

THE SOUTH AFRICAN ENERGY SECTOR REPORT 2025



DIRECTORATE: ENERGY ECONOMICS AND STATISTICS



electricity & energy

Department:
Electricity and Energy
REPUBLIC OF SOUTH AFRICA

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2025

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Compiled by:

Ms. Thapelo Manyane

Email: Thapelo.Manyane@dee.gov.za

And

Supervised by

Mr. Ramaano Nembahe

Email: Ramaano.Nembahe@dee.gov.za

Published by:

Department of Electricity & Energy

Private Bag X96

Pretoria

0001

Tel: (012) 406 7965

192 Visagie Street, C/o Paul Kruger & Visagie Street, Pretoria, 0001

Website: <http://www.energy.gov.za>

DEPARTMENT OF ELECTRICITY AND ENERGY

Acting Director-General:

Mr. S. Pillay

ENERGY RESOURCES BRANCH

Deputy Director-General:

Dr. K. Bhugwandin

ENERGY PLANNING CHIEF DIRECTORATE

Chief Director:

Mr. T. Audat

ENERGY ECONOMICS AND STATISTICS

Director:

Ms. V. Olifant

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Introduction

The South African energy sector is a major pillar of the country's economic and social development, shaping industrial activity, household welfare, and national competitiveness. The industry, which has historically been dominated by coal-fired power, is going through a major change as South Africa deals with issues such as aging infrastructure, growing energy demand, climate commitments, and the requirement for long-term energy security. The state-owned power utility, Eskom remains the cornerstone of South Africa's national grid, serving as the essential foundation upon which the country's entire electrical architecture is built and sustained. It is generating bulk of the country's power and controlling transmission and distribution. However, persistent challenges in power utility prompt the country to shift towards diversifying energy mix.

The long-term strategic energy plan of South Africa is laid out in the Integrated Resource Plan (IRP) 2025, which places a strong emphasis on a clean energy transition while preserving energy security. This includes addressing affordability and access to clean energy as key components of sustainable development. The main objective of the Integrated Resource Plan is to ensure security of electricity supply in South Africa, planning for adequate capacity in balancing electricity supply and demand reliably, and to minimize the environmental impact of electricity supply by reducing global and local emissions.

In this report, the 2023 South African Energy Balance is analyzed by breaking it down per sub-sectors, that is, the total primary energy supply, which includes domestic production as well as imports and exports, and total final consumption, which includes the economic sectors, industry, transport, agriculture, commercial and public, as well as residential sectors. There is also a further breakdown into the various industry subsectors in terms of energy consumption. The purpose of this report is therefore to show how and in what proportions the country's available energy is supplied and consumed by different sectors.

List of Abbreviations

bbl/d	Barrels per day
CAIA	Chemical and Allied Industries' Association
CEF	Central Energy Fund
CTL	Coal-To-Liquid
DEE	Department of Electricity and Energy
DMRE	Department of Mineral Resources & Energy
DMRE	Department of Energy
GDP	Gross Domestic Product
GTL	Gas-To-Liquid
IEP	Integrated Energy Plan
INEP	Integrated National Electrification Programme
IRP	Integrated Resource Plan
JPol	Johannesburg Plan of Implementation
LPG	Liquified Petroleum Gas
Mt	Megaton
MW	Megawatts
MYPD	Multi-Year Pricing Determination
NERSA	National Energy Regulator of South Africa
PetroSA	Petroleum Oil and Gas Corporation of South Africa
TJ	Tera Joules
R/t	Rand per Ton
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
ROM	Run-of-Mine
SAPIA	South African Petroleum Industry Association
StatsSA	Statistics South Africa
SWH	Solar Water Heaters
WSSD	World Summit on Sustainable Development

Key Energy Policies and Legislations.

1. *White Paper on the Energy Policy, December 1998*

The White Paper on the Energy Policy was developed to clarify government policy regarding the supply and consumption of energy for the next decade. It was intended to address all elements of the energy sector as practically as it could. This White Paper gives an overview of the South African energy sector's contribution to GDP, employment, taxes, and the balance of payments. It concludes that the sector can greatly contribute to a successful and sustainable national growth and development strategy.

The main objectives of the White Paper are the following: -

- Increasing access to affordable energy services.
- Improving energy governance.
- Stimulating economic development.
- Managing energy-related environmental impacts.
- Securing supply through diversity.

2. *White Paper on Renewable Energy, November 2003*

The White Paper on Renewable Energy supplements the Government's overarching policy on energy as set out in its *White Paper on the Energy Policy* (as stated above), which pledges '*Government support for the development, demonstration and implementation of renewable energy sources for both small and large-scale applications*'.

- This White Paper sets out the Government's vision, policy principles, strategic goals, and objectives for promoting and implementing renewable energy in South Africa. Additionally, it has the following two goals:
- to inform the public and the international community of the Government's goals, and how the Government intends to achieve them, and;
- to inform Government agencies and Organs of State of these goals, and their roles in achieving them.

3. Nuclear Energy Policy, October 2008

The nuclear sector in South Africa is mainly governed by the Nuclear Energy Act 1999, Act 46 of 1999, and National Radioactive Waste Disposal Institute Act, Act 53 of 2008. National Nuclear Regulator (NNR) Act 1999, Act 47 of 1999. The Cabinet approved the Nuclear Energy Policy for South Africa in October 2008. The Nuclear Energy Policy outlines the South African government's vision for the development of an extensive nuclear energy programme by ensuring that the government's objective on the prospecting and mining of uranium ore and the use of uranium (or other relevant nuclear materials) as a primary resource of energy must be regulated and managed in a manner that will be for peaceful purposes.

Through the Nuclear Energy Policy, the government aims to achieve the following objectives:

- Promotion of nuclear energy as an important electricity supply option through the establishment of a national industrial capability for the design, manufacture and construction of nuclear energy systems.
- Establishment of the necessary governance structures for an extended nuclear energy programme;
- Creation of a framework for safe and secure utilization of nuclear energy with minimal environmental impact.
- Contribution to the country's national programme of social and economic transformation, growth and development.
- To guide in the actions to develop, promote, support, enhance, sustain and monitor the nuclear energy sector in South Africa.
- Attainment of global leadership and self-sufficiency in the nuclear energy sector in the long-term.
- Exercise control over unprocessed uranium ore for export purposes for the benefit of the South African economy.
- Establishing mechanisms to ensure the availability of land (nuclear sites) for future nuclear power generation.
- Allow for the participation of public entities in the uranium value chain.
- Promoting energy security for South Africa.

- Improvement of the quality of human life and to support the advancement of science and technology.
- Reduction of greenhouse gas emissions; and
- Skills development related to nuclear energy.

4. *Integrated Resource Plan (IRP) 2010-30*

The IRP is a generation capacity expansion plan based on a least-cost electricity supply and demand balance in the long term and incorporates government policy. The IRP review presents an analysis of broad options at the disposal of the country with the ultimate view to meet three distinct but not mutually exclusive aspirations, namely, security of supply, energy affordability and carbon emissions reduction. There have been several developments in the electricity industry in South Africa since the promulgation of IRP 2019 and these in the main include:

- The establishment of the Presidential Climate Commission (PCC), which is a multi-stakeholder body established by the President of the Republic of South Africa to advise on the country's climate change response and pathways to a low-carbon, climate-resilient economy and society. One of its main outputs was the development of the Just Transition Framework. In addition, the Inter-Ministerial Committee (IMC) for Just Energy Transition developed the Just Energy Transition Investment Plan (JET IP) and the subsequent Implementation Roadmap for the period 2023-2027, which sets out the scale of need and the investments required to achieve the decarbonisation commitments in line with South Africa's Nationally Determined Contribution (NDC).
- The Energy Action Plan is designed to reduce load-shedding and achieve energy security as announced by the President on 25, July 2022. The plan implemented under the supervision of the National Energy Crisis Committee (NECOM) consists of five crucial actions including; improving the availability of existing power generation plants, enabling and accelerating private investment in power generation capacity, accelerating procurement of new capacity from renewables, gas and battery storage, unleashing businesses and households to invest in rooftop solar, and fundamental transformation of the electricity sector to achieve long-term energy security.

- The removal of licensing requirements for the development of power generation by consumers (embedded generation) is meant to enable and attract more investment necessary to address load shedding. This intervention has to date resulted in the registration of projects with a potential generation capacity of over 6000 MW.
- The intervention by the National Treasury to address the Eskom debt, which impacts the utility's ability to sustain operations and invest in additional infrastructure. Addressing Eskom debt effectively will enable much-needed investment in critical transmission and other infrastructure, and proper maintenance of plant and equipment.
- Procurement of approximately 6000 MW of additional generation capacity under the technology agnostic Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP), Bid Window 5 and 6 of Renewable Energy and Bid Window 1 of Battery Storage.

5. *National Energy Act, 2008*

The National Energy Act, 2008 (Act 34 of 2008) ensures that diverse energy resources are available in sustainable quantities and at affordable prices in South Africa. In addition, the Act provides for the increased use of renewable energies, contingency energy supplies, the holding of strategic energy feedstock and carriers, and adequate investment in energy infrastructure.

6. *Petroleum Products Act, 1977*

The aim of the Petroleum Products Act, 120 of 1977, is to:

- Provide measures in the saving of petroleum products and an economy in the cost of the distribution thereof, the maintenance and control of price, for the furnishing of certain information regarding petroleum products, and for the rendering of services of a particular standard, in connection with petroleum products.
- Provide for the licensing of people involved in the manufacturing and sale of certain petroleum products.
- Promote the transformation of the South African petroleum and liquid fuels .
- Provide for the promulgation of regulations relating to such licenses; and

- Provide for matters incidental.

7. Nuclear Energy Act, 1999

The aims of the Nuclear Energy Act of 1999 (Act 46 of 1999) are:

- To provide for the establishment of the National Energy Corporation of South Africa (NECSA) and define its functions, powers, financial and operational accountability, governance, and management.
- To provide for responsibilities for the implementation and application of the Safeguards Agreement and any additional protocols entered by the Republic of South Africa and the International Atomic Energy Agency in support of the Nuclear Non-Proliferation Treaty acceded to by the Republic.
- To regulate the acquisition and possession of nuclear fuel, certain nuclear and related material, and certain related equipment, as well as the importation and exportation of, and certain other acts and activities relating to, that fuel, material and equipment to comply with the international obligations of the Republic.
- To prescribe measures regarding the discarding of radioactive waste and the storage of irradiated nuclear fuel, and to provide for incidental matters.

