PARTNERSHIP FOR ACTION ON GREEN ECONOMY

SOUTH AFRICA'S COAL SECTOR: CURRENT LANDSCAPE AND SOCIAL DIALOGUE IMPLICATIONS

ABOUT THIS REPORT

This report was developed under the Partnership for Action on Green Economy (PAGE), a joint initiative of the United Nations Environment Programme (UNEP), the International Labour Organization (ILO), the United Nations Development Programme (UNDP), the United Nations Industrial Development Organization (UNIDO), and the United Nations Institute for Training and Research (UNITAR).

The report was commissioned by UNEP on behalf of PAGE and developed in collaboration with South African partners, including the Presidential Climate Commission (PCC), which contributed to the development of the analysis and supports PAGE implementation in South Africa. The report aims to provide evidence and analysis to support informed discussions and social dialogue on South Africa's green and just transition.

This publication reflects the contributions and inputs received during the preparation and validation process, including engagement with relevant stakeholders. It does not represent an official publication or formal position of any individual partner institution unless explicitly stated.

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PAGE is a joint initiative of five United Nations agencies—UNEP, UNDP, ILO, UNIDO, and UNITAR—working together to support countries in advancing inclusive green economy policies and practices.

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LIST OF ACRONYMS

Acronym	Definition
AMCU	Association of Mineworkers and Construction Union
CBAM	Carbon Border Adjustment Mechanism
CFPP	Coal-fired Power Plants
COSATU	Congress of South African Trade Unions
CTL	Coal-to-liquid
DFFE	Department of Forestry, Fisheries and Environment
DMPR	Department of Mineral and Petroleum Resources
DMRE	Department of Mineral Resources and Energy
EAF	Energy Availability Factor
EIA	Energy Information Administration
GHG	Green House Gases
GVA	Gross Value Added
Gt IRP JET-IP	Gigatons Integrated Resource Plan Just Energy Transition Investment Plan
MES	Minimum Emission Standards
Mt	Million tons
NACTU	National Council of Trade Unions
NAQO	National Air Quality Officer
NDC	Nationally Determined Contribution
NUM	National Union of Mineworkers
NUMSA	National Union of Metalworkers of South Africa
RBCT	Richards Bay Coal Terminal
PwC	Price Waterhouse Coopers
SAFTU	South African Federation of Trade Unions
SLP	Social and Labour Plans
TFR	Transnet Freight Rail
UNFCCC	United Nations Framework Convention on Climate Change

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EXECUTIVE SUMMARY

This report provides a comprehensive assessment of South Africa's coal sector, examining its economic significance, policy landscape, and the labour union perspective within the context of a changing global and domestic energy system. It is based on a qualitative scoping review, supported by selected secondary quantitative indicators, and should therefore be read as an integration of available evidence, with findings shaped by the availability and accessibility of published and publicly available data sources. The report presents an analysis of the current state of the coal sector in South Africa to support social dialogue in implementing a Just Energy Transition under the PAGE 2.0 South Africa initiative. The report highlights four key messages with implications for social dialogue: (i) coal's contribution to development and climate challenges, (ii) managing transition risks in highly concentrated coal regions, (iii) aligning mandates and policy implementation, and (iv) labour unions' perspectives in advancing a just energy transition.

(i) Coal's Contribution to Development and Climate Challenges

Coal remains the backbone of national power generation, export revenue, and mining employment.

As of January 2025, coal accounted for 74.3% of national power generation and contributed 2.4% to GDP. The coal sector supports major downstream industries, including petrochemicals, steel, and transport. This resource also remains an important industrial feedstock, particularly through coal-to-liquid (CTL) and associated chemical value chains. This means the transition in industrial coal use is more constrained than the transition in electricity generation, where lower-carbon alternatives are more readily available. Coal remains a key source of export revenue for South Africa, representing around 6% of global coal export revenue. Employment in coal mining ranged between 98 000 and 109 000 workers in 2024, constituting approximately 0.9% of total national employment and about one-fifth of all mining employment.

South Africa's reliance on coal results in high greenhouse gas emissions, attracting both international and local pressure to accelerate the transition to cleaner, low-carbon energy sources.

Although coal is a critical mineral in South Africa, its dominance is associated with significant environmental concerns. In 2022, South Africa's official greenhouse gas (GHG) inventory reported that CO_2 constituted approximately 82% of total national GHG emissions (excluding land use, land-use change, and forestry (LULUCF)), and that the energy sector accounted for 78% of these emissions. This profile places South Africa among the continent's largest GHG emitters and has led to increased pressure to accelerate the transition to low carbon energy sources. Global frameworks such as the Paris Agreement and trade mechanisms such as the European Union's Carbon Border Adjustment Mechanism (CBAM) intensify pressure on the sector to decarbonise. Locally, the Integrated Resource Plan (IRP 2025), the Climate Change Act, and the Just Energy Transition Investment Plan (JET-IP) lay the foundation for a structural shift towards renewables and low-carbon

development. However, implementation remains slow and fragmented, implying a poor coordination across the institutions responsible for implementing the frameworks.

(ii) Managing Transition Risks in Highly Concentrated Coal Regions

***The coal sector is highly concentrated in Mpumalanga, making the country vulnerable to systemic risks that threaten energy security, employment, and fiscal stability*.**
Coal resources are geographically concentrated in one region, which attracts most of the sector's institutions and supporting industries to the same area. Mpumalanga alone hosts 11 of Eskom's 14 operational coal-fired power stations and therefore accounts for most of South Africa's generation capacity. Coal production is similarly dominated by five major companies - Seriti, Sasol, Exxaro, Thungela, and Glencore - which are responsible for 77% of total coal output. This concentration poses systemic risks, as any disruption, whether through market decline, policy change, or rail logistics failure, has widespread employment, fiscal, and energy implications. Some of these risks are already visible in practice: rail-linked export throughput through the Richards Bay Coal Terminal declined from 76 Mt in 2017 to 47 Mt in 2023 before recovering slightly to about 52 Mt in 2024, while Eskom's planned coal plant retirements and broader decommissioning assumptions point to a gradual but significant reduction in coal demand over time. Managing local job losses within the coal value chain and potential revenue decline from a coal phase-down, as well as identifying new viable industries to diversify the economies of the affected regions, is therefore crucial.

Once a driver of industrial and export growth, South Africa's coal sector now faces declining performance due to ageing infrastructure, logistical challenges, and stricter climate policies.
Historically, South Africa's coal industry has underpinned industrialisation and export growth, but it is now at risk of decline due to ageing infrastructure, logistical inefficiencies, and climate-related policies and frameworks. The collapse of rail reliability, with volumes through the Richards Bay Coal Terminal dropping from 76 Mt in 2017 to 47 Mt in 2023, illustrates how infrastructure deterioration contributes to the sector's declining ability to move coal efficiently and remain competitive in export markets. Addressing bottlenecks in the existing coal transportation system to sustain export revenues in the short term and exploring options for grid infrastructure to support the energy transition and diversification are also important.

(iii) Aligning Mandates and Policy Implementation

Gaps in implementation and fragmented mandates among government departments hinder South Africa's coordinated transition from coal to low-carbon energy, with regional disparities further complicating progress.

Policy analysis reveals that, although South Africa has developed several frameworks, such as the Integrated Resource Plan (IRP), Nationally Determined Contribution (NDC), Carbon Tax, Minimum Emission Standard (MES), and Social and Labour Plans (SLP) regulations, implementation of some remains partial. Overlapping mandates between the Department of Mineral and Petroleum Resources (DMPR), the Department of Electricity and Energy (DEE), the Department of Forestry, Fisheries and the Environment (DFFE), and the Department of Water and Sanitation (DWS) affect the government's ability to coordinate execution. Provincial disparities further complicate progress: municipalities in Mpumalanga face exposure to a coal-phase down and the decommissioning of coal-fired power plants, while Limpopo continues to pursue coal-related investment as part of its provincial development strategy, a priority not yet fully aligned with national decarbonisation goals. Aligning national, provincial, and local transition plans to enable coordinated governance and funding that directly benefit affected workers and communities is essential, ensuring that policy implementation is meaningful and participatory rather than merely procedural.

(iv) Labour Union Perspectives on Advancing a Just Energy Transition

Labour unions emphasise that the energy transition must be gradual, state-led, and prioritise social justice to protect jobs and communities.

Labour unions, particularly the National Union of Mineworkers (NUM), the National Union of Metalworkers of South Africa (NUMSA), and the Congress of South African Trade Unions (COSATU), have taken a firm stance that the energy transition must be gradual, state-led, and socially just. They accept the necessity of decarbonisation but reject externally imposed timelines that ignore domestic realities such as unemployment, inequality, and poverty. Their collective position highlights that the energy transition must prioritise job retention, local industrial development, and community resilience, ensuring that decarbonisation does not deepen social divides. Labour unions argue that prioritising realistic timelines for coal-fired power plant closures, worker upskilling, and community livelihood programmes is necessary to ensure a fair and inclusive transition.

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1 INTRODUCTION

This report is part of the Partnership for Action on Green Economy (PAGE) 2.0 South Africa initiative, in collaboration with the Presidential Climate Commission (PCC) and the Council for Scientific and Industrial Research (CSIR) that aims to provide evidence-based analysis to facilitate robust and inclusive social dialogue for implementing a just energy transition in South Africa, with the objective to balance economic, social, and environmental priorities.

PAGE is an alliance of five United Nations agencies: the International Labour Organisation (ILO), United Nations Environment Programme (UNEP), United Nations Development Programme (UNDP), United Nations Institute for Training and Research (UNITAR), and United Nations Industrial Development Organisation (UNIDO), along with funding partners and 22 partner countries. Together, they work to transform economies into drivers of sustainability. To enable deeper economic and inclusive transformation, PAGE focuses on accelerating green growth by embracing circular economy principles and objectives through evidence-based analysis and policy advice. Technical analysis provides empirical evidence to support social dialogue on the just and inclusive implementation of the energy transition.

South Africa is among the countries selected for phase two of PAGE (PAGE 2.0), with the proposed support anchored in the country's Framework for a Just Transition and contributing to the Presidential Climate Commission's (PCC) Just Energy Transition Implementation Plan (JET-IP). The PCC seeks support from PAGE to secure stronger engagement and cross-sectoral, multi-stakeholder coordination, facilitating a just energy transition process in a gender-responsive, inclusive, integrated, and coherent manner. Specifically, PAGE is requested to provide technical and financial support for the establishment and operationalisation of a forum through which the government, organised business, labour and affected communities can discuss and negotiate legally binding agreements on the transition from coal to renewable energy. Within this partnership, PAGE's role is to help mobilise and coordinate technical and financial resources in support of this process; the negotiation and adoption of any binding agreements remains the responsibility of national government, business, and labour stakeholders. The PCC serves as the national focal point, and technical and financial support from PAGE includes research, assessments, multi-stakeholder dialogues, and policy discussions. The ILO is the coordinating PAGE partner, while UNEP is a contributing partner, providing technical analysis to support social dialogue on jobs and social inclusion in the implementation of a just energy transition. To support this effort, UNEP, in partnership with the Energy Research Centre of the Council for Scientific and Industrial Research (CSIR), is supporting South Africa's PAGE 2.0 by providing technical analysis to inform social dialogue and policy discussions. The expected outcomes include:

- Strengthened national capacity and evidence base to guide a just energy transition within the coal sector.
- Informed and inclusive social dialogues supported by data and policy analysis on the socio-economic impacts of phasing down coal.
- Enhanced understanding and ability to mobilise and align financial resources for implementing sectoral transition policies in support of the PCC.

- Strengthened the foundation for the just transition forum to coordinate, endorse, and guide implementation of sectoral transition policies, strategies, and programmes.

This document provides an integrated analysis of the South African coal sector landscape. It combines economic, policy, market and labour perspectives to map the current state of the sector and identify the opportunities and challenges it faces. While studies on the national employment vulnerability assessment (TIPS, 2019) and sector job resilience (TIPS, 2020b) have assessed employment vulnerability and climate-related risks within various sectors, including the coal value chain, this report complements them by integrating these findings within a broader national context. In contrast, Strambo et al. (2019) explored the main challenges associated with the transition away from coal in South Africa over a five-to-ten-year period. Expanding on this work, a collaborative report by the Stockholm Environment Institute and TIPS, took stock of the just transition away from coal, highlighting the political economy and social context of the value chain, challenges of the transition, and just transition framings (Strambo et al. , 2024),. This study consolidates economic, industry structure, and policy implementation insights to present a view of the coal sector's current structure, including reflections on the implications for social dialogue. By consolidating fragmented data and insights from the literature, the report strengthens understanding of the sector, supports the development of sustainable transition pathways, and contributes to a just and inclusive energy transition for South Africa. The additional value of this report resides not only in the compilation of existing knowledge, but in the integration across different dimensions – the coal value chain, economic, labour, and policy perspectives into a single document with a focus on supporting social dialogue in implementing a Just Energy Transition under the PAGE 2.0 South Africa initiative.

