under 1 MW, totalling 268 MW.

Since the 2021 announcement and gazetting of the 100 MW embedded generation, the Energy Regulator has registered six generation facilities with a capacity ranging between 1 MW and 10 MW. The total capacity to be generated from the six generation facilities is 24 MW.

The DMRE continues to work with other government departments, under Operation Vulindlela, to streamline approval processes for generation for own use.

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.

Oil and Gas

The Upstream Petroleum Resources Development Bill of 2021 was tabled to Parliament. Among others, the Bills seeks to provide for orderly development of petroleum resources; to provide for equitable access to, and sustainable development of, the nation's petroleum resources; to provide for active state and black persons' participation in the development of the nation's petroleum resources; to provide for a petroleum right that integrates the right to explore and to produce; to designate a state-owned company as an entity responsible for managing the State's carried interest in petroleum rights; and designate the PASA as the regulatory authority for the upstream petroleum sector.

iGas, a subsidiary of the CEF, has acquired an additional 40% ownership of the Republic of Mozambique Pipeline Company pipeline. South Africa and Mozambique jointly own 80% of the pipeline with Sasol owning the remaining 20%.

The CGS has since confirmed the verification of the shale gas samples that were tested internationally. We are now awaiting environmental assessment approval before the next phase. A gas master plan was expected to be presented to Cabinet.

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.

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.

Solar energy is used to power equipment such as watches, calculators, cookers, water heaters, lighting, water pumping, communication, transportation, power generation, and many more. Solar energy, like all other renewable energies, is very safe and environmentally friendly. There are no emissions as the source of fuel is the sun, unlike coal-powered stations.

Wind power

Wind energy, like solar energy, is a free and sustainable renewable energy source that is being used to generate electricity. The amount of energy that can be extracted from the wind depends on its speed. The higher the wind speed, the more energy can be harnessed to generate electricity on a large scale. South Africa has fair wind potential, especially along the coastal areas of the Western Cape and Eastern Cape.

Hybrid systems

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

Nuclear

Government has committed, through the Nuclear Energy Policy and 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. The Koeberg Nuclear Power Plant units will reach the end of life in July 2024 and plans are underway to extend the life of this plant by an additional 20 years.

Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)

The REIPPPP, established in 2010, has become one of the world's most progressive and successful alternative energy programmes. Ever since the introduction of these renewable energy technology programmes (solar, wind, biomass, small hydro and landfill gas power), plants have been going up across the country, feeding additional, clean energy into the national grid.

The REIPPPP represents the country's most comprehensive strategy to date in achieving the transition to a greener economy. The programme has been designed to contribute to the development of a local green industry and the creation of green jobs. 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, government 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.