8. The Gas Act, 2001

The aims of the Gas Act are as follows:

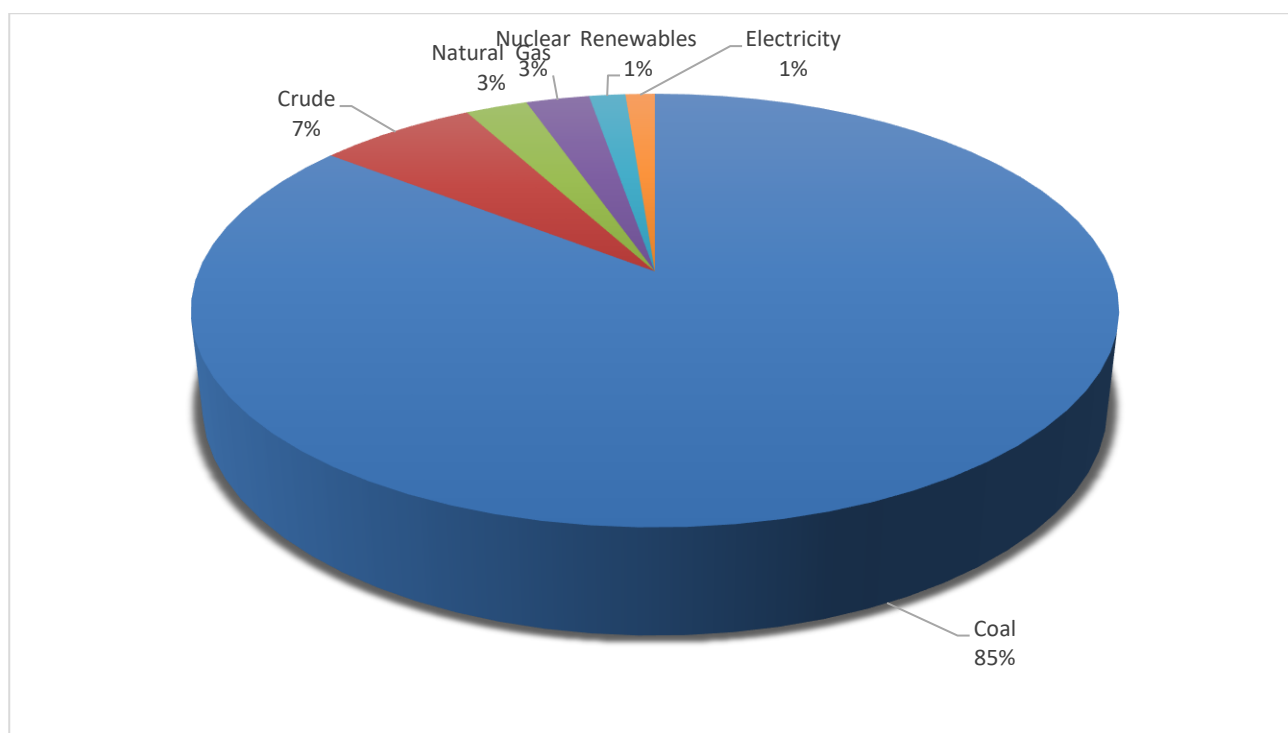
- To promote the orderly development of the piped gas industry.
- To establish a national regulatory framework.
- To establish a National Gas Regulator as the custodian and enforcer of the national regulatory framework; and
- To provide for matters connected therewith.

1. ENERGY SUPPLY

South Africa's energy landscape remains heavily centralized around fossil fuels. Coal continues to be the undisputed backbone of the country's energy supply, accounting for nearly 85% of the total. Petroleum products and natural gas follow as secondary sources, while the transition toward cleaner energy specifically nuclear and renewables remains in its beginning, collectively making up a very small fraction of the national footprint.

The South African energy supply is still dominated by coal, which made up 85% of the primary energy supply in 2023, followed by crude oil at 7%. Natural Gas and Nuclear contributed 3% each to the total primary energy supply. Electricity and Renewables contributed 1% respectively to the total energy supply. The primary energy supply in this case includes indigenous production and imported sources, less exported quantities as shown in the **Figure 1** below.

Figure 1: Total primary energy supply, 2023



Source: DEE Energy Data, 2023

1.1 Crude oil and Petroleum Products

Overview

South Africa currently does not have significant proven oil reserves and therefore relies heavily on imports to meet its crude oil needs. South Africa also imports most of the petroleum products to supplement production shortfall. During the transformation stage, the country produced approximately 10% of its fuel requirements from gas (GTL), 2% from coal (CTL), and 88% from crude oil (DEE, Energy Balance 2023). Crude oil was the third most imported product in South Africa for the year 2023. South Africa imports crude petroleum primarily from Nigeria, Saudi Arabia, Angola, Ghana, and the Republic of Congo. The fastest-growing markets in crude for 2023 were Mozambique, Lesotho and Saint Helena. As it stands, there are six refineries in the country; four are on the coast and two are inland. Two of the refineries are synthetic fuel production facilities that produce liquid fuels from coal and gas, which are owned by Sasol and PetroSA respectively.

South Africa is unique in its use of Coal-To-Liquid (CTL) and Gas-To-Liquids (GTL) technologies, which is primarily operated by Sasol. The synthetic fuel plants, which are owned by Sasol, convert coal and Natural Gas into synthetic petroleum products, therefore reducing dependency on crude oil imports. The Petroleum Oil and Gas Corporation of South Africa (PetroSA) produces synthetic products using GTL technology.

Major refineries include Sapref and Enref in Durban, Astron Energy in Cape Town, and Natref at Sasolburg. According to Sapia, in 2023, the Astron refinery at Milnerton in Cape Town commenced with startup operations at the end of 2022 following the major incident at the refinery in 2020 and full production was achieved by the end of the first quarter 2023. Natref in Sasolburg and Sasol synthetic operations-maintained production throughout the year 2023. The capacity and location of the six refineries are shown in **Table 1** below.

Table 1: Refinery production capacity, 2023

Refinery	Area and Province	Type	Capacity*
Astron Energy	Cape Town, Western Cape	Crude	100 000
Enref	Durban South, KwaZulu Natal	Crude	0
Natref (Sasol Oil owns 64% and Total SA 36%)	Sasolburg, Free State	Crude	108 000
PetroSA	Mossel Bay, Western Cape	Synthetic (GTL)	0
Sasol Synfuels	Secunda, Mpumalanga	Synthetic (CTL)	150 000
Sapref (BP owns 50% and Shell 50%)	Durban South, KwaZulu Natal	Crude	0
Total			358 000

*Source: SAPIA Annual Report 2023*Crude equivalent (bbl/day)*

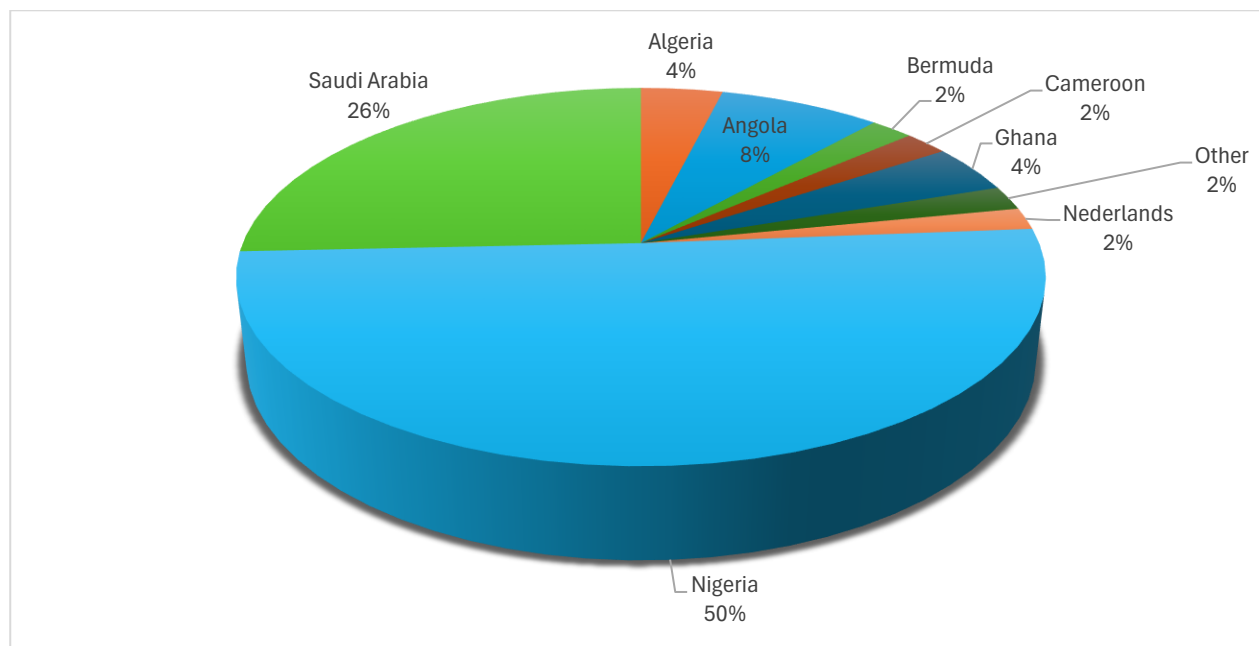
Crude Oil

In 2023, South Africa remained highly reliant on imports for its crude oil requirements. The total primary crude oil supply was used by refineries during the transformation process for liquid fuels production. Almost all the imported crude oil is used to produce liquid fuels, with a small percentage used for lubricants, bitumen, solvents, and other petrochemicals.

To mitigate the risks associated with this heavy import dependency, the country continues to leverage its sophisticated synthetic fuel capabilities, which convert coal and natural gas into liquid energy. However, the aging infrastructure of traditional crude refineries has led to frequent operational pauses, further tightening the domestic supply of petrol and diesel. Consequently, the national energy strategy is increasingly pivoting towards diversifying the energy mix to ensure long-term stability against volatile global oil prices..

As depicted in **Figure 2** and **Table 2** below, Nigeria continues to dominate as the highest importer of crude oil at 50% and It is followed by Saudi Arabia at (26%), Angola (8%), Algeria and Ghana at 4% respectively, with Bermuda, Cameroon and Netherlands at 2% respectively. Small volumes from various producers reported as “Others” accounted for 2% of crude oil imports (SARS trade data, 2023).

Figure 2: Crude oil imports by country of origin, 2023



Source: South African Revenue Service (SARS), 2023

Table 2: Crude Oil import volumes by country of origin, 2023

Country of Origin	Imports volume	
	Tons	%
Angola	514115378	8
Algeria	260187247	4
Bermuda	135410500	2
Cameroon	140547056,1	2
Ghana	275803808,7	4
Nederlands	124418987	2
Nigeria	3382520666	50
Saudi Arabia	1719900800	26
Others	137903502	2
Grand Total	6690807945	100

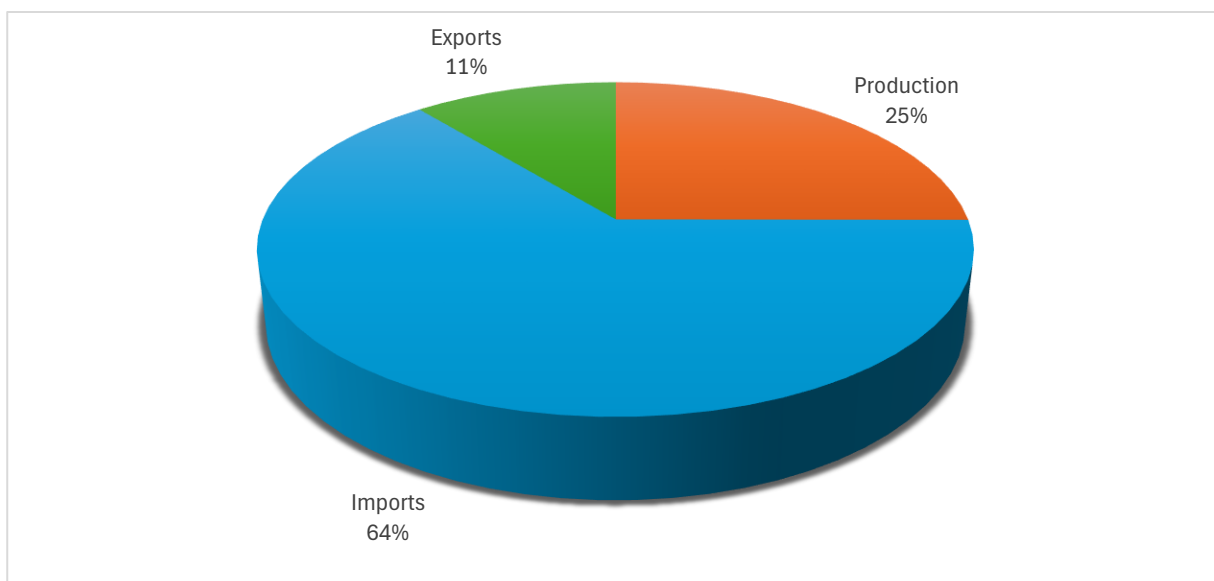
Source: South African Revenue Services (SARS),2023

Petroleum products

According to the 2023 Energy Balances, just 25% of the required petroleum products were produced domestically in South Africa, which relied on a varied supply chain. The country significantly relied on foreign markets for the majority of its fuel needs in order to close the significant gap between local production and national demand. A smaller percentage of the total supply was also exported to outside markets, but the main objective remained to secure enough energy for domestic use.