1.1 Background

South Africa's coal sector plays a significant role in the country's economy and energy system, contributing 2.4% of GDP in coal resource rents in 2021 (World Bank Group, 2021). In January 2025, it accounted for 74.3% of South Africa's electricity generation (DFFE, 2025). The sector supports critical downstream industries such as petrochemicals, steel, and transport. It also contributes substantially to export earnings (approximately 6% of global exports) and employment. In 2024, the coal mining sector employed between 98,269 and 109,099 workers, representing at least 0.9% of national employment and nearly 19% of mining employment in the country (MCSA, 2025; Quantec, 2025).

South Africa is one of the largest CO_2 emitters on the African continent. In 2022, according to the country's official greenhouse gas inventory, CO_2 accounted for approximately 82% of total national GHG emissions[1] (excluding Land Use, Land-Use Change, and Forestry (LULUCF)), while the energy sector contributed 78% of total emissions (excluding LULUCF) (DFFE, 2023, 2024). Coal's central role in electricity generation, industrial processes, and synthetic fuel production means it constitutes a substantial portion of the energy sector's

[1] This figure (82%) refers to the share of CO_2 in South Africa's total greenhouse gas emissions, not to coal's specific share of national emissions, and not that of coal which can often be misrepresented as such.

reported CO_2 emissions and reflects its longstanding position within South Africa's energy system. This also means that the coal transition challenge is not uniform across the economy. While electricity generation has clearer decarbonisation alternatives, industrial coal use, particularly coal-to-liquid and related petrochemical value chains, remains hard to decarbonise in the near term. At the same time, the coal industry faces increasing global pressure of reduction in coal use and a shift to low-carbon energy sources. This pressure arises from international frameworks and organisations such as the United Nations Framework Convention on Climate Change (UNFCCC) through the Paris Agreement (UNFCCC, 2015, 2022), the European Union's Carbon Border Adjustment Mechanism (CBAM) (European Union, 2025), and similar mechanisms under consideration in other jurisdictions, which drive decarbonisation and low-carbon trade compliance. Globally, climate commitments and trade policies are accelerating the decline in demand for coal, while local policy instruments such as the Integrated Resource Plan 2025 (DEE, 2025), the Climate Change Act (Republic of South Africa, 2024), and the Just Energy Transition Investment Plan (JET-IP) (The Presidency of SA, 2022) lay the groundwork for a structural shift towards increased renewable energy deployment and low-carbon development pathways (IEA, 2023; PCC, n.d.).

Understanding the current landscape of the coal sector is, therefore, a critical foundation for shaping the just energy transition. The coal sector is highly concentrated both geographically and institutionally, with five mining companies: Seriti, Sasol, Exxaro, Thungela, and Glencore, accounting for 77% of coal production (Cole et al. 2023; Bhorat et al. 2024). Similarly, Mpumalanga is the largest power-producing province, hosting 11 of the 14 operational Eskom coal-fired plants (Bhorat et al. 2024). This concentration increases the risks of disruption through rapid job losses, municipal revenue shortfalls, and supply chain interruptions. However, this concentration may also provide a leverage point for better planning, as targeting interventions in Mpumalanga, or through the five dominant companies that control most of the production, could enable broader impact on the sector. By focusing planning, investment, and transition policies on this core region, the government and relevant stakeholders can coordinate more effectively and manage a coal phase-down that influences the broader coal sector nationally.

1.2 Purpose and Scope

The purpose of this report is to provide an integrated analysis of the current landscape of the South African coal industry, serving as a baseline for evidence-based dialogue within the social dialogue on energy transition. The scope covers the economic, social, and policy dimensions of the coal value chain. Whilst the report considers coal, energy, and emissions together, it does so in a manner that considers these as different but related concepts in the context of the transition challenge: coal relates to the fuel and the value chain, energy relates to the system, and emissions relate to the environmental impacts of the system and the value chain. Specifically, the report:

- Provides a historical and current overview of coal production, reserves, consumption and exports;

- Analyses the coal value chain and identifies key stakeholders, organisations and regions most dependent on coal;
- Assesses the economic significance of coal in terms of Gross Domestic Product (GDP), employment, and municipal revenue;
- Examines existing policy and the regulatory environment of the sector and highlights gaps that may affect inclusivity and transition; and
- Provides an overview of the labour union perspective on the just energy transition.

1.3 Methodology

This report used a scoping review to assess the current landscape of the coal sector in South Africa, providing evidence for just energy transition social dialogues. A scoping review is an effective methodology for assessing trends and the landscape based on existing studies (Peterson et al., 2017). A set of guidelines, shown in Table 1, established the scope of the study, data sources, and information gathered from existing studies. The scope defined the language, access, and type of studies reviewed. Data were collected from various sources, including Scopus, Google Scholar, and standard Google searches for grey literature. The information reviewed from these studies included the historical and current coal sector, coal value chain, economic contribution of coal, labour union perspectives, and policy frameworks. The analysis was complemented with secondary data on socioeconomic indicators to provide statistical analysis from credible databases, including STATS SA[2], Quantec: EasyData[3], and the World Bank[4]. The approach integrated diverse quantitative and qualitative sources relevant to South Africa's coal sector and energy transition. The review followed a thematic approach, identifying coal sector reports, government statistics, and academic studies based on their relevance to the scope.

Table 1: Guidelines followed in the scoping review

Scope	Data Sources	Information Gathered
• **Access to full text** • **English language** • **Policy or practice-based reports (grey literature) on South Africa coal sector** • **Academic publications on South Africa coal sector**	• Normal Google search for grey literature • Scopus • Google Scholar • STATS SA • Quantec: Easy Data • Mineral Council South Africa	• Coal sector historical development • Coal value chain • Economic contribution including GDP, employment • Labour union perspectives on the transition away from coal • Policy frameworks enabling transition away from coal

The scoping review followed a structured search including:

(i) Identification of policy or practice-based reports (grey literature) on the coal landscape and the transition away from coal. These included, among others, well-known reports on the coal landscape such as the Integrated Resource Plans (DEE, 2025)), Just Energy Transition Investment Plan (JET-IP) (The Presidency of SA, 2022), Just Transition Framework (PCC, 2022) reports from Trade and Industrial Policy Strategies (Patel & Makgetla, 2021; TIPS,

[2] (Stats SA, 2022)
[3] (Quantec, 2025b)
[4] (Word Bank Group, 2026)

2019, 2020b), Stockholm Environment Institute (SEI)–TIPS collaborative studies on the just energy transition (Strambo & Atteridge, 2019; Strambo et al., 2024), and Bhorat et al. (2024) on the labour market in the coal-based electricity utility industry in Mpumalanga. In addition, reports from the Department of Electricity and Energy (DEE, 2024, 2025), the Department of Mineral and Petroleum Resources (previously named Department of Mineral Resources and Energy)[5,6] (DMRE, 2023, 2024b, 2025), Stats SA (Stats SA, 2024), and the Minerals Council South Africa (MCSA, 2023, 2024a, 2025b) were also reviewed.
(ii) Identification of relevant academic literature on the coal energy transition in South Africa using keywords including "Coal Transition" AND "South Africa"; "Just Transition" AND "Coal" AND "South Africa". The study focused on the most recent publications and used a snowballing approach to identify other relevant academic literature. Some relevant literature on specific topics are highlighted in Table 2.

Table 2: Relevant literature from Academic publications

Information gathered for study from Academic literature	Relevant literature
Coal sector historical development	Mirzania et al., (2023)
Mapping the coal value chain	Alade (2025) Barnes & Vermeulen (2012) Bohlmann & Inglesi-Lotz (2018) Cole et al. (2023) De Saxe et al. (2023) Dworzanowski (2013) Hughes et al. (2024) Kharlampenkov et al. (2020) Latief et al. (2023) Magagula et al. (2024) McCarthy (2011) Mlalazi et al. (2025) Mogashane et al. (2025) Naidu & Naidoo, (2017) Pulles et al. (2001) Simpson et al. (2019) Singh & Irusen (2025)
Economic contribution including GDP, employment	Cole et al. (2023)
Labour union perspectives on the transition away from coal	Cock (2019) Mirzania et al., (2023)

Coal value chain mapping was conducted to illustrate the linkages between mining, logistics, and downstream uses of coal. The economic analysis compiled and presented data from sectoral reports on coal's contribution to the economy through various indicators. The policy framework applied a comparative and interpretive approach, assessing implications and identifying potential gaps in the framework.

[5] (DMRE, b)
[6] (DMRE, a)

This method and approach is subject to some limitations: The report uses various secondary sources of information with different definitions, time periods, and levels of disaggregation. These include estimates of coal reserves, employment statistics, and some economic statistics. At times, the exact statistics of municipal revenues related to the coal industry may not be available and need to be derived from studies and trends in the sector. In addition, the report does not undertake a full monetised assessment of externalised environmental, health, or remediation costs, and instead recognises these at a higher level where relevant to the analysis. Another limitation is that some potentially relevant documents were not fully accessible during the review process, including the South African Coal Roadmap, and could therefore not be assessed. The report therefore uses the most appropriate available sources.

1.4 Structure of the Report

The remainder of the report is structured as follows: Section 2 presents a historical overview of South Africa's coal sector, tracing its development from early discoveries to its central role in the national energy and industrial system. Section 3 maps the entire coal value chain, covering reserves, production, beneficiation, transport systems, exports, and downstream uses such as electricity, coal-to-liquid fuels, metallurgy, and the 'water-coal' nexus. Section 4 discusses the economic contribution of the sector to GDP, employment, exports, and municipal revenues, highlighting the dependence of local economies on coal-related activities. Section 5 presents the perspectives of major labour unions (NUM, NUMSA, COSATU, and the Association of Mineworkers and Construction Union (AMCU)) on the Just Transition, focusing on employment security, coal phase-down, and social justice. Section 6 discusses the key national policies and regulations (IRP, NDC, Carbon Tax, Minimum Emission Standard, Social and Labour Plans, National Water Act JET-IP) related to coal, identifying gaps, and governance challenges affecting implementation. Finally, Section 7 concludes the report, consolidating the findings across economic, environmental, and social dimensions, emphasising the need for coherent policy alignment, infrastructure recovery, and regionally focused transition planning.

2 COAL SECTOR OVERVIEW

South Africa's coal sector has been central to the country's industrial growth and energy supply for over a century, shaping communities, infrastructure, and policy development, as well as influencing market dynamics. As the country transitions away from coal, inclusive social dialogue is essential to address historical injustices and enable a just and equitable future for all stakeholders, ensuring that coal phase-down is equitable and supports vulnerable regions. This section provides a historical overview of South Africa's coal sector, tracing its development, key milestones, and the implications for current and future social dialogue around the transition from coal.

2.1 Historical Overview and Coal Timeline

South Africa's energy and industrial development have centred on coal since the early 19th century, when it supported the growth of the gold and mining industries (Cole, Megan J. & Broadhurst, 2022), anchored by the Mpumalanga coalfields and later expanded through Eskom's coal fleet, Sasol's coal-to-liquid (CTL) operations, and the Richards Bay export corridor. Over time, the sector has followed a dynamic pathway shaped by policy changes and market inflections, including the Integrated Resource Plan, South Africa's commitments under the Paris Agreement, and the emerging concept of a just transition (Strambo & Atteridge, 2019). Operational realities, such as ageing plants, rail constraints, and the concentration of social and employment factors in coal towns, have influenced both short-term decisions and long-term risks.

Coal is an abundant, carbon-rich material found worldwide and is the most plentiful fossil fuel in South Africa. The country is among the top ten global producers and is the fifth largest exporter (Global Data, 2024a). Its production levels and reserves are therefore essential for understanding the sector's current and future trajectory.

Coal was first discovered in the Molteno-Indwe coalfield in the Eastern Cape in the 1860s as shown in Table 3, with small-scale mining beginning in the 1870s to supply steam power to the Kimberley diamond fields (XMP Consulting, 2013). The discovery of the Witwatersrand coalfields in 1886 created new energy demand, which drove exploration of the Witbank and Highveld coalfields in present-day Mpumalanga (MCSA, 2022; XMP Consulting, 2013). By the early 20th century, coal had become a strategic mineral and a catalyst for rail transportation, electricity generation, and industrial growth (Makgetla & Patel, 2021b).

According to Thomas (2020), coal deposits in South Africa are located in several basins in the north and east of the country. The Karoo basin extends for 200 km from the Free State to the east and south of Mpumalanga, and for 400 km from Mpumalanga to KwaZulu-Natal (Thomas, 2020). Coalfields in the western part of South Africa include the Vereeniging – Sasolburg and South Rand coalfields. The coal seams vary in thickness and quality. Mpumalanga and Limpopo produce high-volatile bituminous steam coal, generally low in sulphur but with high ash content, requiring beneficiation for export; KwaZulu-Natal yields anthracite from thinner seams, while the Free State and Springbok Flats have smaller or less exploited resources (Thomas, 2020). Table 3 presents a summary of these historical milestones.