It is also shown in the 2023 Energy Balances, that imports of petroleum products amounted to 64% to make up for the local production shortfall and to meet the local demand, while exports amounted to 11%, as shown in **Figure 3** below.

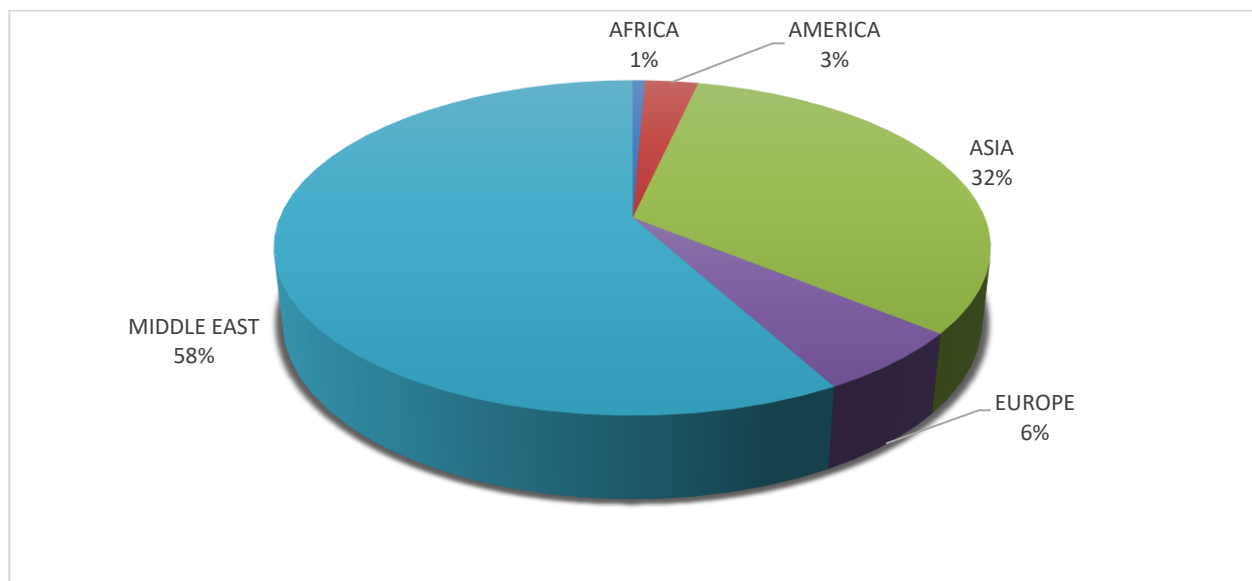
Figure 3: Petroleum products supply, 2023



Source: DEE Energy Balances, 2023

Most of the petroleum products imported into South Africa were from the Middle East at 58%, as depicted in Figure 4 below. This was followed by Asia at 32%. America and Europe accounted for 3% and 6% respectively, while Africa accounted for 1% as per **Figure 4** below.

Figure 4: Petroleum products imports by region, 2023



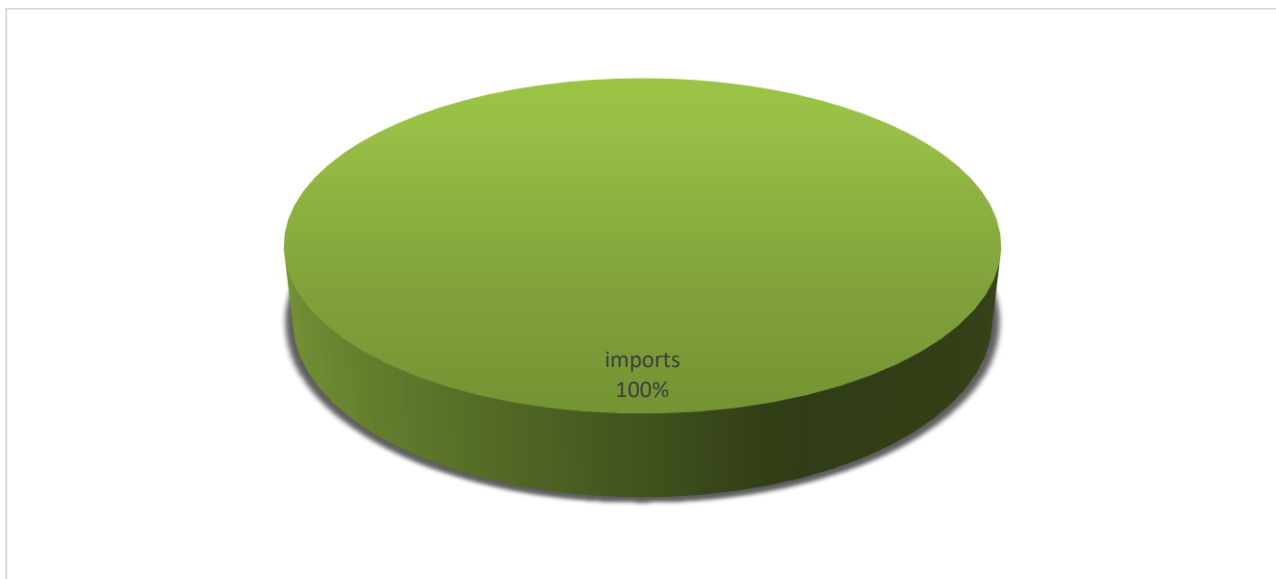
Source: Sars Data, 2023

1.2 Natural gas

Currently, Natural gas is imported into South Africa by Sasol Gas via an 865 km pipeline from the Temane and Pande gas fields in Mozambique. Reserves in the Temane and Pande are estimated at around 2.6 trillion cubic feet (TCF). The pipeline has a capacity of 240 million gigajoules (GJ) per annum. Approximately 120 million GJ is used annually by Sasol in the GTL and chemicals plant in Secunda, while the balance is distributed to commercial and industrial customers via a pipeline network covering more than 3,000 km in the Mpumalanga, Free State, Gauteng, Kwa-Zulu Natal and Northwest.

As per 2023 Energy Balances, South Africa imported all of its natural gas to meet local supply. There has been no production and exports of natural gas in the year 2023, as per **Figure 5** below

Figure 5: Natural gas primary supply, 2023



Source: DEE Energy Balances, 2023

1.3 Electricity

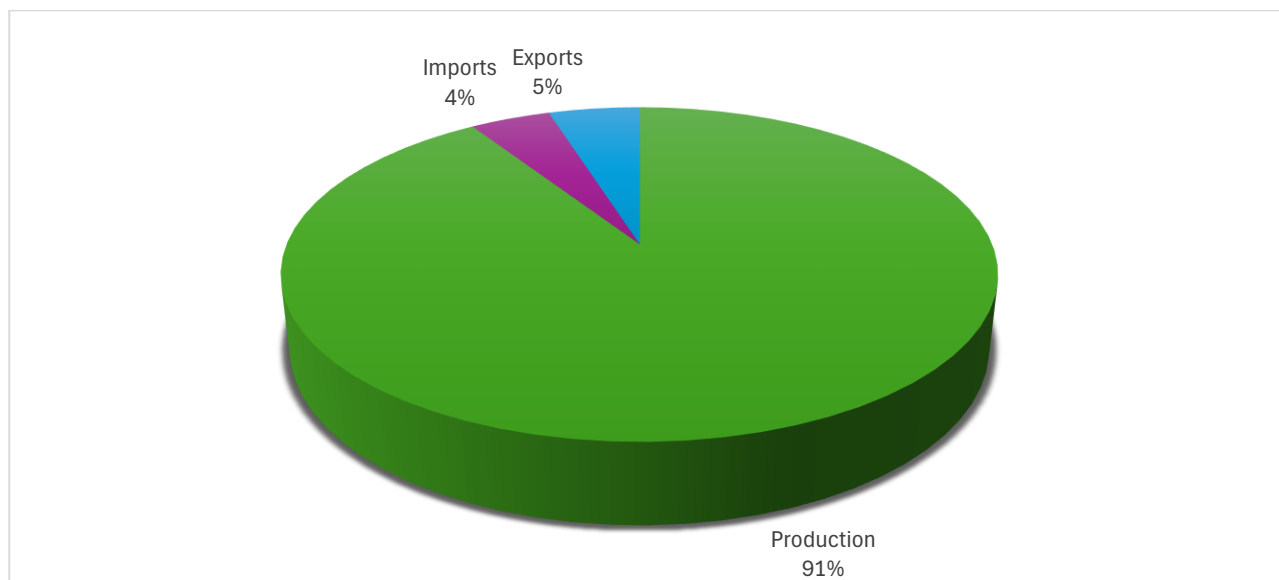
Eskom creates value through the generation, transmission, distribution, purchase, and sale of electricity. Electricity is generated by transforming inputs from the natural environment, such as coal, nuclear, fuel, fuel oil, and diesel, as well as water and wind, into electricity. The energy is transmitted over Eskom's 33 000km of network, in which supply and demand of electricity are balanced in real-time, maintaining the frequency of the power system at 50 hertz (Hz). The electricity is distributed through an extensive distribution network that covers the entire country to supply over 86% of South Africa's needs and 20% of the electricity produced in Africa. (Eskom, 2023).

Eskom is a vertically integrated, state-owned power company that owns and operates the National electricity grid and supplies about 90% of the power generation in South Africa. Eskom generates 30% of the electricity that is used in the rest of Africa, respectively exported to neighbouring countries such as Botswana, Eswatini, Lesotho, Mozambique, Namibia, Zambia, and Zimbabwe (Eskom, 2023).

The electricity generated by Eskom and IPPs, combined with imports from neighbouring countries, is supplied in bulk to distributors, i.e., large metros and other municipalities, and distributed to industrial, commercial, residential, and others (Eskom, 2022). Eskom

owns and operates several coal-fired, gas-fired, hydro, and pumped storage power stations, as well as one nuclear power station. Local production amounted to 91% of the total electricity supply in 2023, the country's imports amounted to 4%, with exports amounting to 5%. (**Figure 6 below**).

Figure 6: Electricity supply, 2023

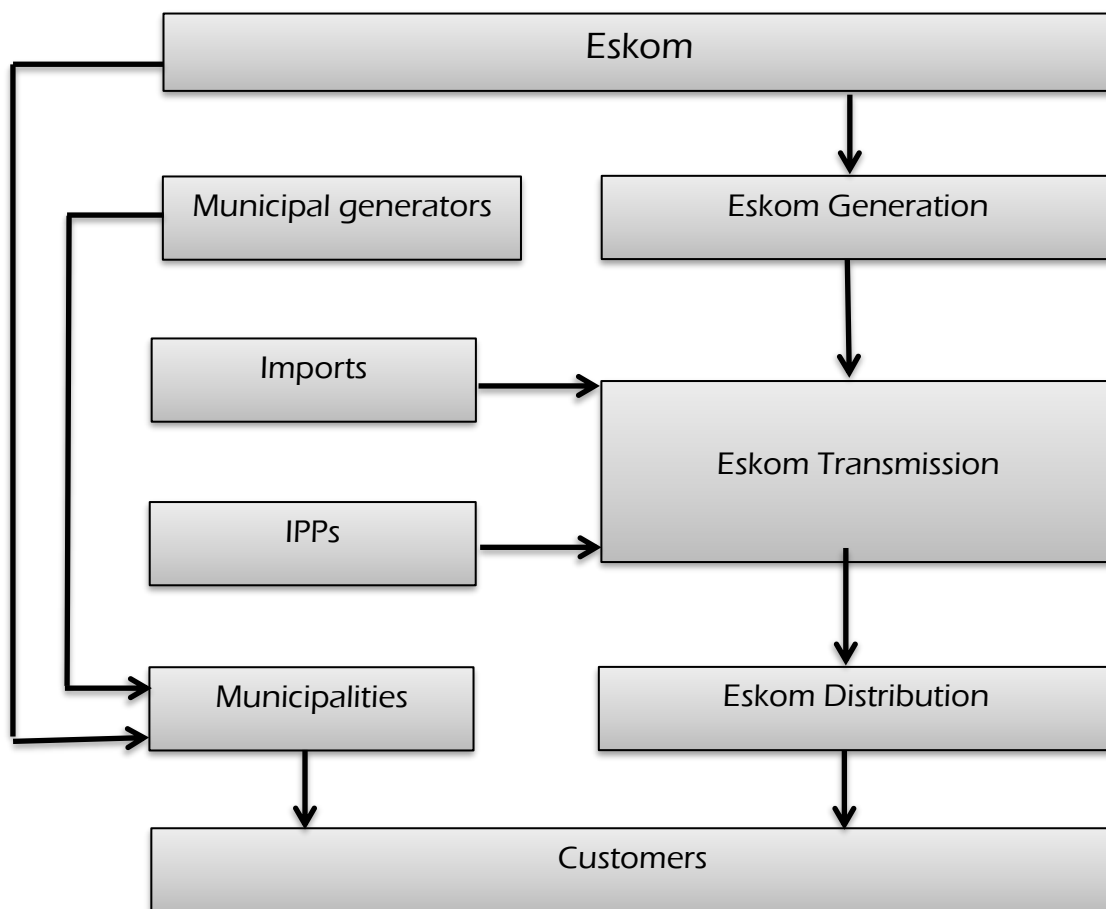


Source: DEE Energy Data, 2023

Generation, Transmission, and Distribution

As shown in **Figure 7** below, electricity infrastructure comprises three sub-sectors, namely: generation, transmission, and distribution. In terms of generation, Eskom dominates the production of electricity. Eskom generates, transmits, and distributes electricity to industrial, mining, commercial, agricultural, and residential customers in South Africa, and to municipalities, who in turn redistribute electricity to businesses and households within their areas. The utility also purchases electricity from Independent Power Producers (IPPs) in terms of various agreement schemes as well as electricity-generating facilities beyond the country's borders. Most power stations are in Mpumalanga, except for Lethabo and Matimba, which are in the Free State and Limpopo provinces, respectively.

Figure 7: Electricity Generation, Transmission and Distribution

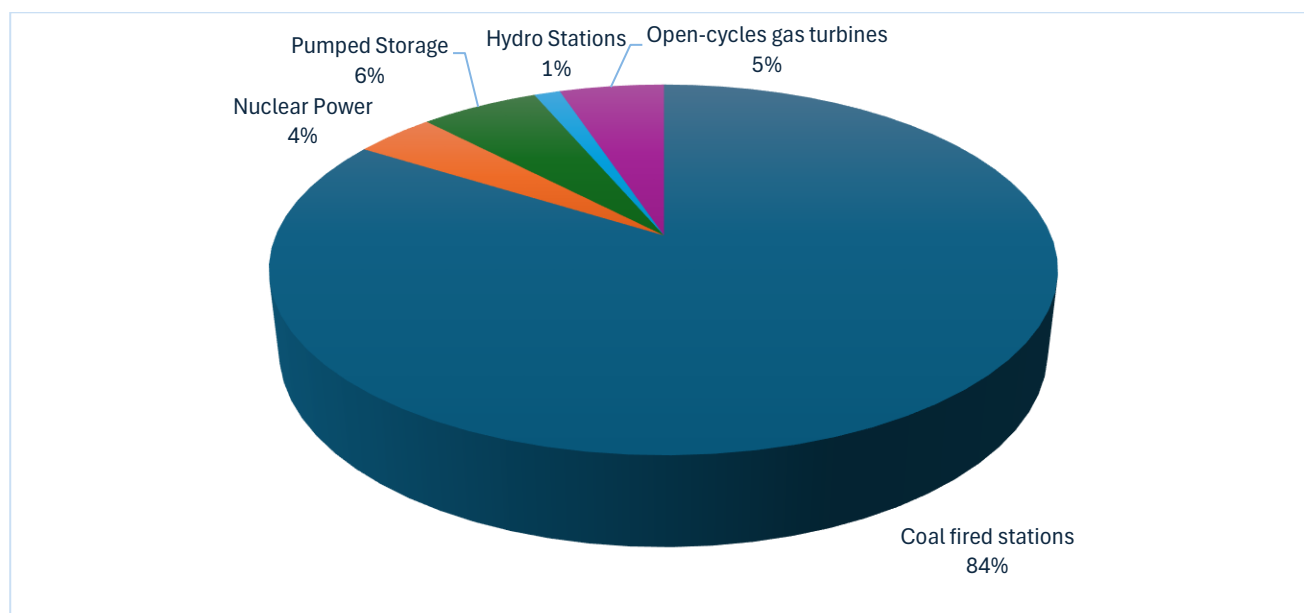


Source: Eskom

Eskom Generating Capacity

According to Eskom's Integrated Results 2023, the total nominal capacity as of March 2023 amounted to 47 GW.

Figure 8: Power Station Maximum Generating Capacity Mix



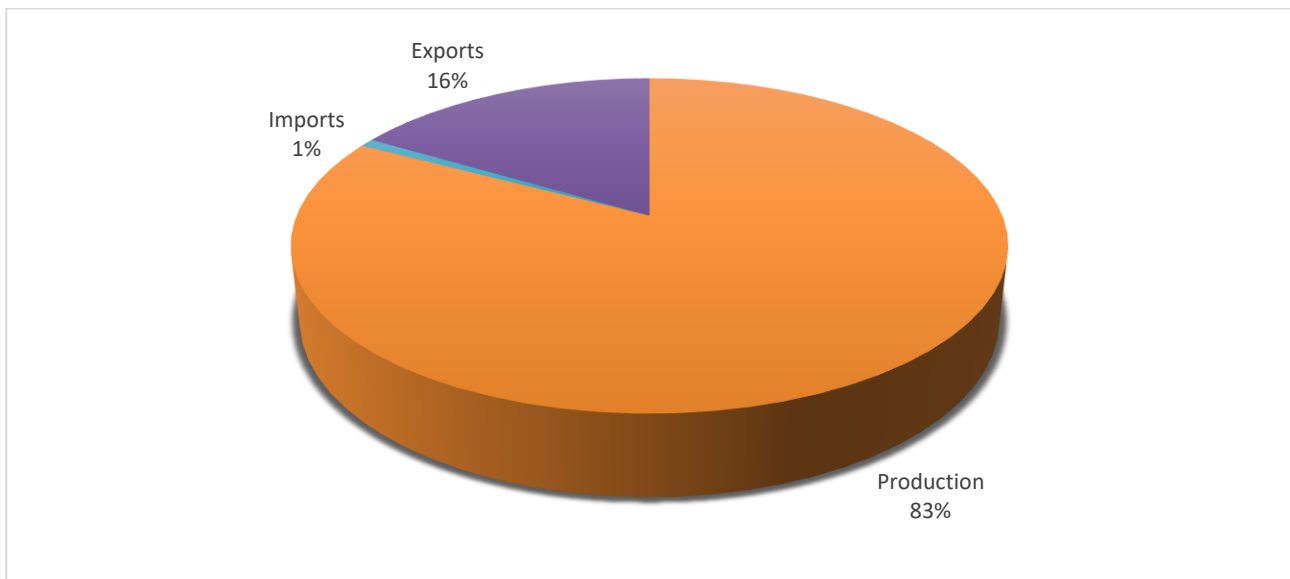
Source: Eskom Integrated Results, 2023

Coal-fired power stations made up 84% of the nominal capacity of the total electricity generated in 2023 (**Figure 8** above). The rest of the electricity generated came from a combined contribution by other power stations, which accounted for 16% of total nominal capacity, with nuclear contributing 4%, pumped storage at 6%, Open-cycle gas turbines at 5%, and Hydro at 1%.

1.4 Coal

South Africa's indigenous energy resource base is dominated by coal. Coal is the most common source of electricity production in South Africa. In 2022, fossil fuels accounted for 84.44% of total electricity production (Statista. com, 2024). South Africa exported 16% of coal while it imported 1% in 2023. Domestic production accounted for 83% of the total primary coal supply as per **Figure 9** below.

Figure 9: Coal primary supply, 2023



Source: DEE Energy Balances, 2023

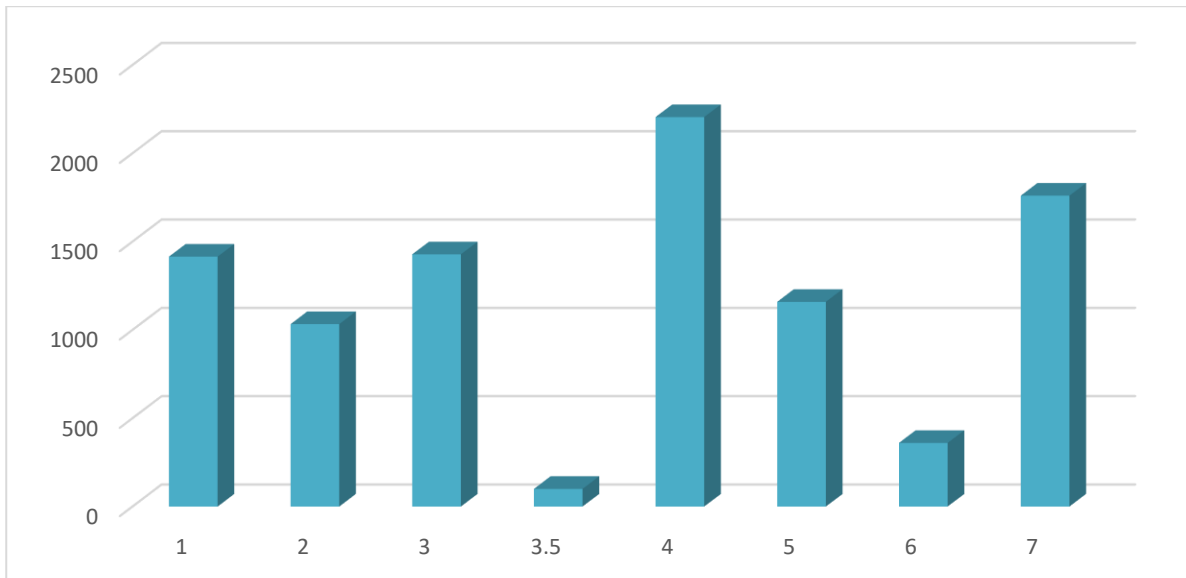
1.5 Renewables

Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)

The REIPPPP is a public procurement program in South Africa that encourages the private sector to invest in renewable energy generation. The REIPPPP is aimed at bringing additional megawatts into the country's electricity system through private sector investment in onshore wind, photovoltaic, concentrated solar power (CSP), biomass, landfill gas, and small hydro technologies.

The REIPPPP program constitutes one of the energy mixes as outlined in the National Development Plan and the Integrated Resource Plan 2023. According to the Integrated Resource Plan 2030, South Africa continues to pursue a diversified energy mix that will provide security of supply while ensuring compliance with its emissions reduction plan. **Figure 10** below shows the program capacity in Windows for the year 2023. The overall supply capacity was the highest for window 4 and window 7 at 2205 MW and 1760 MW, respectively. Window 3.5 was the lowest by 100 MW.