Table 3: Historical overview of the coal sector and coal-related milestones

Date	Event	Implications
1800 – 1900	• Coal discovery.	• Beginning of commercialisation of coal[7].
1864	• First commercial coal mining near Molteno-Indwe (Eastern Cape).	• Establishes South Africa's coal industry[8].
1870s	• Diamond-led power demand boosts coal expansion.	• Rapid mine openings[8].
1880 -1890	• Commercial mining starts in KZN and on the Witwatersrand; Witbank also rises.	• Shifts coal heartland to north-east and creates Mpumalanga/KZN coal belt[8].
1920	• Coal first exported out of the country.	• The Central Basin coalfields (Highveld, Witbank, Ermelo) were the country's leading producers of coal with approximately one ton of coal first exported during that year [9].
1923–1928	• Eskom (then Escom) is established; first Escom coal stations (Salt River & Congella, 1928).	• Marks the institutional and infrastructural foundation of South Africa's coal-based electricity system. Eskom's creation formalised government-led electrification and established coal as the backbone of South Africa's power generation. [10,11,12].
1950–1955	• Sasol is founded (1950), and Sasol 1 (Sasolburg) begins coal-to-liquid production (1955).	• Sasol creates coal-to liquid and chemicals pillar. South African coal deepens beyond power [13].
1960 – 1980	• Eskom builds 14 large CFPP in Mpumalanga.	
1976	• Richards Bay Coal Terminal (RBCT) commissioned, initial 12 Mt capacity[8].	• This infrastructure supported large-scale coal exports [9]. • Over the years capacity grew 76Mtpa in 2008[7] .

[7] DMRE (2016)
[8] MCSA (2022)
[9] XMP Consulting (2013)
[10] Eskom (b)
[11] Eskom (c)
[12] Eskom (a)
[13] Sasol (ND)

1980s	• Sasol expands coal-to-liquid under sanctions to reduce oil imports [14].	
1998	• White Paper on Energy Policy calls for diversification and renewables [15].	• Governance and diversification goals established[16].
2005-2015	• Coal exports grow by 2.6% per year [7].	• Employment in coal mining and export corridor strengthened[7].
2007- 2008	• Emergency load shedding was implemented in order to avoid a potential overall nationwide blackout. • Medupi (project alpha) and Kusile (project beta) construction to begin.	• Loadshedding crisis revealed structural underinvestment and ageing coal infrastructure, prompting Eskom's expansion programme (Medupi & Kusile)[17,18,19].
	• South Africa's coal export price grew steadily from the second half of 2007. Prices eventually reached a peak in July 2008 at a record high of R1 279/t[7].	
2010's	• Coal exports dropped from 7% of South Africa's total foreign earnings in 2011 to 4,6% [14].	• Gradual decline in global demand and competitiveness of South African coal[14].
2011	• The South African Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) initiated	• From the first Bid Window 1, tariffs for both wind and photovoltaic (PV) projects declined steadily [20].
2013	• From the REIPPPP, the first power from Bid Window 1 was supplied to the grid	
2011 - 2020	• Contribution of coal mining to GDP share dropped from 2.3% to 1.9% (in 1993, the share was at 1.3% of GDP) [14].	Gradual decline in global demand and competitiveness of South African coal[14].
2019	• IRP 2019 gazetted[21].	• Implications on coal de-scaling and retirement of coal plants with the IRP 2019 outlined that approximately 10 500 MW and 35,000 MW of coal

[14] TIPS (2021)
[15] (DME, 1998)
[16] DMRE (1998)
[17] Eskom (2012)
[18] Eskom (2009)
[19] Mail&Guardian (2007)
[20] DEE (2025)

		capacity would be decommissioned by 2030 and 2050, respectively[21].
2022	• Komati coal station fully decommissioned[22,23].	• First coal plant decommissioned in due to age as well as efforts of decarbonisation [23].
2025	• IRP 2025 gazetted[24].	• The IRP 2025 assumes that 8GW of coal-fired power stations will be shut down by 2030. Beyond that, the document provides an indicative decommissioning schedule based largely on a 50-year plant life assumption rather than a fixed policy target outlined in IRP 2019 [24].

2.2 Implications for Social Dialogue

The coal transition raises several unresolved choices that require structural social dialogue between government, labour, industry and communities. First, stakeholders must determine the timing and sequencing of the coal phase-down and assess whether the proposed timelines are indeed sufficient and allow for socio-economic adaptation for the transition to be deemed 'just'. Discussions should balance scheduled ageing plant closures with developmental needs, grid stability, and employment risks.

Dialogues need to identify the regions most exposed, with evidence already showing that eMalahleni, Steve Tshwete, Msukaligwa and Govan Mbeki are structurally dependent on coal for employment and municipal revenue, as outlined in TIPS Sector Jobs Resilience Plan (TIPS, 2020) and Bhorat et. al. (2024) study on the just energy transition and the labour market in South Africa. The degree of exposure, allocation of responsibility and support, prioritisation and sequencing, and any trade-offs in planning interventions need to be examined for these regions. Within the dialogue, "no-regret" actions to which all stakeholders can commit should be considered. These include improving enforcement and accountability of Social and Labour Plans, planning for mine and power plant closures and repurposing, and initiating early and relevant (industrially recognised) skills retraining so that workers can transition before closures occur. Early retraining will reduce drop-out rates, as many workers would otherwise leave the programmes to seek income once mines or plants shut down. This is especially critical for workers who migrate for employment and will have to relocate once earnings cease.

Box 1 presents some of the questions and pointers that the stakeholders' dialogue should address.

[21] DMRE (2019)
[22] (Eskom, 2022)
[23] World Bank (2023)
[24] (DEE, 2025)

Box 1: Implications for the ongoing social dialogue for the historical development of South Africa's coal industry

Potential discussion questions for various stakeholders include:

Government:

- What policies are needed to address historical injustices in the coal sector and promote equitable development in affected communities?
- What regulatory mechanisms are required to manage environmental and social liabilities from past mining activities?

Unions:

- How can the historical contributions of coal workers be recognised and valued in a just transition process?
- How can unions ensure that the voices of historically disadvantaged workers are heard in dialogue?

Industry:

- How can companies help address the legacy of historical injustices and promote social and economic development in coal-dependent communities?
- What investments can improve the environmental performance of existing coal operations?

Communities:

- How can communities participate meaningfully in shaping their future during the transition away from coal?
- What mechanisms can ensure that communities benefit from new economic activities in their regions?

3 MAPPING THE COAL VALUE CHAIN

The coal value chain in South Africa links geological resources to diverse economic uses, underpinning energy, industry, and exports, but faces resource depletion, challenges in logistics, policy shifts, and pressure for a transition to cleaner energy. This section maps South Africa's coal value chain, detailing the sequence of activities from its geological origins to its final uses in the economy. It maps and explains the various stages, including resource discovery, processing, transportation, conversion, and ultimately consumption across multiple sectors, including export. In South Africa, this chain connects upstream operations, such as exploration and mining, with midstream processes, such as preparation and logistics, and downstream applications, such as electricity generation, coal-to-liquid, metallurgical, and industrial fuel and chemical supply. It is important to note that these downstream uses are not equally substitutable due to the mono-feedstock dependency, which is coal. This distinction is important for social dialogue, particularly between coal used for power generation and coal used as feedstock in industrial processes.

Figure 1 shows a schematic of the coal value chain in South Africa, discussed in detail in the sub-sections that follow. This foundation supports informed social dialogue and policy discussions regarding South Africa's energy future and the socioeconomic implications of the coal value chain.

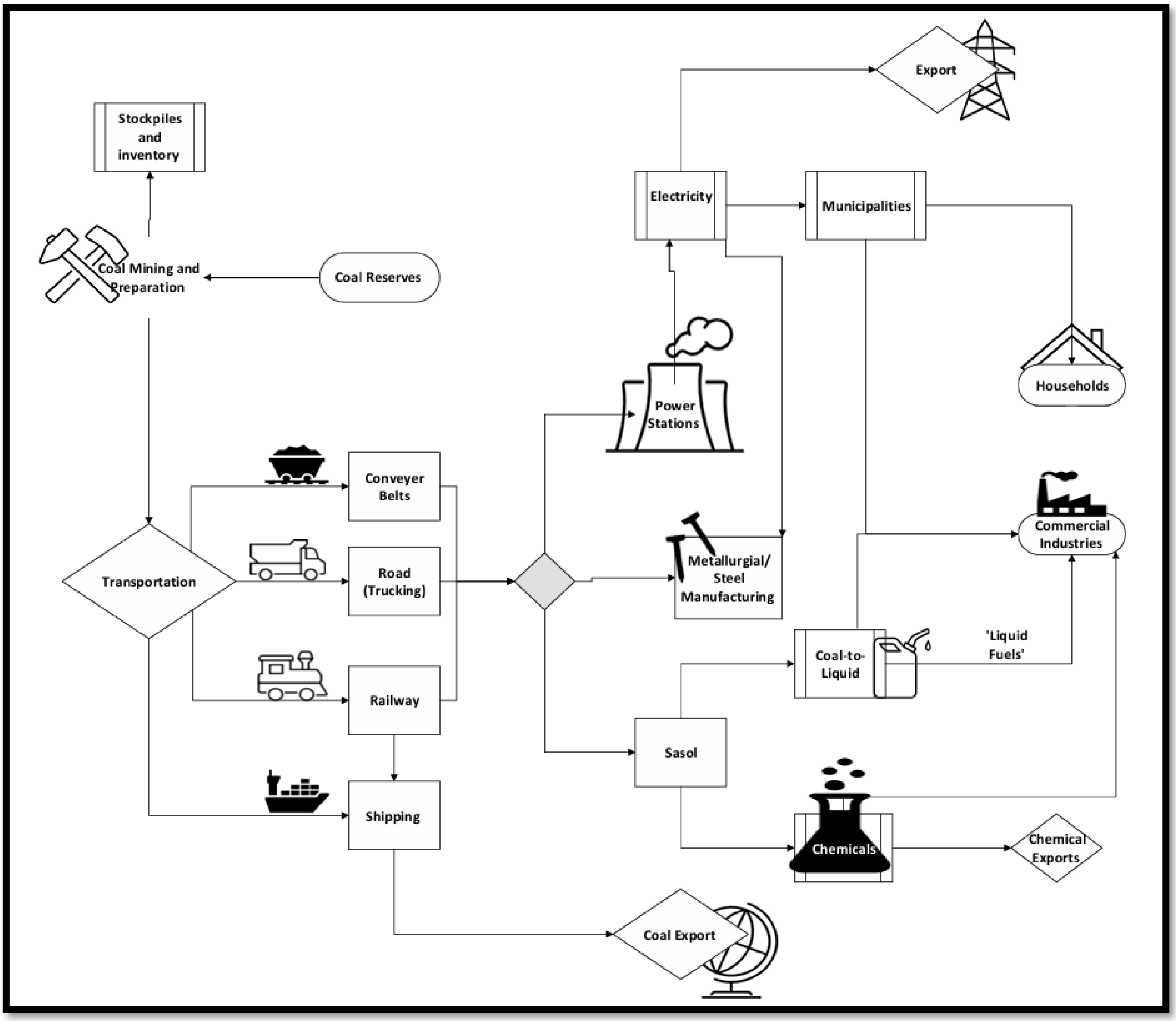

Figure 1: Illustration of the coal value chain in South Africa
Source: Adapted from TIPS (2019)

3.1.1 Reserves and Resources

The classification of reserves follows the South African Code for the Reporting of Exploration Results and the South African Code for the Reporting of Mineral Asset Valuation Codes, which have been developed under the joint guidance of the South African Institute of Mining and Metallurgy and the Geological Society of South Africa. The South African stock exchange requires public companies to disclose exploration results, mineral resources, and mineral reserves in accordance with the standards set out in these codes (Thomas, 2020). This framework distinguishes between coal resources (based on geological confidence) and coal reserves (economically recoverable coal under current conditions).

One of the earliest estimates of South Africa's coal reserves was provided by the 1987 Bredell Report, which indicated 55 Gt of reserves and 115 Gt of resources ((DMRE, not dated) ; Jeffrey, 2005). In 2021, Eskom reported South Africa's coal reserves as 53Gt (Eskom, 2021a), while recently, international organisations such as the Energy Information Administration (2024a) stated that in 2022, there were approximately 10 Gt of proven reserves. Although these figures are drawn from different reporting years, the magnitude of the gap suggests that the discrepancy is not due to timing alone. Rather, it reflects differences in classification systems, reporting scope, and assumptions regarding economic recoverability. This distinction is important because reserve estimates are often used in debates on long-term energy security, future mine life, and the pace of transition planning. The discrepancy between these figures risks overstating or understating the long-term coal supply and possibly creating uncertainty in long-term planning, as well as affecting energy security narratives.

Figure 2 shows South Africa's reserves base compared to major producers such as the United States, China, and India, while Figure 3 presents these as a percentage share of global coal reserves.

Figure 2a displays the absolute tonnage of reserves across the four countries. South Africa's reserves remained stable from 2008 to 2017 but have declined from 2018 onwards, although they remain relatively stable. This contrasts with the growth in Chinese and Indian reserve declarations from 2013, while the United States saw a slight increase in reserve declarations from 2020. The decline in South Africa's reserves reflects both geological reassessments and economic reclassification, rather than purely physical depletion.

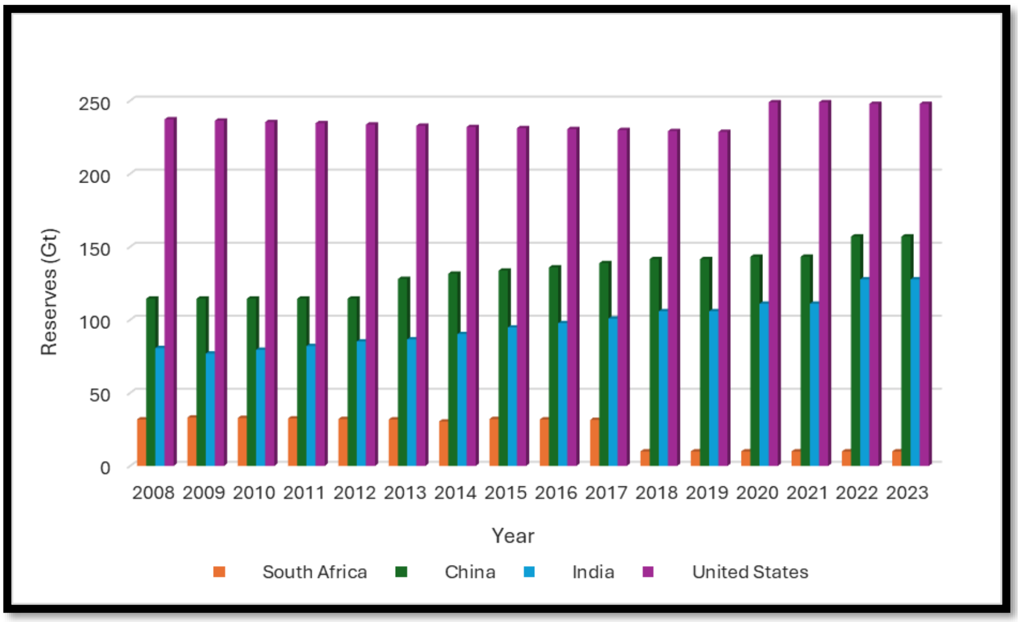

Figure 2: Coal reserves of different countries in million tons between 2008 and 2023
CSIR analysis based on data obtained from the Independent Statistics and Analysis of the Energy Information Administration (EIA) for coal and coke reserves (EIA, 2024b)

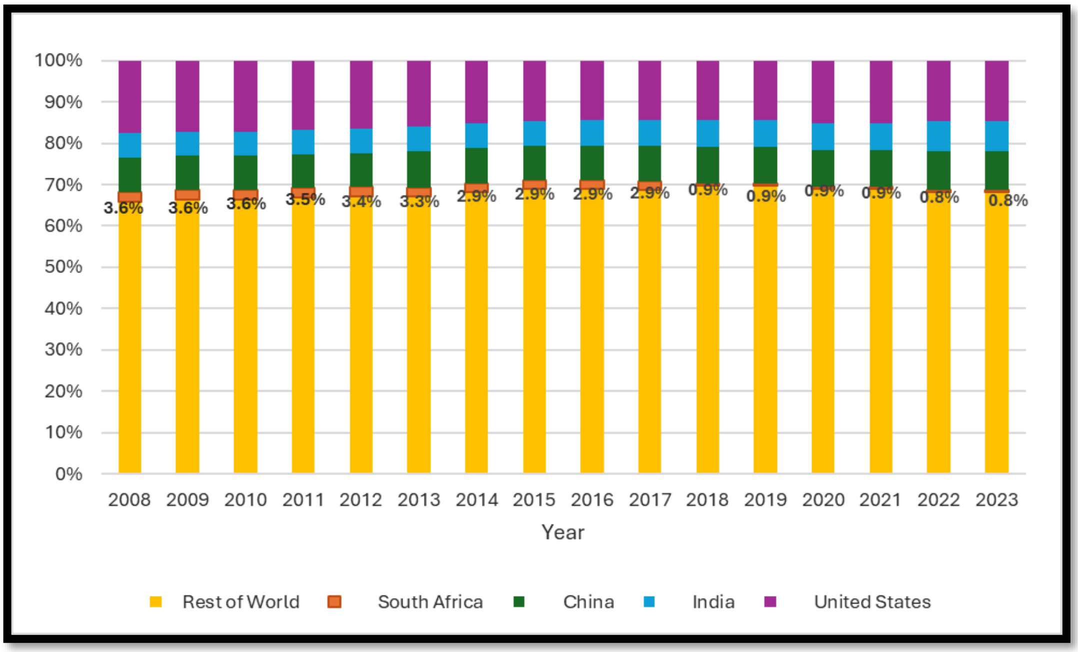

Figure 3: Percentage share of coal reserves of different countries between 2008 and 2023
CSIR analysis based on data obtained from the Independent Statistics and Analysis of the Energy Information Administration (EIA) for coal and coke reserves (EIA, 2024b)

Table 4 shows the provincial data from PwC's analysis of Johannesburg Stock Exchange (JSE) listed mining companies in 2023. It shows that Mpumalanga and Limpopo together account for nearly 98% of the 5,106 million tonnes (Mt) of coal reserves from this study, with estimated lifespans of 27 and 86 years, respectively (PWC, 2023). According to PWC (2023), four coal projects are currently being developed in Limpopo. These collectively add approximately 426 Mt to the province's existing reserve base, along with an additional 7,443 Mt of declared exclusive resources to these projects. This expansion suggests that coal mining in the region could continue well beyond the current average remaining mine life.

Table 4: South Africa's provincial Coal Reserves in 2023 of JSE listed mining companies.

Product	Province	Unit of measure	Reserves	Total exclusive resources	Reserves/exclusive resources*	Total output	Years left*
Coal	Free State	Mt	24.99	141.00	0.18	1.10	23
	KwaZulu Natal	Mt	11.14	11.98	0.93	0.47	24
	Limpopo	Mt	2 584.99	1 629.97	1.59	30.20	86
	Mpumalanga	Mt	2 484.67	5 520.54	0.45	93.73	27
	TOTAL	**Mt**	**5 105.78**	**7 303.49**	**0.70**	**125.51**	**41**

Source: PWC (2023) * Indicates an average

3.1.2 Coal types and coalfields

South Africa's coal deposits consist primarily of bituminous coal, with smaller amounts of anthracite and lignite (Eskom, 2021b) (Kershaw and Taylor, 1992, cited in Van Niekerk, 2008)

Bituminous coal is the dominant grade; it is a dense black coal with medium to high carbon content and a high calorific value, making it suitable for combustion and ideal for electricity generation, industrial boilers, and synthetic fuel production (USGS, 2024). Subbituminous coal is a lower-grade coal with a lower calorific value than bituminous coal but is higher in grade than lignite, the lowest-grade coal (MCSA, n.d.-d). It can also be used in steam-electric generation and as fuel. Anthracite is the most carbon-rich form of coal and contains the least volatile matter. This coal is mainly used in metallurgical processes that require clean-burning fuel (EIA, 2023).

Figure 4 shows the distribution of coal types across South Africa's provinces, highlighting the dominance of bituminous coal, particularly in Mpumalanga. Anthracite coal is in small quantities and largely concentrated in the KwaZulu-Natal region.

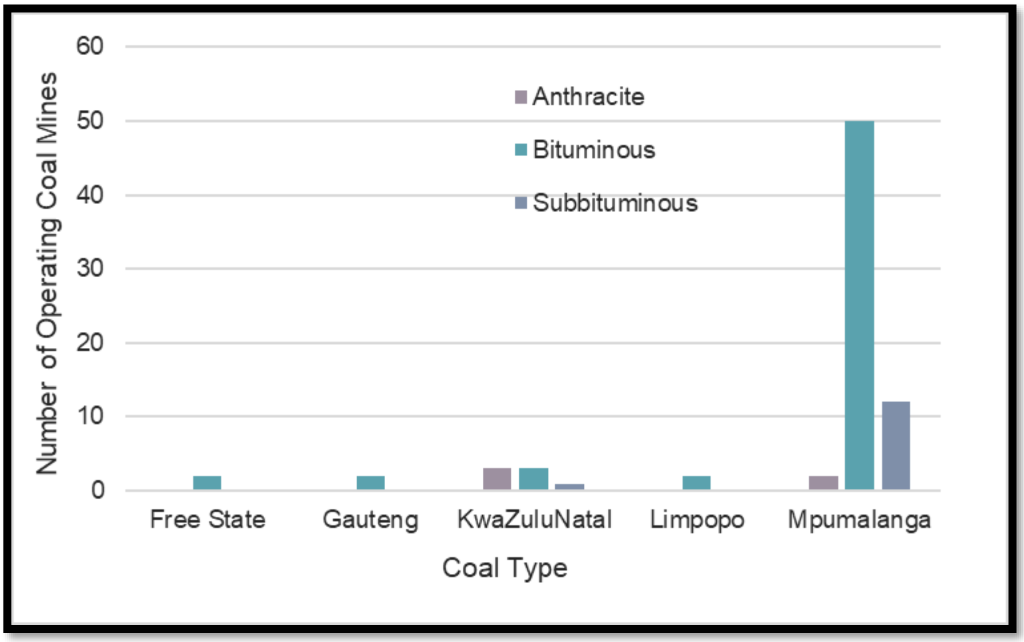

Figure 4: Coal types available in the operating mines of South Africa in 2025
Source: CSIR analysis based on data obtained from (Global Energy Monitor, 2025)

3.1.3 Production and Consumption

Coal production and consumption have significantly shaped the South African economy and energy system for over a century. As one of the top ten coal producers, South Africa also remains among the top five exporters of seaborne coal (IEA, 2023). Production has historically been concentrated in Mpumalanga's Witbank and Highveld coalfields, with Waterberg in Limpopo emerging as the long-term frontier (DMRE, 2016). This section highlights historical and recent trends in coal production and consumption, the balance between domestic consumption and exports, and the structural issues affecting the sector.

Coal production expanded significantly during the 1980s in response to rising electricity demand and Sasol's coal-to-liquid expansion at Secunda. **Error! Reference source not found.** shows the long-term trajectory of production and consumption in million tonnes from 1980 to 2024. Figure 5 also indicates that since the late 1980s, coal production has consistently exceeded consumption, with the gap representing coal exports. The rapid growth in coal production in the early 1980's coincided with the commissioning of Eskom's large coal-fired power stations, such as Matla and Duvha. Coal consumption appears to flatten around 2009 at 250 Mt.. After the 2008 financial crisis, electricity demand from heavy industries such as smelters and mines dropped and did not fully recover, thereby affecting coal consumption. In addition, Eskom's coal plant availability factor has decreased over the years, meaning the utility cannot consistently meet the relatively stable energy demand.

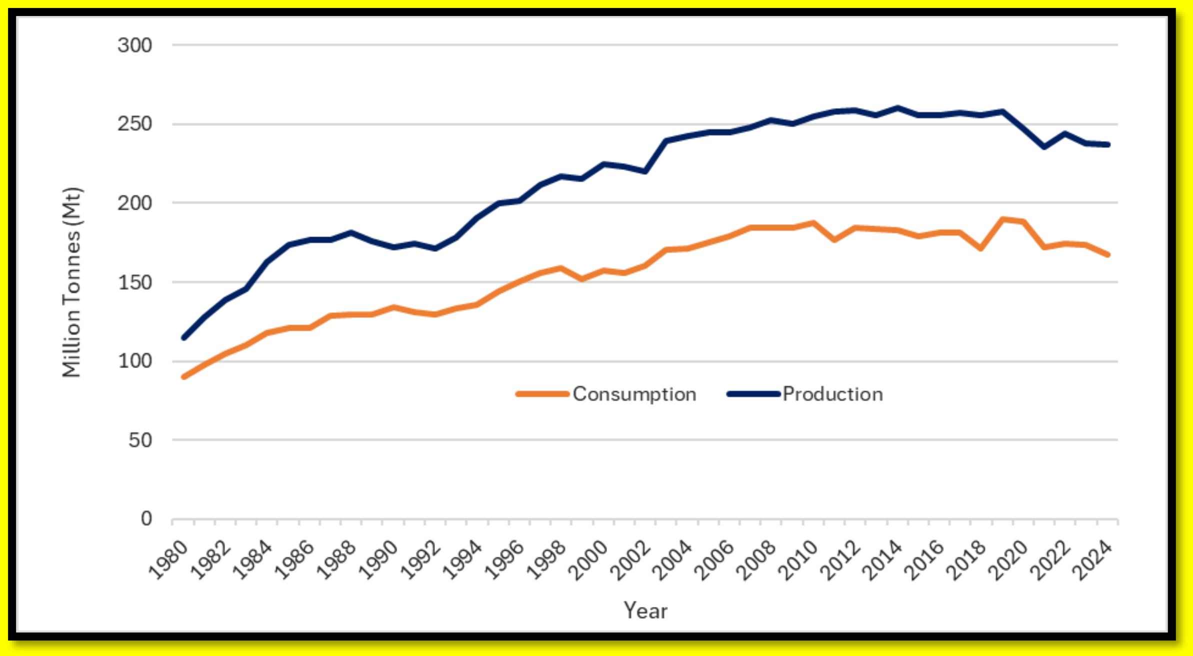

Figure 5: Coal production and consumption, 1980 – 2024
Data Source: Estimated from EIA (2024).