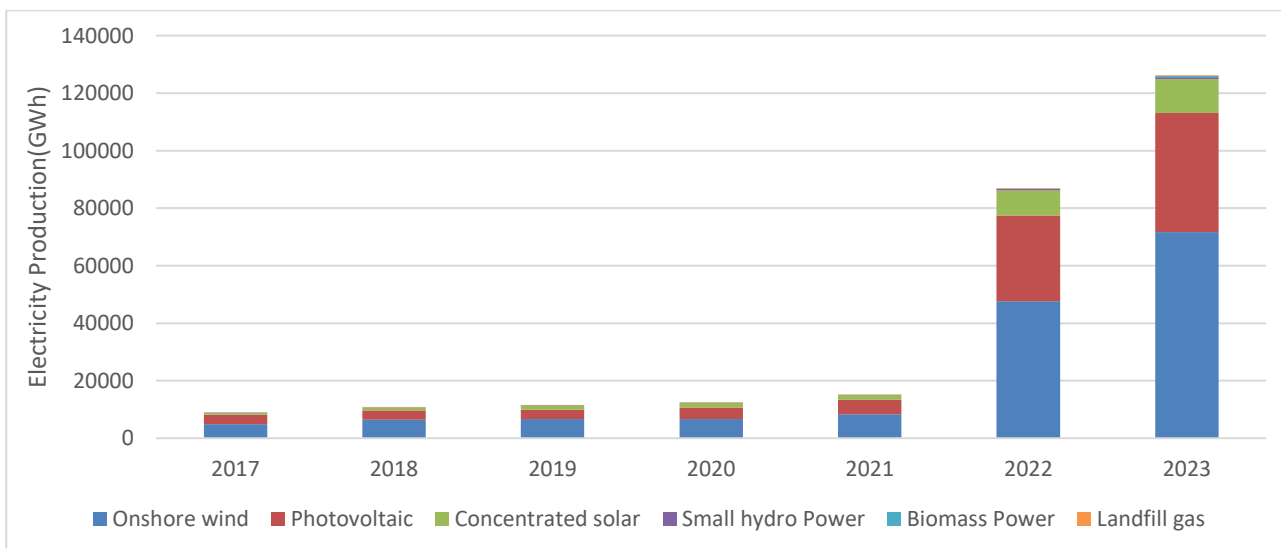
Figure 10: Programme capacity in Windows 1, 2, 3, 4, 5, 6 and 7



Source: Department of Electricity and Energy (DEE), 2023

The REIPPPP power production in 2023 was dominated by onshore wind power at 57%, followed by photovoltaic power at 33%. Concentrated solar power contributed 9% while small hydropower contributed 1% to electricity produced through the REIPPPP. A total of 126 191 GWh was produced in the year 2023, as shown in **Figure 11** below.

Figure 11: Electricity production through REIPPPP, 2017 – 2023



Source: Department of Electricity and Energy (DEE), 2023

1.6 Nuclear

Nuclear power is an important clean energy source for electricity generation. It can complement other clean energy technologies in reducing power sector emissions while also contributing to electricity security as a dispatchable power source. Nuclear facilities offer a consistent "baseload" of electricity that keeps the system stable during times of low renewable output, in contrast to intermittent sources like wind and solar. Nuclear fission, which produces steam by splitting uranium atoms and releasing huge quantities of thermal energy, is the method used to attain this dependability. Modern small modular reactors (SMRs) can be integrated with conventional large-scale plants to give countries greater flexibility in replacing old coal-fired facilities with carbon-free alternatives. In 2023, Nuclear energy contributed about 2% to the total energy supply.

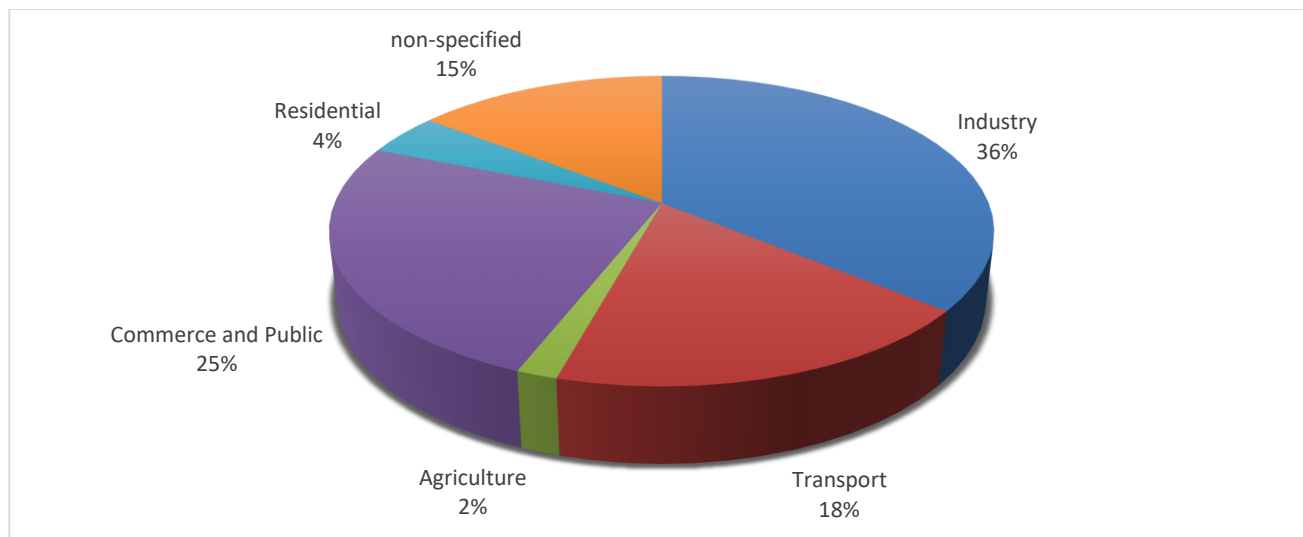
Koeberg is the only nuclear power station in Africa and has the largest turbine generators in the Southern Hemisphere and is the most southerly-situated nuclear power station in the world. Koeberg ranks amongst the safest of the world's top ranking PWR's of its vintage and is the most reliable Eskom power station. The station is located 30 km north of Cape Town (Eskom, 2023).

2. ENERGY DEMAND

Energy is the core of the South African economy and a major economic sector that creates jobs and value through the extraction, processing, and distribution of goods and services related to energy throughout the whole economy. The energy sector in South Africa is essential to social advancement, job creation, economic growth, and environmental sustainability.

Figure 12 below depicts the share percentage of energy consumed by various sectors in the economy. The five sectors identified in this report are industrial, transport, agriculture, residential, commerce, and public services. The sector "non-specified" refers to unaccounted energy (energy that has not been classified into a specific sector). The industrial sector contributed the highest by 36% to the energy demand in 2023.

Figure 12: Energy demand by sector, 2023



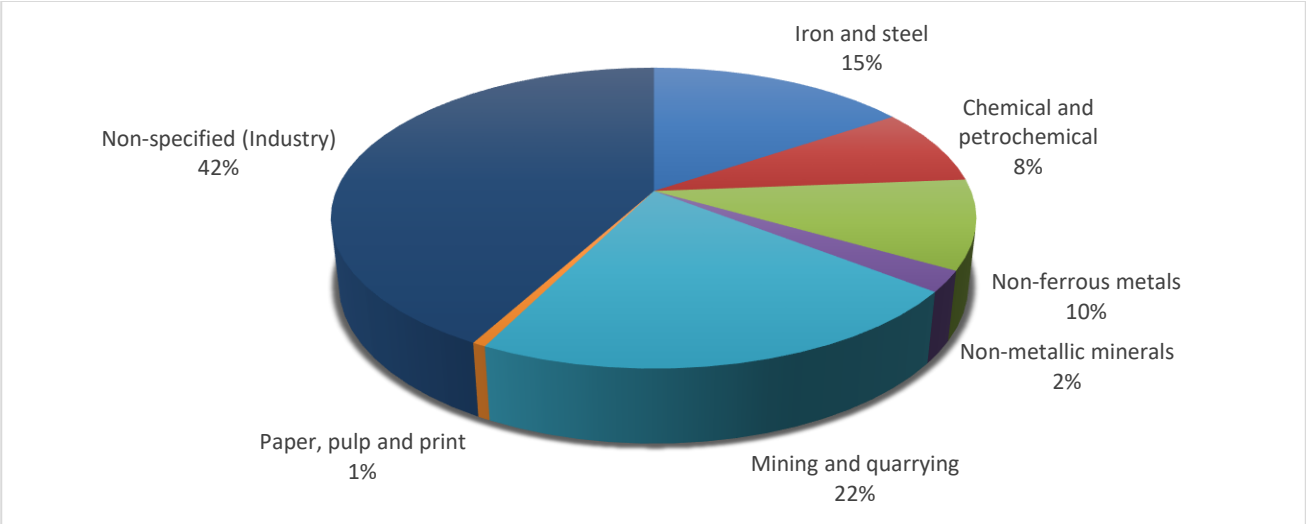
Source: DEE Energy Data, 2023

2.1 Industrial sector

The industrial sector is currently the biggest energy consumer and a major contributor to carbon emissions. Heavy industries like steel, chemicals, and cement, which need a lot of thermal energy for high-temperature chemical reactions and material processing, account for a large portion of this demand. Industries are increasingly using demand-side management and electrification to handle this huge load, substituting high-efficiency industrial heat pumps and electric furnaces for conventional fossil fuel boilers.

Energy demand in the industrial sector has been dominated by the mining and quarrying sub-sector (22%) and the Iron and steel (15%). Non-Ferrous metals contributed 10% while Chemical and petrochemical contributed 8% to the energy demand in the industrial sector. The remaining sub-sectors contributed 2% or less to the total energy consumption in the Industrial sub-sectors for 2023. (**Figure 13** below).

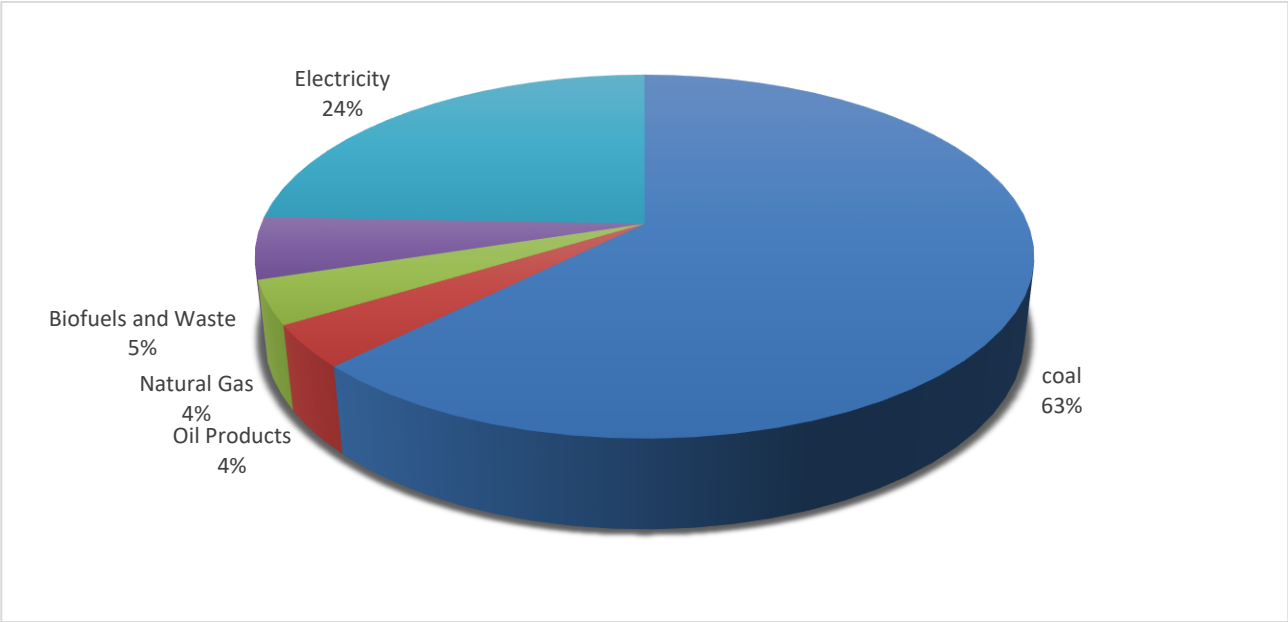
Figure 13: Energy demand by industrial sub-sectors, 2023



Source: DEE Energy Data, 2023

As shown in **Figure 14** below, Coal (63%) and Electricity (24%) have been the most consumed sources of energy in the industrial sector for the year 2023. This was followed by Biofuels and waste at 5%, with Natural Gas and Oil products at 4% respectively.

Figure 14: Energy demand in the industrial sector, 2023



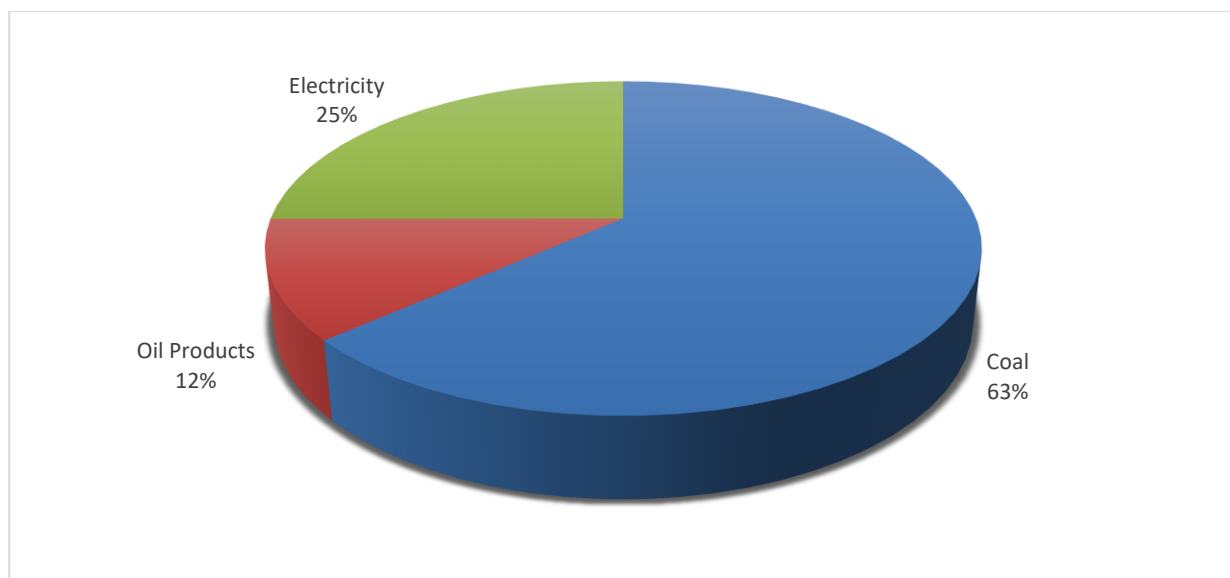
Source: DEE Energy Data, 2023

2.1.1 Mining

The Mining Sector is the main consumer of energy out of all sectors in South Africa, with coal and Electricity dominating as the most energy consumed in the sector. This intense energy demand is largely driven by deep-level underground operations, where massive amounts of electricity are required for continuous ventilation, water pumping, and the hauling of ore to the surface. However, many mining companies are now investing in their own large-scale renewable energy projects to lessen their carbon footprint and protect themselves from growing national utility prices as the demand to decarbonize grows on a global scale.

Coal was the highest energy consumed and contributed 63% of the total energy consumed in mining, while Electricity and Oil Products contributed to 25% and 12% respectively. The mining sector consumed approximately 405 165 TJ of energy in total in the year 2023. (**Figure 15** below).

Figure 15: Energy demand in mining, 2023



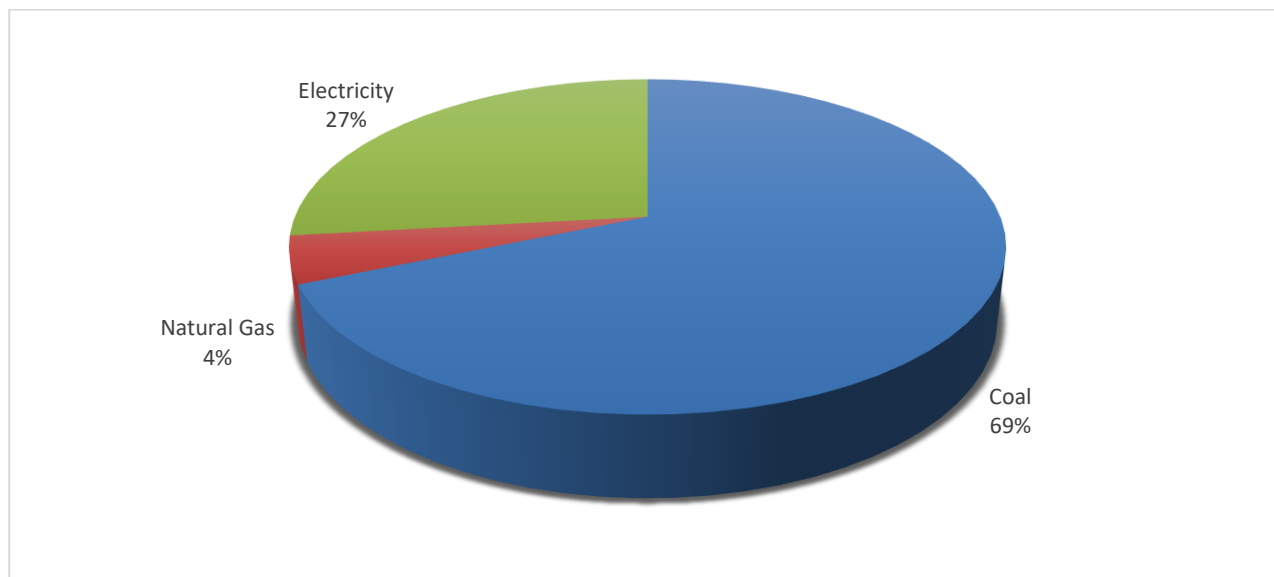
Source: DEE Energy Balances, 2023

2.1.2 Iron and steel

One of the manufacturing sub-sectors in South Africa that uses the most energy is the iron and steel sector. Coal and electricity are the main sources of energy used in this industry.

The main energy carriers in the Iron and steel industry comprise of electricity, coal, and natural gas. Coal contributed the most at 69% to the final energy demand in the Iron and Steel industry. Electricity followed by contributing 27% while Natural gas contributed 4%. The iron and steel industry utilized a total energy of 225 879 TJ in 2023, as shown in **Figure 16** below.

Figure 16: Energy demand in Iron and Steel industry, 2023

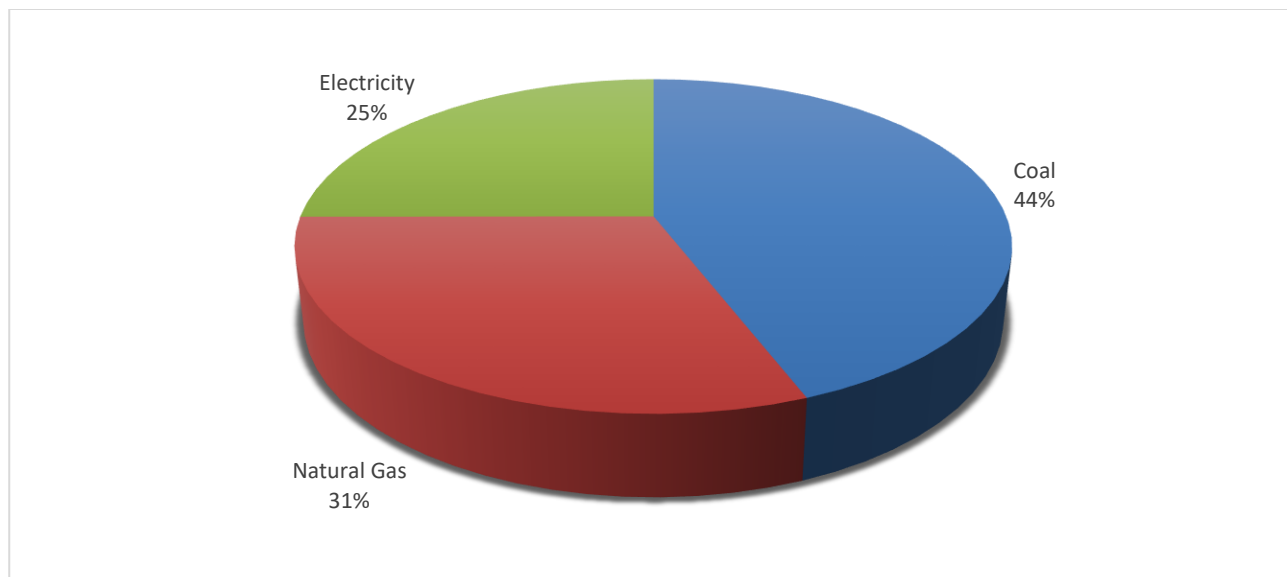


Source: DEE Energy Data, 2023

2.1.3 Chemicals

The chemical industry in South Africa intensively uses natural gas, coal and electricity in the manufacturing process. These raw materials serve a dual purpose, acting as both high-energy fuel for thermal processing and as essential chemical feedstocks. Coal contributed 44%, while electricity and natural gas contributed a share of 25% and 31% respectively. A total energy of 114 814 TJ was consumed in the chemical and petrochemical industry in the year 2023. **Figure 17** below depicts the energy demand in the chemical and petrochemical industry.

Figure 17: Energy demand in Chemical and Petrochemical industry, 2023



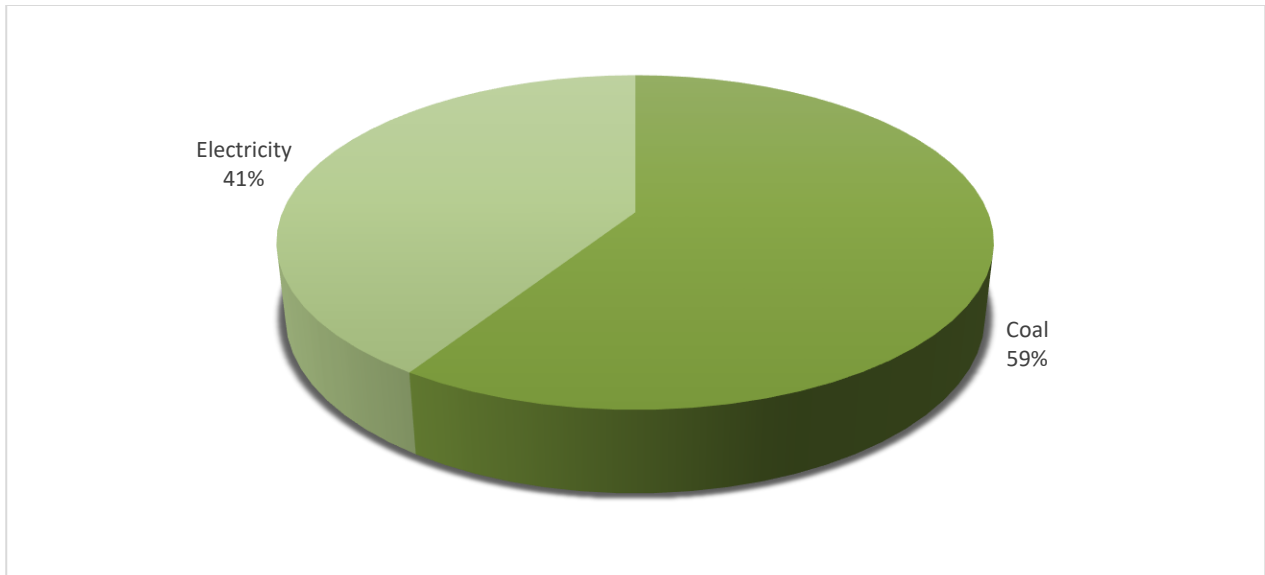
Source: DEE Energy Data, 2023

2.1.4 Non-Ferrous Metals

The non-ferrous metal industry in South Africa is a significant energy-intensive subsector that greatly depends on a steady supply of power for the smelting and refining processes. However, many local manufacturers are now using secondary smelting, which requires a lot less energy than processing primary ore, and energy-efficient recycling technology to reduce escalating prices and grid instability.