Coal consumption is dominated by electricity generation, which accounts for approximately 53% to 62% (DMRE, n.d.-b; Eskom, 2021a). Eskom's fleet of coal-fired stations, mainly located in Mpumalanga, was reported in 2017 to consume about 120 Mt of coal annually, though in a recent Eskom report, the coal consumption in 2023 and 2024 were 102.3 Mt and 99.5 Mt respectively, indicating a sharper decline in consumption than EIA projections for the same years (Eskom, 2025)

Figure 6**Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.** shows that coal has consistently dominated the primary energy sector since the early 1960s, surpassing oil and gas consumption. According to Osborne (2013), coal demand is forecast to grow by 50% between 2013 and 2030, driven by the economic growth of the BRICS countries (Brazil, Russia, India, China and South Africa), however, excluding South Africa. Despite the global transition towards cleaner energy, the IEA (2024) also forecasts an increase in coal demand in Africa, with consumption that was projected to grow by 1% in 2024, reaching 6 Mt and totalling 191 Mt in 2027.

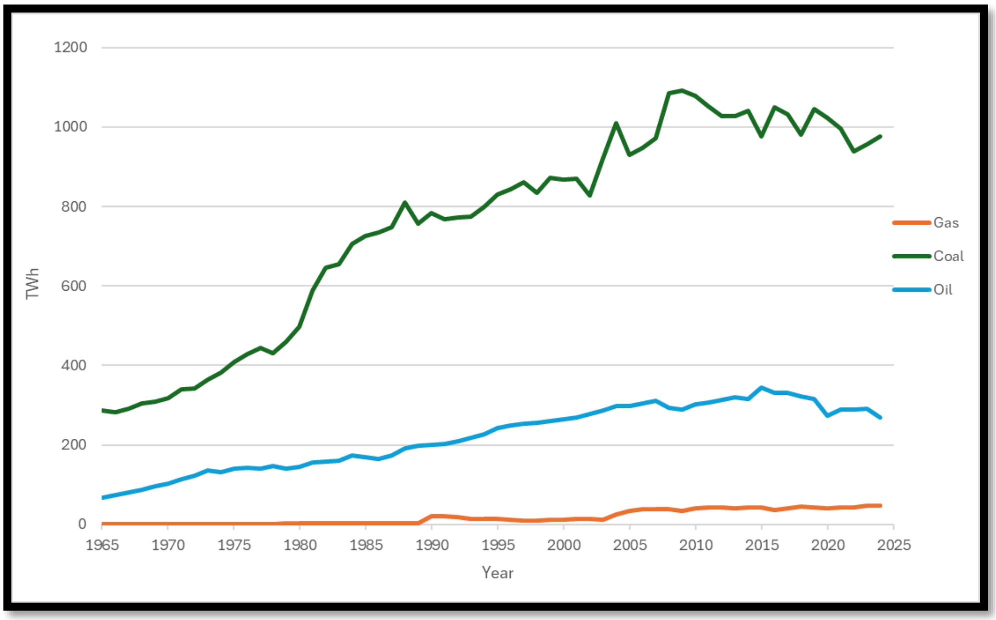

Figure 6: South Africa's Fossil Fuel Consumption (1965 - 2024)
Data Source: CSIR analysis using Our World in Data

3.1.4 Mining and Coal Preparation

Mining connects the geological coal resource to all downstream users. The country operates 77 of 83 active coal mines, most of which are in Mpumalanga, as shown in Table 5. This region accounts for 80% of national coal production, with eMalahleni, Msukaligwa, Steve Tshwete, and Govan Mbeki being the municipalities most dependent on coal (Bhorat et al., 2024b). Limpopo hosts one of the largest mining operations, Grootegeluk, which produced an estimated 30.4 Mtpa of coal in 2023 (Global Data, 2024b), KwaZulu-Natal contributes smaller anthracite mines, while the Free State has only a few small producers (Thomas, 2020).

Table 5: Mines by province and status

Province	Cancelled	Mothballed	Operating	Proposed	Shelved	Grand Total
Free State			2	1		**3**
Gauteng		1	2	2		**5**
KwaZulu Natal		1	7	6	1	**15**
Limpopo	2		2	5		**9**
Mpumalanga	4	15	64	21	2	**106**
Grand Total	**6**	**17**	**77**	**35**	**3**	**138**

Source: Global Energy Monitor (2025)

The mining industry is highly concentrated, with only a few companies collectively accounting for 77% of all coal production: Seriti, Exxaro, Thungela, Glencore and Sasol (Bhorat et al., 2024b; Cole et al., 2023). Although the production side of the coal sector is concentrated among a handful of large firms, it does not necessarily imply that the larger coal economy is limited to these actors alone. Smaller-scale mines, contractors, and informal livelihood activities may also form part of the wider coal economy in some regions, even where these may not be well captured in formal sector data. Figure 7 shows the location of mines in South Africa, including coal mines. The growth of these companies began in 2006 when Anglo American, the largest producer at the time, gradually divested all its mines to Exxaro, Seriti, and, from mid-2021, to Thungela. Glencore plans to exit coal in South Africa by 2035, in line with its strategy to gradually reduce its coal holdings worldwide, while South32 divested its coal assets, transferring ownership to local companies (Makgetla & Patel, 2021a). This shift has advanced local empowerment and black ownership goals but has also left a smaller number of locally listed companies in a more challenging market shaped by rising logistics costs, investor divestment from carbon-intensive assets, and an uncertain policy outlook (Makgetla & Patel, 2021a).

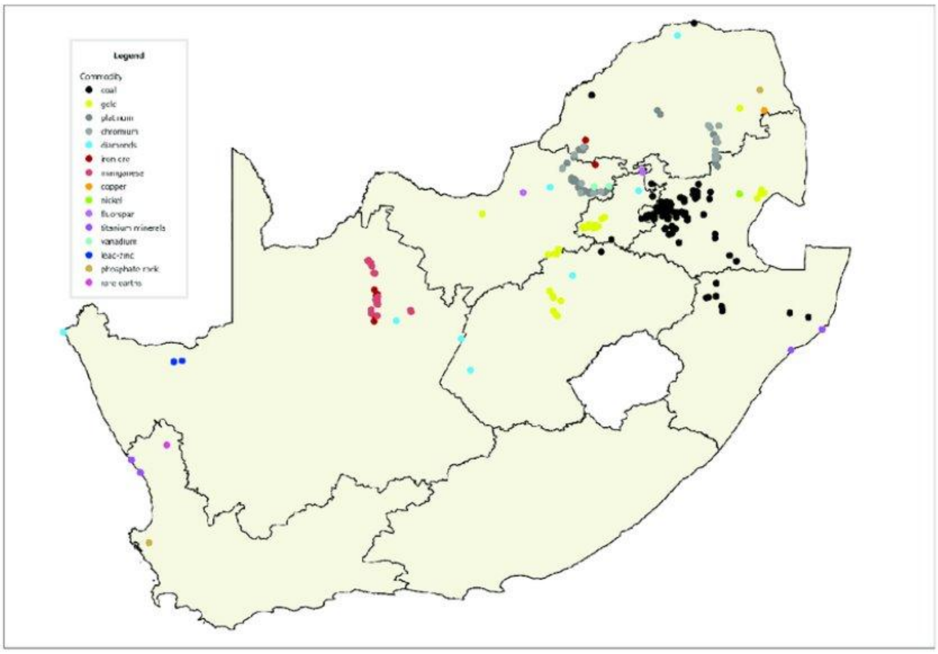

Figure 7: Illustration of coal mines in South Africa
Source: Adapted from Cole (2024)

Coal extraction methods depend on deposit depth and seam geometry (Balasubramanian, 2016). The board-and-pillar technique remains one of the most common underground mining methods, while truck-and-shovel opencast mining dominates the shallower seams of the Witbank and Highveld coalfields (XMP Consulting, 2013). According to the DMRE (2024a), approximately 73.3% of South Africa's coal is produced from opencast mines, followed by board-and-pillar mining at 26.5%. Opencast mining has low unit costs and higher mechanisation levels, but causes greater environmental impacts (Williams, 2017), whereas underground mining is labour-intensive and supports higher employment per production unit (Kharlampenkov et al., 2020). Employment trends reflect these dynamics. Coal mining directly employed about 50,000 workers in the early 2000s, rising to approximately 90,000 by the mid-2010s as production expanded, with 2019 seeing up to 108,000 workers (Bhorat et al., 2024b; Makgetla & Patel, 2021a).

Coal preparation or beneficiation is an important step in the value chain. Most South African raw coal has a high ash content and varying calorific value. In South Africa, 85% of coal preparation uses dense-medium separation, a wet-coal beneficiation and screening process; these methods upgrade coal energy content by reducing impurities (BHP, 2024; Hughes et al., 2024). However, increasing concerns over water scarcity and stricter environmental regulations are driving interest in dry coal beneficiation as an alternative to traditional wet washing in South Africa. Conventional wet plants remain dominant due to their efficiency, but they consume large volumes of water and produce slurry waste, raising sustainability concerns (CSIR, n.d.; Hughes et al., 2019).

Thomas (2020) notes that approximately 60% of national production is beneficiated for export coal, typically with calorific value enhanced to 27- 30 MJ/kg, whereas Eskom accepts lower-grade coal of around 19-21 MJ/kg. Eskom reports that only about 25% of coal is exported, while 75% is used locally (Eskom, 2021a). This difference reveals the dual-market structure of the coal industry: high-quality coal is channelled to the Richards Bay Coal Terminal for export, while lower-grade coal, usually less extensively beneficiated, supplies Eskom for power generation, as well as Sasol and domestic industries.

The difference in coal grading affects pricing. Export-grade coal is traded at global parity prices and is rail-linked to Richards Bay Coal Terminal, whereas Eskom's long-term supply contracts set lower domestic prices, often making Eskom coal supply less profitable. As a result, although mining volumes have remained stable in recent years, investment has shifted towards mines with access to export markets, despite the logistical constraints of Transnet's rail system (IEA, 2022; Makgetla & Patel, 2021b; OECD, 2025). MCSA (2022) highlights this as a strategic vulnerability, as export margins sustain producers in the short term, but dependence on international demand exposes them to volatile prices and global decarbonisation trends.

The mining and preparation sector in South Africa's coal value chain remains economically central and structurally exposed. Its concentrated ownership, focus on Mpumalanga, and reliance on beneficiation for marketability make it highly sensitive to rail performance, export demand, and regulatory certainty. The sector continues to provide the foundation for downstream electricity, coal-to-liquid, and industrial production. Therefore, even as new policy frameworks emphasise a managed coal decline, maintaining efficient and responsible operations within this sector of the value chain is necessary to ensure energy and socio-economic stability during the transition.

3.2 Transportation

Transportation and logistics in South Africa operate through three primary methods: (i) conveyor belts serving Eskom and Sasol collieries for short-haul transportation, (ii) road haulage, and (iii) long-haul rail, primarily via Transnet Freight Rail to domestic hubs or for export, including ship loading at Richards Bay Coal Terminal (DMRE, 2016; DoT, 2023).

3.2.1 Conveyer and Road Systems

Eskom power plants are situated adjacent to major collieries, which are contractually tied to Eskom power stations. Consequently, these plants receive most of their coal directly via overland conveyors, which offer the lowest cost and lowest emission transport option (DMRE, 2016).

According to Steyn et al. (2017) in 2015, Eskom was transporting 60% of its coal by conveyor, 10% by rail, and 30% by road. The use of trucks increased by 14% in 2007 (Steyn et al., 2017). Eskom conveyors are capital-intensive but have low operating expenditure over short distances and provide reliable throughput to washeries for coal preparation (Crickmay & Associates, 2009). However, conveyor systems are geographically constrained and cannot accommodate independent mines; for these, trucking is essential.

Trucking provides flexibility and is widely used in Mpumalanga to transport run-of-mine coal to Eskom plants and rail sidings. Coal is trucked between mines across 3,200 km of Mpumalanga's haulage network, with an average distance travelled of 600,000 km per day (DMRE, 2016). The cost of moving coal by road is relatively high, with estimates of R1.18 per tonne-kilometre for standard 56-tonne interlink coal trucks (C. De Saxe et al., 2020; C. C. De Saxe et al., 2023). This represents the baseline road-freight cost observed in Eskom mine coal haul contracts reported in 2018, and it continues to be cited in recent transport cost studies as a representative value for coal road haulage. However, in a Reuters (2020) report, South African mining company Menar claimed that trucking coal costs four times more than rail (Banya & Reid, 2022).

3.2.2 Railway

Long-haul transport depends on Transnet Freight Rail (TFR), which operates approximately 22,000 km of track, including 1,500 km of heavy-haul lines for coal and iron ore exports (GIBS, 2024). A 580 km line connects the coal mines in Mpumalanga to Richards Bay[25] . At Ermelo, two 100-wagon coal trains are combined into a single 200-wagon train, stretching 2.5 km and capable of carrying 20,800 tonnes.

Figure 8 shows the main export routes from Ermelo-South to Richards Bay, linking Mpumalanga's coalfields via the "Coal Backbone" and connecting the Waterberg fields through Lephalale (Transnet, 2024a).