The total energy consumption in the non-ferrous metal industry amounted to 132 912 TJ in 2023. Coal was consumed most in the non-ferrous metals and amounted to 78 501 TJ, which contributed 59% and electricity contributed 41% to the total energy demanded in 2023 as per **Figure 18** below.

Figure 18: Energy demand in non-ferrous metals,2023



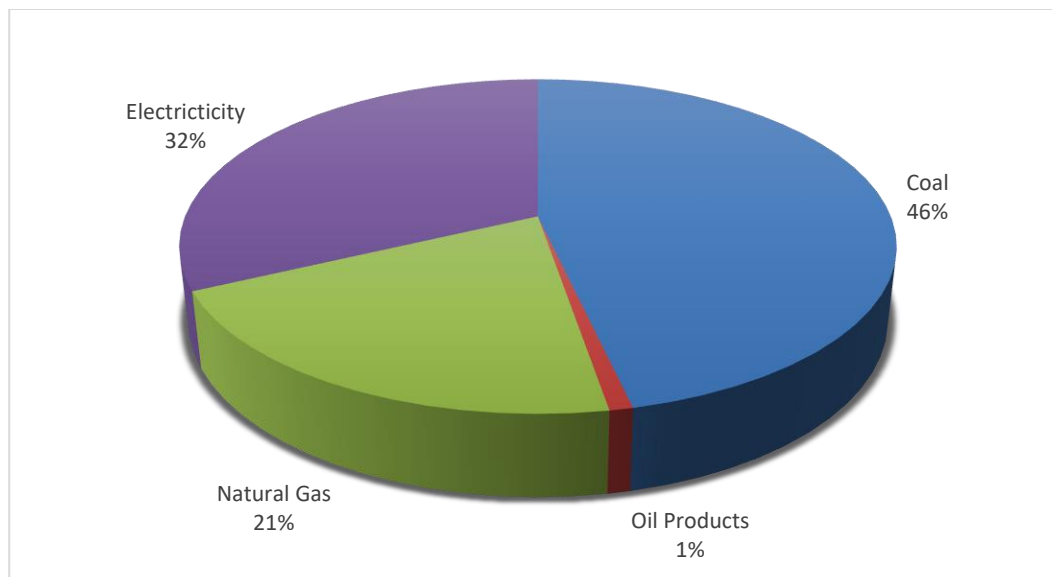
Source: DEE Energy Data, 2023

2.1.5 Non-Metallic Minerals

The non-metallic minerals sector, which includes the production of cement, glass, and ceramics, is a significant energy consumer due to the high-temperature heat required for its manufacturing processes. In South Africa, electricity is necessary for grinding and milling activities, while coal and natural gas are major sources of fuel for burners and furnaces.

In 2023, coal dominated the non-metallic minerals sector with (46%), followed by electricity contributing (32%), Natural gas (21%) and 1% for oil products. The total energy consumed by the non-metallic minerals sector was 22 566 TJ in 2023, as depicted in **Figure 19** below.

Figure 19 : Energy demand in non-metallic minerals, 2023



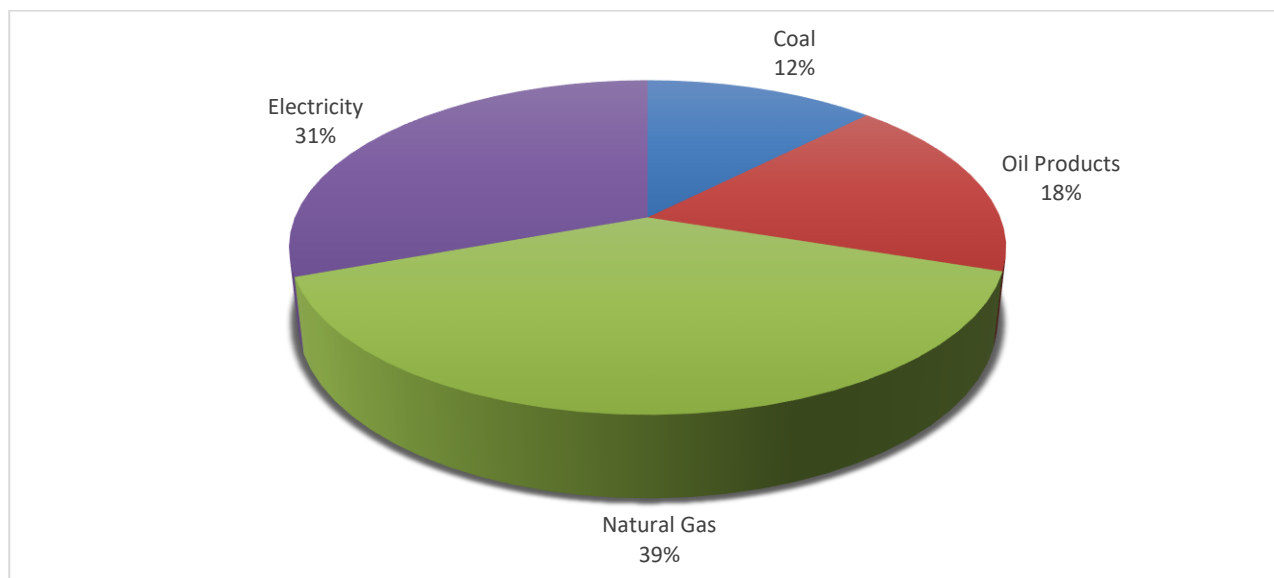
Source: DEE Energy Data, 2023

2.1.6 Food, Beverages and Tobacco

In the food, beverages, and tobacco sector, energy consumption is primarily concentrated in thermal processes like heating for cooking and baking, as well as intensive cooling and freezing for preservation. Electricity remains the dominant power source for driving automated production lines and refrigeration systems, though many South African manufacturers are increasingly installing their own solar and battery storage systems to mitigate rising utility costs and grid instability.

The total energy consumed in the food, beverages, and tobacco sector was 7690 TJ in 2023, with natural gas and electricity contributing 39% and 31% respectively. Oil products contributed 18% while coal contributed just 12% to the total energy consumed in the sector as depicted in **Figure 20** below.

Figure 20 : Energy demand in food, beverages and tobacco, 2023



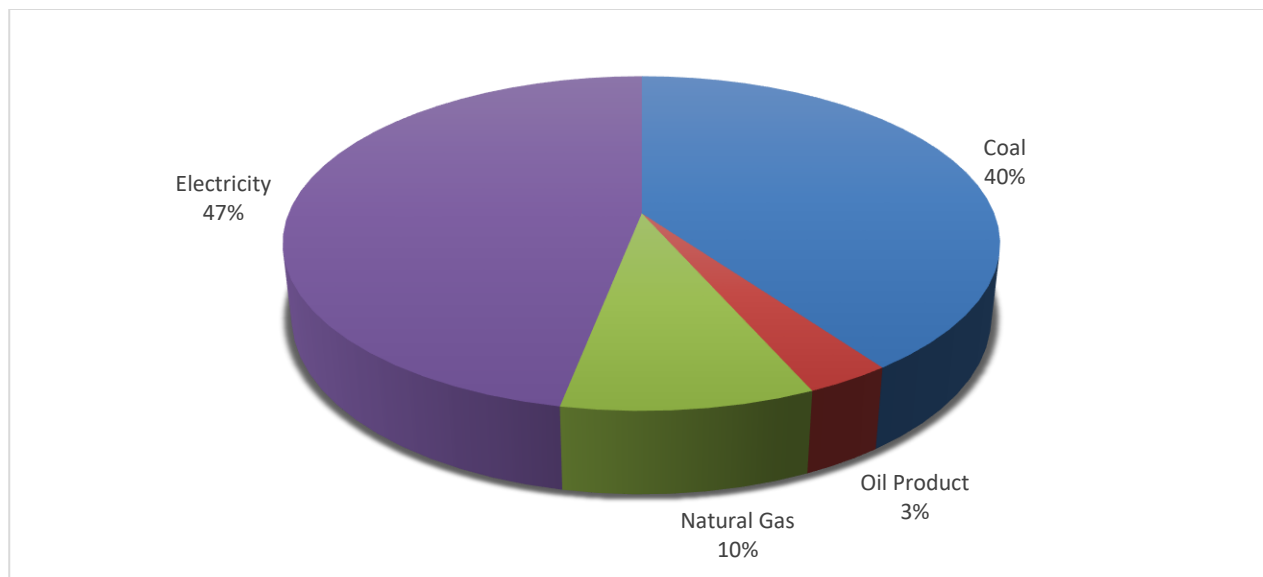
Source: DEE Energy Data, 2023

2.1.7 Paper, Pulp and Print

In the paper, pulp, and print industries, electricity is essential because it powers the complex rollers used in paper creation and the high-speed machines needed for mechanical pulping.

During 2023, electricity was the most used main source of energy in the Paper, Pulp, and Print Industries. Electricity contributed 47%, and coal contributed 40%. Natural gas and Oil products contributed the lowest at 10% and 3%, respectively. This industry consumed 8194 TJ in total in the year 2023, as shown in **Figure 21** below.

Figure 21 : Energy demand in paper, pulp and print industry, 2023.