[25] Richards Bay refers here to the Richards Bay Coal Terminal (RBCT), a private export facility. This is distinct from the Port of Richards Bay, which is operated by Transnet National Ports Authority for general cargo and other bulk commodities. The rail line to RBCT is operated by Transnet Freight Rail (TFR), the state-owned freight rail operator. TFR is responsible for rail infrastructure and operations but does not own or operate the terminal.

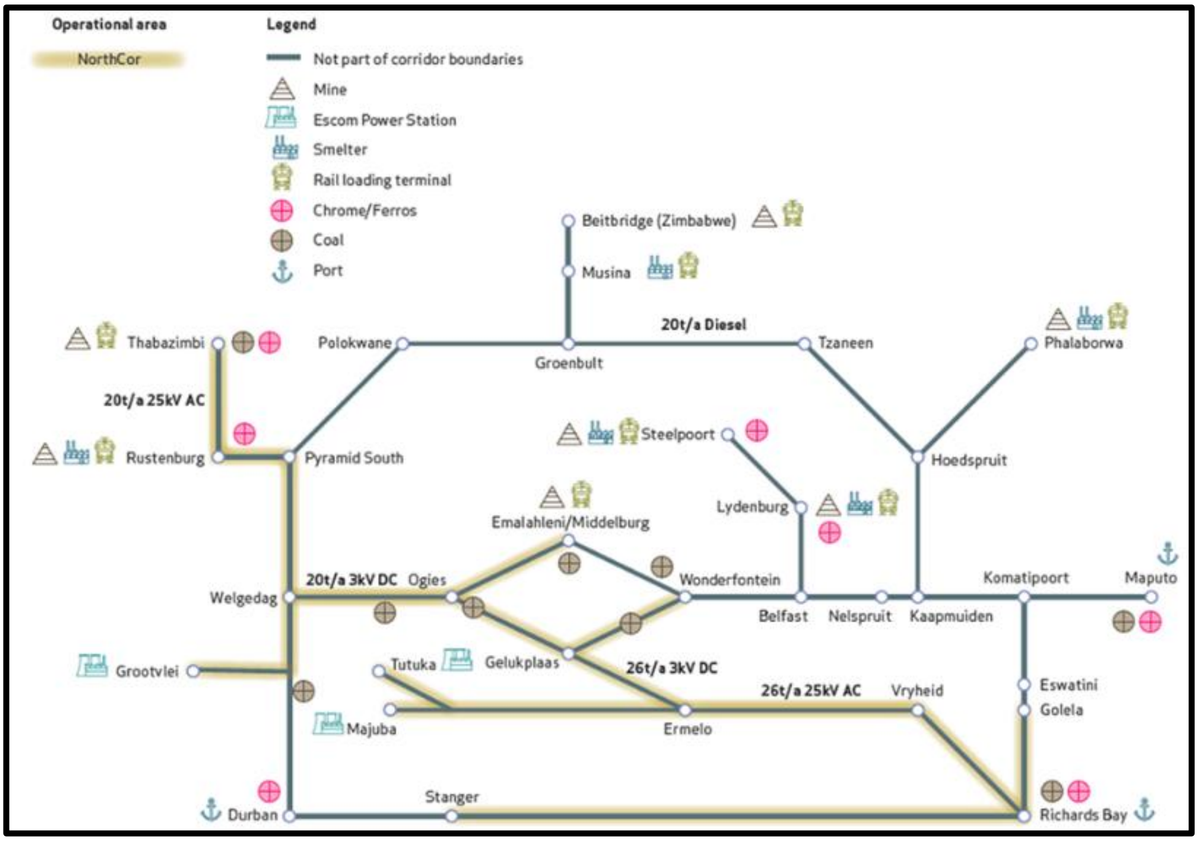

Figure 8: Infrastructure Management - Corridor maintenance management overview (North Corridor) (Transnet, 2024a)

The coal export line from Mpumalanga to Richards Bay Coal Terminal (RBCT) is the backbone of seaborne production. However, the reliability of this system has deteriorated over time due to locomotive shortages, maintenance backlogs, cable theft, and flood damage, reducing transport volumes (MCSA, 2024; Transnet, 2023). Freight delivered to Richards Bay Coal Terminal fell from 76 Mt in 2017 to 58 Mt in 2022. Eskom's direct coal rail collapsed from 13.6 Mt in 2015 to 2.5 Mt in 2023 (GIBS, 2024).

Despite these challenges, rail remains more cost-efficient than road transport. The Transnet coal corridor tariff for the 2024/2025 financial year was approximately R0.06 per gross tonne-kilometre (MCSA, 2023; OPIS, 2025), confirming that rail can transport at nearly 20 times less per tonne-km than road haulage.

The MCSA (2023) reported that coal companies jointly assumed responsibility for ensuring and enforcing security along the 600 km rail line, which reduced incidents. However, when coal prices fell in late 2023, these security contributions became financially unsustainable, leaving the rail line vulnerable once again. By 2024, despite improvements by the Transnet Freight Rail Industry Recovery team, criminal activity and infrastructure decay continued to hinder throughput (MCSA, 2024), with freight delivered to RBCT in 2023 falling to 47.21 million tonnes in 2023, the lowest since 1992 (Africa, 2024); (News, 2024).

The National Freight Logistics Roadmap aims to address systemic failures through institutional reform, establishing an independent Rail Infrastructure Manager and mandating economic regulation of corridor pricing to attract private investment (DoT, 2023). Early signs of progress are evident: Reuters (2025a) reported a 10% rise in Richards Bay Coal Terminal exports to 52 Mt in 2024, though Transnet's total volumes still lag behind targets (Reuters, 2025b). In early 2026, Transnet and RBCT also agreed to establish a joint project office to fast-track high-impact interventions aimed at improving corridor performance, export volumes, and network reliability (Mining Weekly, 2026).

Figure 9 shows the main routes of the North-East Corridor.

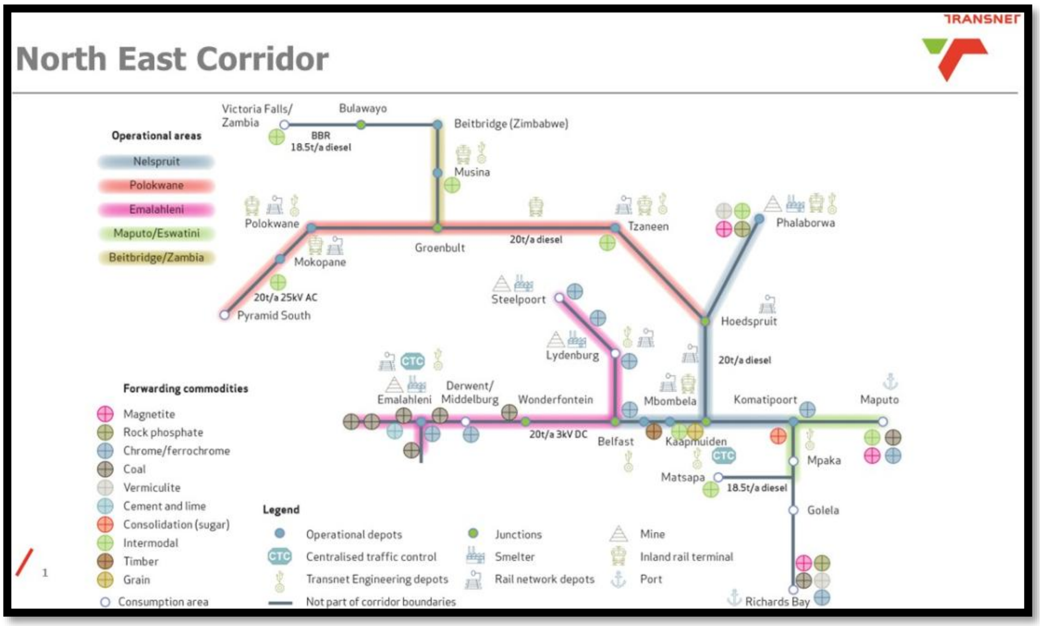

Figure 9: Infrastructure Management - Corridor maintenance management overview (North-East Corridor) (Transnet, 2024b)

3.3 Coal Exports

South Africa has been among the top five coal exporters, shipping an average of 61 - 76 Mt annually since 2013 (DMRE, 2016; IEA, 2023, (MCSA, 2025a). Export revenues have been a crucial source of foreign exchange and fiscal income; however, declining rail reliability and narrowing market access could erode this advantage.

Exports move almost entirely through the Richards Bay Coal Terminal. This corridor was commissioned in 1976 at 12 Mt/yr and expanded to a capacity of 91 Mt/yr with 8.2 Mt of stockyard capacity (MCSA, n.d.-c). Over time, throughput passing through this corridor fell sharply from 76 Mt in 2017 to 47.2 Mt in 2023, rising moderately to approximately 52 Mt in 2024 as rail recovery efforts began (DoT, 2023; MCSA, 2024; Reuters, 2025a).

Minerals Council South Africa (MCSA) data indicate that over 90% of seaborne exports are transported via Richards Bay, 10% through Durban, and approximately 7 Mt of coal left the land border via Komatipoort to Maputo (MCSA, 2024; Transnet, n.d.). The MCSA attributes the continuing underperformance to locomotive shortages and previously mentioned impacts, such as vandalism. Producers such as Thungela Resources (2024) have confirmed that unreliable rail materially limits exports, causing increased stockpiles, which could consequently lead to exposure to demurrage. The destination of coal exports has shifted towards Asia, which absorbed 71.7% of exports in 2023 (of which India accounted for approximately 34%, the largest receiver in Asia), while Europe took 15% (MCSA, 2024). This aligns with IEA (2023) projections that Asian import demand will remain steady through 2026, while Europe will reduce. However, Makgetla and Patel (2021b) caution that diversification is limited, leaving South African coal companies vulnerable to Asian policy shifts, especially India's expansion of domestic coal production/mining and China's decarbonisation trajectory. South African coal export earns API4[26] parity prices, providing significant margins well above Eskom's regulated domestic contracts. However, profitability depends on Transnet Freight Rail performance: when trains fail, exporters truck small volumes to the port at prohibitive cost (Havenga et al., 2023).

Despite lower tonnage volumes, exports still generate between R150 and R180 billion per year in foreign earnings (Makgetla & Patel, 2021b; OECD, 2025). The export share of total coal output has declined from about 40% in 2010 to about 20% in 2023 (IEA, 2023; MCSA, 2023). The fragility of the Richards Bay Coal Terminal, along with growing global decarbonisation trends, may limit confidence in coal investment. TIPS (2021) warn that diminishing royalties and freight inefficiencies are already eroding fiscal and employment benefits.

3.4 Electricity

The link between coal and power dates back to the 1800s, when coal from Vereeniging fuelled diamond mining in Kimberley and later supplied steam and compressed air for the Witwatersrand gold mines (XMP Consulting, 2013). As industrialisation in South Africa increased, coal became the foundation of the country's energy economy.

Currently, coal provides about 77% of South Africa's primary energy due to abundant local reserves (DMRE, n.d.-a). Although renewable generation has expanded since 2013, the Integrated Resource Plan 2019 (IRP 2019) still projects coal's share of electricity generation to remain above 60% in 2030 (DMRE, 2019) while the IRP 2025 does not provide a specific percentage (DEE, 2025). According to the IEA (2025) and OECD (2025), South Africa remains among the world's most coal-dependent power systems, producing roughly 234 Mt of marketable coal annually, of which over half is used for electricity generation.

Eskom alone consumes the majority of national coal output to supply its power stations (Makgetla & Patel, 2021b). Coal-fired generation accounted for about 86% of national electricity in 2020, down from 92 % in 2010 (IEA, 2023; Makgetla & Patel, 2021b). According to Eskom's (2024) report, the current energy mix in installed capacity consists of 84.2% from coal, with renewables contributing 7%, nuclear 3.5%, and gas 4.9%, as shown in Figure 10. However, CSIR (2025), reported that, in 2025, about 73% of total electricity was generated from coal installed capacity. Despite this decline, coal remains an integral part of the South African economy: Eskom ranks as the 11th largest electricity generator globally, while Sasol operates the world's largest coal-to-liquids complex (Eskom, 2021).

[26] API4 (Argus/McCloskey's API 4) is the official benchmark price for coal exported from South Africa.

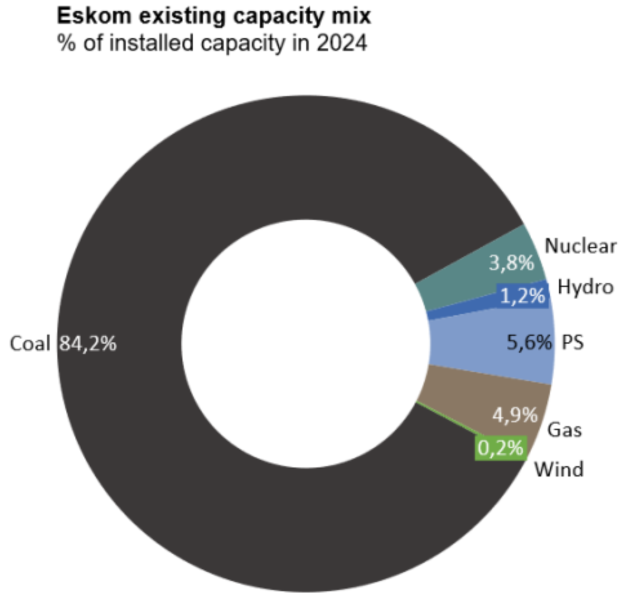

Figure 10: Eskom Electricity Mix
Source: Eskom (2024)

The Medupi and Kusile projects, each exceeding 4,000 MW, were conceived to replace retiring units but have experienced cost overruns, technical failures, and delays in environmental compliance (Burton et al., 2018). By 2023, Eskom's Energy Availability Factor (EAF) had fallen below 60%, directly reflecting ageing plants, maintenance backlogs, and coal quality variability (MCSA, 2023; OECD, 2025). According to CSIR's 2025 utility-scale generation statistics, the EAF for 2024 was 59.81%, an improvement from 55% in the previous year; however, it fell short of meeting the 2024 EAF target of 65% (Eskom, 2023). By March 2025, Eskom targeted an EAF of 70% under its Generation Recovery Plan (Eskom, 2024), a target that has not been met according to outage data, which reflects only an average of 62% availability from January to November 2025, with the highest Energy Availability Factor recorded in September (70.3%) and November (70.4%) (Eskom, 2025b).

Though total coal production remained significant, load-shedding has persisted over the years, with 2023 experiencing the worst effects (see Figure 11), revealing a structural decoupling between mining output and generation reliability. However, as of September 2025, Kusile's final Unit 6 was declared commercially operational, marking the completion of Eskom's large project fleet and enabling the combined Medupi and Kusile stations to deliver a capacity of 9,600 MW (Creamer, 2025b; Dludla, 2025; Eskom, 2025a). This operational milestone is expected to support improvements in EAF and grid stability, and as of September 2025, load-shedding has reduced from 329 days in the 2024 financial year to 13 days in the 2025 financial year (Eskom, 2025).

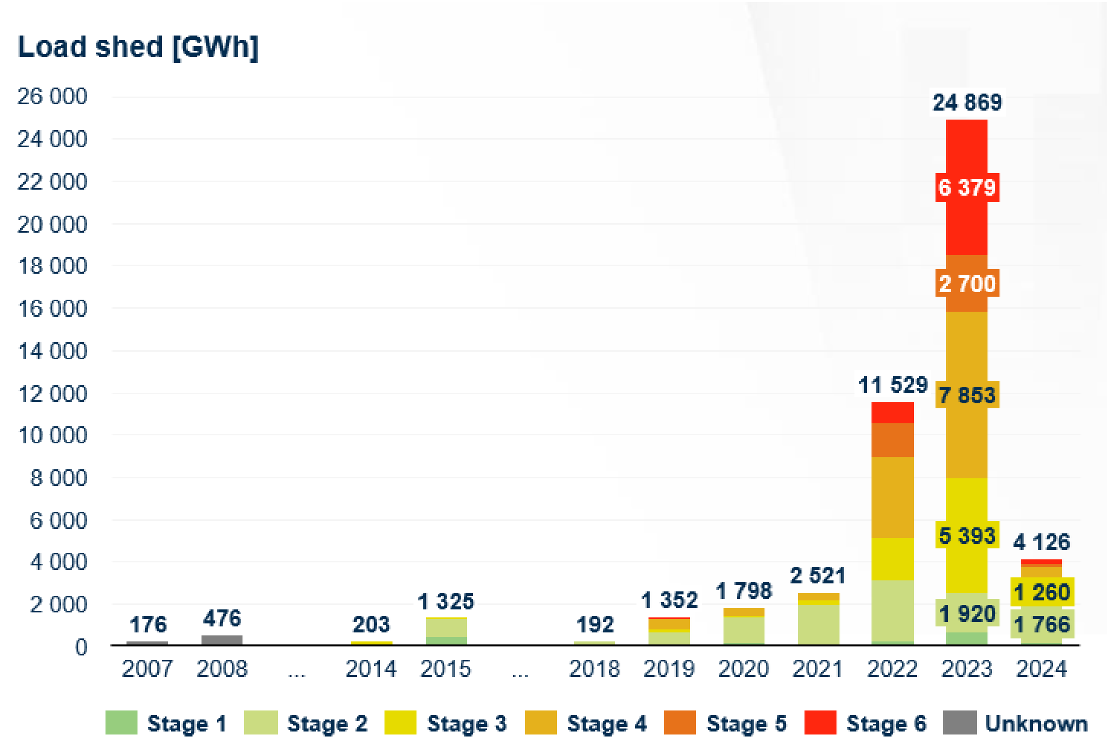

Figure 11: Loadshedding rollouts, 2014 to 2024 (CSIR, 2025)

Decommissioning is now certain to reshape coal demand and supply, regardless of the capacities to be retired. The Eskom (2024) report confirms that 5.3 GW of coal capacity, collectively from Arnot, Grootvlei, Camden, Hendrina and Kriel, will be retired by 2030. This marks a gradual yet irreversible decline in coal consumption. The IRP 2025 assumes that 8 GW of coal-fired power plants will be shut down by 2030. Beyond this, the document provides an indicative decommissioning schedule based mainly on a 50-year plant life assumption rather than a fixed policy target as outlined in IRP 2019.

Coal remains the foundation for South Africa's energy economy: 53% is used for electricity generation while Sasol consumes approximately 33% of domestic coal, ArcelorMittal South Africa and ferro-alloy producers consume about 12%, and 2% is used for heating and cooking (Eskom, 2021). These relationships link the coal-electricity complex to broader manufacturing, employment and trade outcomes. Coal remains essential to electricity system stability in the short and medium term; however, decommissioning coal-fired plants will gradually reduce coal demand and further contribute to the energy diversification towards renewable energy at a similar rate. South Africa is therefore at an inflection point where balancing short-term reliability with long-term transition efforts is imperative, as reflected in the IRP 2025.

3.4.1 Subsidy support to the coal-based electricity sector

The economic impact of coal-based electricity generation should be viewed in relation to the government support for the sector, which sustains it and reduces its effective cost of generation. The latest analysis done by the International Institute for Sustainable Development (IISD) (2025) indicates that South Africa's total energy subsidies have been at least R198 billion in FY2025, with 55% of this being direct fossil fuel subsidies. Also, electricity subsidies have been increasing, having risen from R21 billion in FY2018 to R87 billion in FY2025, mainly due to Eskom bailouts. Furthermore, over 70% of the nominal value of electricity subsidies since FY2020 have been going to assist Eskom in managing its debt. Eskom received R299 billion from the government between FY2020 and FY2025, and an additional R80.2 billion for FY2026 (IISD, 2025).

Previous research work on the subsidy mapping for South Africa indicated high levels of investment support to coal-based electricity generation for state-owned enterprises, amounting to an estimated R49 177 million (2016- 2017 annual average), while at the same time, there was coal consumption support of R8 271 million[27] (ODI Global, 2019). The OECD indicates that coal-based electricity generation in South Africa is highly subsidised, and further highlights that the carbon tax policy planned for 2026 includes tax-free allowances of up to 85% of Eskom's emissions (OECD, 2025). The effect of this support is that it makes coal-based electricity appear cheaper than it would otherwise be, which can slow the shift away from coal. It also means that part of the cost is being carried by government support and public debt, rather than by Eskom alone. This does not diminish coal's importance to the South African economy, but its overall value should be viewed with greater caution.

3.5 Coal-to-Liquid

South Africa is among the few countries operating industrial-scale coal-to-liquids technology, which is central to Sasol's operations. Sasol Secunda Synfuels and Sasolburg together anchor the national petrochemical value chain. Sasol converts coal into liquid fuels and chemicals through the Fischer-Tropsch process (Naidu & Naidoo, 2017), supplying approximately 20-25% of South Africa's total liquid fuel demand (Burton et al., 2018; Makgetla & Patel, 2021b).

Sasol is the largest private-sector coal consumer, historically using 33% of marketable coal (Eskom, 2021). As shown in Figure 12, Sasol's coal production declined steadily from around 40 Mtpa in 2016 to approximately 33 Mtpa in 2023. Coal production declined further to 30.2 Mt in 2024 and 28.2 Mtpa in 2025. To compensate for declining coal yields at its mines, Sasol externally purchased an additional 10Mt of coal in 2025 (Creamer, 2025a). Six collieries supply coal mainly to Secunda: Bosjesspruit, Thubelisha, Impumelelo, Shondoni, Syferfontein and Twistdraai. The coal is used for gasification (synfuel production), some is used to generate onsite electric power, and a small portion is exported through the Twistdraai Export Plant (Sasol, n.d.).

The coal from Sasol has been of poor grade, with much of the run-of-mine containing sink materials, such as stones, which affect gasifier yields and ultimately reduce synfuel production. To address this, Sasol has invested in a project to repurpose the Twistdraai Export Plant into a destoning plant, which will improve gasifier performance and yields by enhancing feed quality (Sasol, 2025).

[27] "This category includes support for consumption of coal-fired power, and of coal other than for its use for coal-fired power generation (or for co-generation of power and heat)."

Moreover, Sasol Secunda contributed an estimated 1.2% of the national GDP directly, over 2.9% indirect contributions, and accounted for R51 billion in tax revenue in 2021 and R151 billion in indirect contributions (Crompton et al., 2024a).

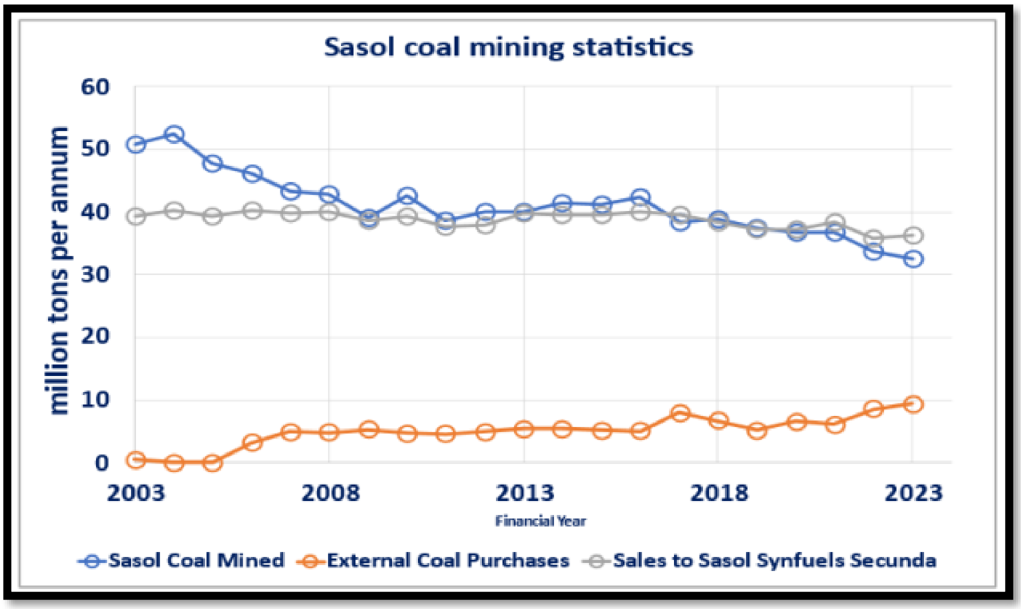

Figure 12: Sasol Coal mining production and purchases
Source: Trade & Industrial Policy Strategies (Crompton et al., 2024a)

As with many industries, Sasol faces pressure from climate regulation and carbon taxation, as well as unreliable Transnet freight rail and Eskom grid constraints. Sasol has committed to reducing its GHG emissions by 30% by 2030 through cutting Secunda's production by 11%. (Crompton et al., 2024b, 2024a).

3.6 Metallurgical Use

Metallurgical coal, also known as coking coal, is a critical raw material for the global steel industry. It differs from thermal coal, which is used for electricity generation, due to its unique properties that enable it to be transformed into coke at high temperatures. Globally, about 70% of steel production relies on metallurgical coal-based processes, with approximately 770 kg required to produce one tonne of steel (BHP, 2024).

In South Africa, metallurgical coal makes up a smaller proportion of overall coal reserves compared to thermal coal. The country has extensive reserves of medium-grade bituminous coal but has limited deposits of high-quality hard coking coal, which is necessary for conventional blast furnace steelmaking. According to XMP Consulting's *Review of the South African Coal Mining Industry* (2013), only about 0.8% of the nation's bituminous coal production is beneficiated to coking coal. This geological limitation means domestic steel producers rely on imported coking coal. Dworzanowski (2013) notes that ArcelorMittal depends on imports for most of the coking coal required for steelmaking.

The *South African Coal Sector Report* issued by the then Department of Mineral Resources and Energy further confirms that the country's coal imports are primarily metallurgical grades required by the iron and steel industry (DMRE, 2016). Therefore, despite being among the world's top coal exporters, South Africa imports hard coking coal and anthracite (DMRE, 2023). Eskom (2021), reports that the metallurgical industry, including ArcelorMittal and other ferro-alloy producers, consumes about 12% of the nation's coal production.