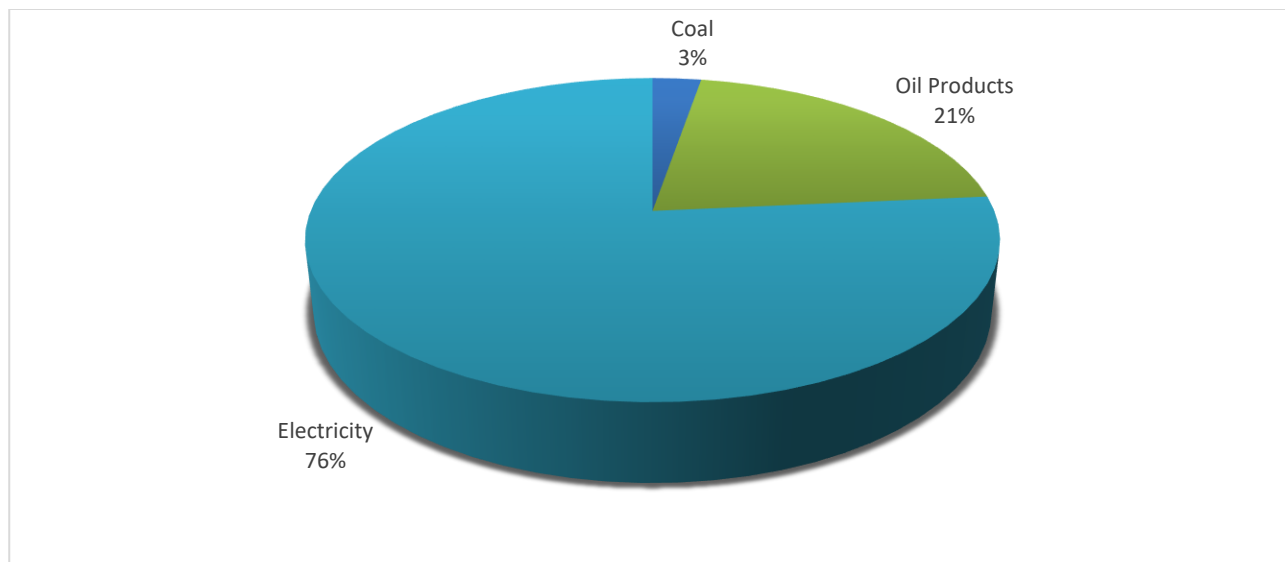


Source: DEE Energy Data, 2023

2.2 Commerce and Public Services Sector

The commercial sector comprises financial services, information technology, retail, tourism, and the services industry. The public services sector comprises of government and quasi-government institutions which provide goods and services to the public, mainly for free. Electricity was the highest and accounted for 76% of the total energy consumed, while Oil products contributed 21% to the total energy consumed. Coal was the lowest energy consumed in the sector and accounted for only 3%. The total energy consumed by this sector is approximated to 990 024 TJ in 2023 as per **Figure 22** below.

Figure 22: Energy demand in the commerce and public services sector, 2023



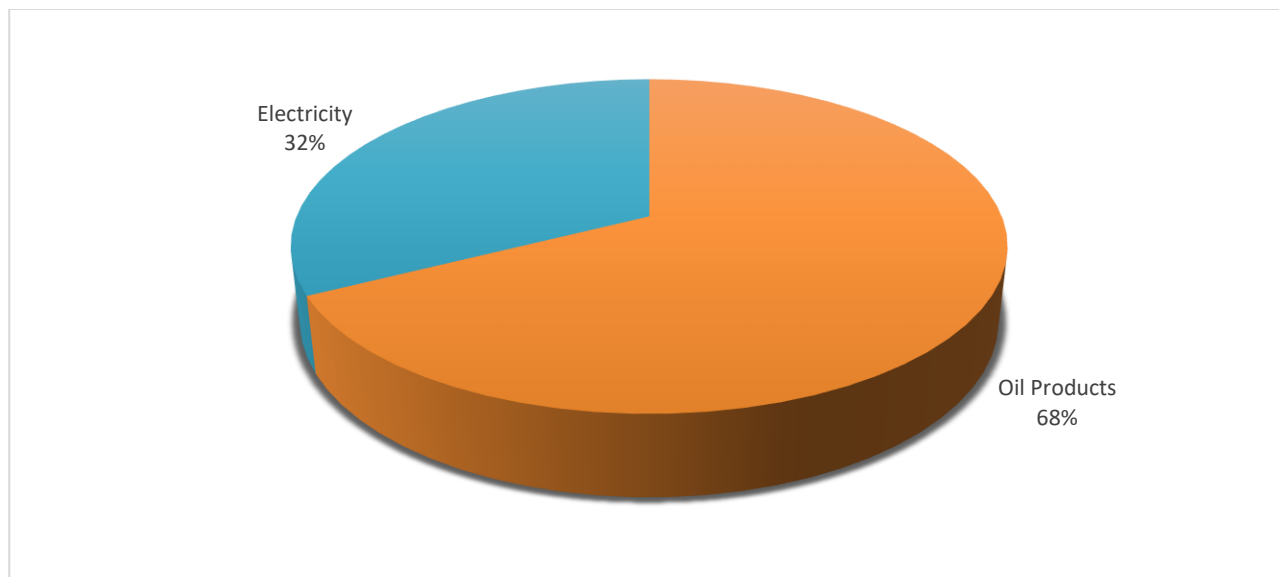
Source: DEE Energy Data, 2023

2.3 Agricultural and Forestry Sector

Oil products serve as the primary energy source for South Africa's agriculture and forestry sectors, largely because the heavy machinery required for large-scale operations relies on powerful diesel engines. For the mechanical cultivation of land, the transportation of wood, and the operation of specialized harvesting equipment in isolated locations with frequently poor grid access, these industries rely significantly on liquid fuels.

Oil Products have been the main energy used in the Agriculture and Forestry sector in 2023, which contributed 68% to the total energy consumed for 2023 for this sector. Oil products alone amounted to a consumption of 45 045 TJ. This is a result of the transportation of agricultural raw materials, feeds, intermediaries, and finished products from farms to various market areas. Electricity accounted for 32% of the total energy consumed in the agricultural and Forestry sector and amounted to 21 649 TJ in 2023. As shown in **Figure 23** below.

Figure 23: Energy demand in the agriculture and forestry sector, 2023



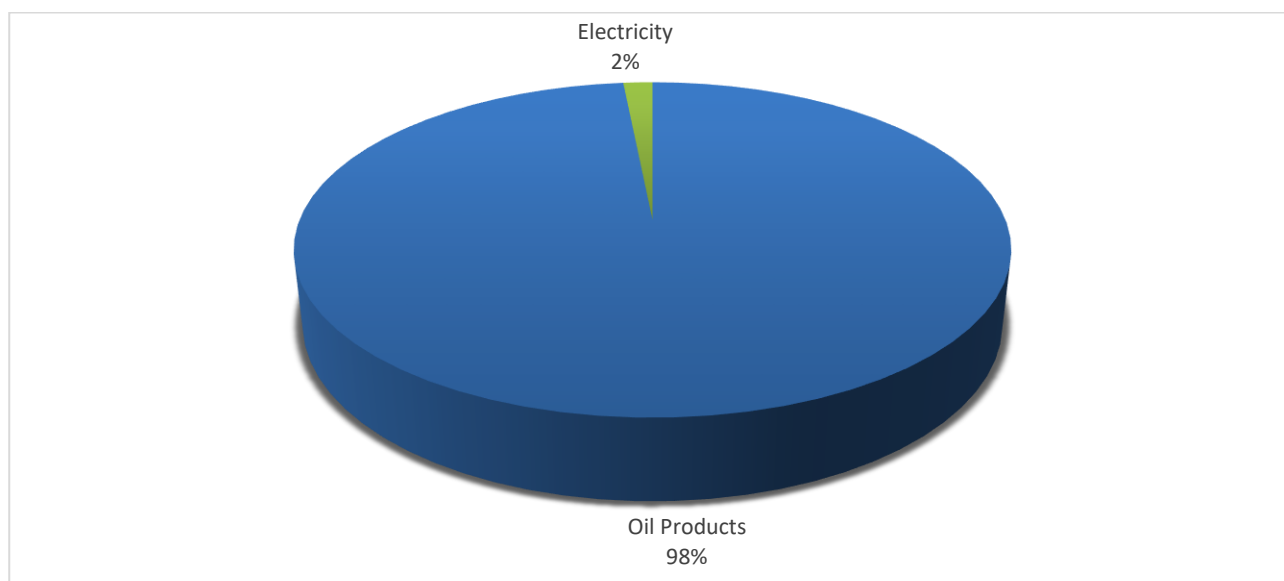
Source: DEE Energy Data, 2023

2.4 Transport Sector

The transport sector remains the largest consumer of global liquid fuels, with road vehicles accounting for most of the energy demand due to the heavy reliance on internal combustion engines. Even as engine efficiency is significantly improving, overall consumption is still rising in many areas due to increases in passenger and freight transport.

The transport sector used Oil products mostly for its activities and consumed 458 849 TJ in 2023. Oil products accounted for 98% while electricity accounted for 2% of the energy consumed in this sector in the year 2023. A total of 466 122 TJ of energy was consumed in 2023, as shown in **Figure 24** below.

Figure 24: Energy demand in the transport sector, 2023



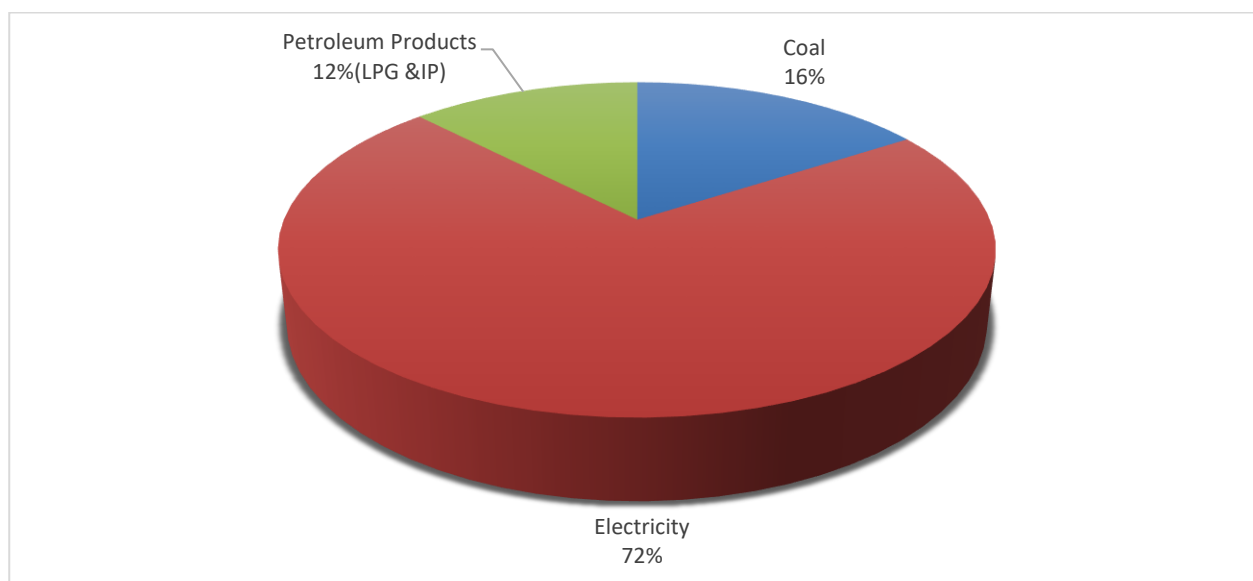
Source: DEE Energy Data, 2023

2.5 Residential Sector

The utilization of renewable energy sources and electrification are on the rise worldwide. Improvements in building insulation and the use of high-efficiency technology to lower overall environmental impact and utility costs frequently promote this shift. Otherwise, energy requirements for cooking, space heating, water heating, and running household appliances are the main drivers of fuel use in the residential sector.

The residential sector accounted for 4% of the total energy consumption in 2023. The consumption of electricity amounted to 72% of the total energy consumed in the sector. Petroleum products, which include Liquefied Petroleum Gas and Illuminating paraffin, accounted for 12% while coal accounted for 16%. The total energy consumed in the sector amounted to 494 760 TJ of energy in total. (**Figure 25** below).

Figure 25: Energy demand in the residential sector, 2023



Source: DEE Energy Data, 2023

NB: Due to misaligned mappings of the raw data on consumption to the ISIC codes, the Department of Electricity and Energy estimated the residential consumption of coal as one-third of sales to merchants and domestic markets. This estimate kept on increasing over the years, which is contrary to the increasing number of residential electricity connections.

It was subsequently found necessary to estimate the actual consumption in this sector using methodologies that consider the actual residential coal end-use data (from the General Household Survey) carried out by Statistics South Africa (StatsSA). The methodology was based on the average (in Rands) spent each month by the sampled household. This average was used to calculate tons of coal consumed by dividing the total expenditure by the average coal price. Inferring these to the total population resulted in a massive drop in coal consumption in the residential sector

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