The development of the Makhado Project by MC Mining in Limpopo aims to produce both steelmaking hard coking coal and export-quality thermal coal (Bulbulia, 2025). This project is set to become the largest coking coal facility in South Africa (Mining Frontier, n.d.).

The metallurgical sector remains strategically important to the national coal value chain, providing industrial demand and export opportunities. However, the limited availability of hard coking coal indicates both a supply vulnerability and an opportunity for future resource diversification. As global steel markets transition towards lower-carbon production pathways, such as hydrogen-based direct reduction and electric arc furnaces, the long-term role of metallurgical coal will depend increasingly on technological innovation and trade competitiveness, whether this coal is domestic or imported.

3.7 Other Industries and Residential Uses of Coal

According to the DMPR *Energy Sector Report 2024,* the food, beverage and tobacco sector consumed 8,422 TWh of energy in 2022, with coal contributing only 9% to the total energy consumed by these sectors, compared to natural gas (34%), electricity (30%) and oil products (27%) (DMRE, 2024). In the paper and pulp industries, coal was more significant, accounting for 32% of total energy consumption. In the commerce and public sectors, however, coal was far less significant, representing only 3% of consumption, or approximately 974,009 TJ in 2022 (DMRE, 2024).

The residential sector accounts for 19% of total energy consumed, and in 2022, coal accounted for 5% of total energy consumption and electricity for only 25%, whereas biofuels and waste dominated energy consumption at 70%, indicating that many households still rely on traditional fuel sources (Bohlmann & Inglesi-Lotz, 2018; DMRE, 2024b). These alternative energy sources are predominantly used in low-income households, usually in Mpumalanga, Limpopo and the Eastern Cape, where these fuels, including coal, are used for space heating and cooking (Bhorat et al., 2024b; Bohlmann & Inglesi-Lotz, 2018; DMRE, 2024b).

3.8 Water in the Coal Value Chain

The nexus between coal production and water resources is one of South Africa's most critical environmental and economic challenges. As a water-scarce country with semi-arid conditions, South Africa faces pressure on its freshwater resources at a time when coal mining and thermal power generation remain central to the national economy (Nanfuka, Oosthuizen, 2023). The 'coal-water nexus' describes the complex interdependencies between coal extraction, processing, combustion for electricity generation, and the availability and quality of water resources throughout the coal value chain (Marcatelli 2020).

Coal mining and power generation together are significant water consumers in South Africa's economy. Understanding this nexus requires examining both direct consumption (water use in mining and cooling operations) and indirect impacts (water quality deterioration through contamination). The water-energy nexus has become increasingly recognised as critical to national development planning, given that South Africa's energy demand is projected to double by 2040, alongside climate variability that threatens water availability (Nanfuka, Oosthuizen 2023). Policymakers and industry stakeholders must navigate complex trade-offs between energy security, economic development, and water security, recognising that the decisions in one sector directly affect another (Marcatelli, 2020).

The coal value chain's water footprint begins with extraction and continues through processing, beneficiation, power generation, and disposal of waste products. Each stage presents distinct water management challenges. Mpumalanga province, which contains the majority of South Africa's coal resources and nearly half of the country's high-potential arable land, demonstrates the strain between coal extraction and competing sectoral demands (Simpson et al. 2019). Section 3.10 reviewed the current landscape of the coal-water nexus to understand the scale, nature, and implications of water interactions within South Africa's coal sector.

3.8.1 Water Consumption Across the Coal Value Chain

Water consumption is significant at every stage of the coal value chain. Mining operations consume an average of 133 litres per tonne of coal mined, with water-intensive beneficiation (washing) plants accounting for 36.1% of this use, compared to the 25% of available water used by mining operations (Pulles et al., 2001). Coal washing accounts for between 4.8 and 18 million m^3 annually, with water usage ranging from 38 to 581 litres per tonne depending on the coal grade (Centre for Environmental Rights, 2018).

Coal mines in the Olifants River catchment (51% of South Africa's coal mines) require 347 litres per tonne, amounting to 115,059 m^3 daily, with river water (36.9%) and groundwater (37.7%) as the primary sources (Pulles et al., 2001). Dry beneficiation technologies offer water-free alternatives, and it has been demonstrated that high-ash South African coal can be beneficiated using wind sifter separators, reducing ash from 37.4% to 16.7% while maintaining clean coal recovery (Alade et al., 2025; Hughes et al., 2019).

Thermal power generation represents an equally substantial water consumption, with Eskom's coal-fired power plants consuming 315 million m^3 in 2016, rising to 841 million m^3 subsequently (Centre for Environmental Rights, 2018). Water consumption per unit of energy increased from 1.3 to 1.44 litres per kilowatt-hour between 2006 and 2016, reflecting ageing infrastructure according to the Centre for Environmental Rights (2018). Although power generation accounts for only 2% of South Africa's total water consumption nationally, it represents 37% of water use in the Upper Olifants region where major coal-fired power stations are concentrated (Centre for Environmental Rights 2018). Water pricing has historically undervalued electricity sector consumption (R3.40/m^3 in 2010) compared to household rates (R8/m^3), creating disincentives for water-efficient alternatives (Centre for Environmental Rights, 2018).

3.8.2 Water Quality Impacts and Acid Mine Drainage

Acid mine drainage (AMD) forms when pyrite, a common minor constituent in coal deposits, is exposed to oxygenated water during mining operations. These mining activities accelerate oxidation processes and overwhelm the natural buffering capacity (McCarthy, 2011). AMD remains a critical environmental challenge in South Africa due to its severe impacts on water quality, ecosystems, and public health (Mogashane et al., 2025). Recent research shows that AMD-impacted environments in South African coalfields persist for decades after mine closure. Water quality degradation near coal mining operations is extensively documented. Assessment in Middelburg, Mpumalanga Province, revealed that surface water monitoring sites ranged from poor to fair water quality, with groundwater points showing similar poor to fair rankings (Magagula et al., 2024). Using combined water quality indices over 2017 - 2021, the pollution indices confirmed that some sites exhibited extremely poor water quality during summer seasons, thus exceeding expected limits throughout the study period.

Coal-fired power stations contribute specific trace metal contamination. Selenium concentrations in wastewater from selected coal-fired power plants ranged between approximately 5 and 9 micrograms per litre, while river water samples near plants ranged from approximately 3 to 8 micrograms per litre (Shiri et al., 2023). Though generally too low to pose direct health hazards, these levels represent environmental threats to aquatic life. Abandoned coal mines present ongoing water quality challenges; assessment of an abandoned coal mine site in Mpumalanga documented that soil samples exceeded prescribed thresholds for sulphate and lead, while water samples showed exceedances for several parameters as per South African National Standards (Mlalazi et al., 2025). Water quality assessment using the Canadian Council of Ministers of the Environment Water Quality Index yielded scores indicating poor quality for livestock watering and unsuitability for domestic use.

3.8.3 Environmental and Socio-economic Impacts

The coal-water nexus poses a direct threat to agricultural production in regions where coal mining and power generation compete for limited water resources. Mpumalanga contains almost half of South Africa's high-potential arable land, yet over 60% of its surface area is subject to mining rights or prospecting applications (Simpson et al., 2019). Water quality deterioration from acid mine drainage and contaminated runoff from mines and agricultural land creates interconnected challenges for food security. The water-energy-food nexus offers a focused lens framework for evaluating resource security holistically, requiring regulators, NGOs, industry, and the public to address challenges in an integrated manner.

Coal mining and related water contamination pose direct health risks to mining communities. While the association between tuberculosis and gold mining are well-established, coal mining contributes through different mechanisms (Singh & Irusen, 2025). Research indicates that tuberculosis risk is not solely attributable to coal exposure; rather, socioeconomic factors such as poor working and living conditions around mines and comorbid illnesses play more significant roles (Singh & Irusen, 2025). Water contamination from coal mining affects human health through multiple pathways. A study in the Mhlathuze catchment found that 65% of water samples were classified as poor to unsuitable for drinking, with mining activities contributing over 70% to human health risks from metal contamination (Akinpelu et al., 2025).

Ecosystem degradation affects both aquatic and terrestrial environments. Lake Heritage, located along the Crocodile River in Gauteng and impacted by acid mine drainage, has documented negative effects on aquatic organisms (Latief et al., 2024). Wetlands adjacent to coal mining operations play critical roles in remediating acid mine drainage through biogeochemical processes; the Zaalklapspruit valley bottom wetland showed that sediment rich in organic material has significantly high adsorption rates of manganese and absorption of iron by plant roots and algae (van Vuuren et al., 2024). Coal mine closures create significant vulnerabilities for communities. An assessment identified that five coal-fired power plants (approximately 9 GW) and 15 coal mines (approximately 30 million tonnes per annum) are likely to close by 2030, with further closures expected by 2040 (Cole et al., 2023). The impact on 2.5 million residents of mining host communities will be substantial, particularly as income, employment, and education levels are already exceptionally low in many communities.

3.8.4 Policy, governance and institutional frameworks

South Africa has robust environmental legislation, including the National Water Act and the Environmental Management Act, yet implementation challenges persist (Mlalazi et al., 2025). The National Water Act establishes integrated water resource management frameworks, with the Department of Water and Sanitation responsible for allocation and regulation. A comprehensive guide to groundwater monitoring for the coal industry states that the major impact on South Africa's groundwater resources is a reduction in both quantity and quality (Barnes & Vermeulen, 2012). Long-term protection requires proactive implementation, yet methodical approaches must be understood by industry practitioners.

Statistics South Africa provides crucial sectoral data. In the coal mining sector, expenditure on water and electricity increased substantially from R3,321 million in 2019 to R8,597 million in 2022, representing an annualised percentage change of 37.3% (Stats SA, 2024). Overall mining industry expenditure reached R47,259 million in 2019 and R62,284 million in 2022. Provincial variations show that Mpumalanga recorded water and electricity expenditure of R23,278 million in 2019, rising to R33,138 million in 2022, representing an annualised percentage change of 12.5% (Stats SA, 2024). Water allocation in South Africa occurs within defined Water Management Areas established for integrated catchment-scale management. Government water sector data from the early 2000s estimated coal mining's value of water use at approximately R23.51 million, accounting for 26.82 million m^3 in volume of water used. (Stats SA, 2010).

While there is a comprehensive policy framework, institutions set up for integrated water management are still fragmented. This means that the responsibilities are spread across different government institutions, while the coordination between water management, energy, mining, and climate-related plans is lacking. A study by Mathetsa et al. (2019) on the water-energy and climate-change nexus also found that institutions and policies do not yet address the nexus in an integrated and efficient way. This poor coordination makes it more difficult to manage coal-related water risks in a systematic and long-term manner.

3.9 Implications for Social Dialogue

The coal value chain in South Africa - from geological exploration to production, beneficiation, transportation, consumption, and water use - has significant implications for social dialogue among stakeholders, including government, industry, labour, and affected communities. As the coal sector faces increasing pressures from global decarbonisation trends, domestic energy transition policies, and structural changes in mining and logistics, effective and inclusive social dialogue becomes increasingly important. Key implications for social dialogue are presented in Box 2 as questions and pointers for these diverse stakeholders to consider, relating to diversification of the coal value chain, retraining and reskilling workers for new jobs, adopting new business models and investment strategies, and creating opportunities for communities to benefit from the transition away from coal.

Box 2: Implications for the ongoing social dialogue for South Africa's coal value chain

Potential discussion questions for various stakeholders include:

Government:

- How can the government facilitate diversification of the coal value chain to create new economic opportunities?
- What incentives can be offered to attract investment in alternative industries?
- How can planning processes better identify and support smaller-scale and informal coal-linked livelihoods that may be excluded from formal transition support measures?

Unions:

- How can workers be retrained and reskilled to transition to new jobs in emerging sectors along the value chain (e.g. renewable energy, green manufacturing)?
- What support is needed to ensure workers retain their livelihoods and benefits during the transition?
- How can worker support mechanisms be extended to vulnerable workers and contractors who may fall outside formal labour protections?

Industry:

- What new business models and investment strategies can companies adopt to adapt to a changing energy landscape?
- How can companies leverage existing infrastructure and expertise to participate in new value chains?

Communities:

- How can communities benefit from the development of new industries and value chains in their regions?
- What mechanisms can be established to ensure local businesses are given priority in procurement and employment opportunities?

4 ECONOMIC CONTRIBUTION ANALYSIS

The coal value chain remains one of the most significant contributors to South Africa's industrial and regional economies, supporting electricity generation, liquid fuel production, and export earnings. In 2024, the coal sector produced approximately 248 Mt of coal, generating about R200 billion in total sales (a decrease from around R247 billion in 2022) and directly employing over 98 000 direct workers who collectively earned R36 billion in wages (MCSA, 2025b; MCSA, n.d.-b). Despite stable production, price volatility affects coal sales, influenced by global market dynamics and geopolitical events such as the Russia-Ukraine conflict. Although export revenues peaked in 2022, they were projected to decrease in 2023 and indeed declined due to falling prices. Approximately 83% of mines and 80% of national production are concentrated in Mpumalanga, specifically in the eMalahleni and Gert Sibande districts (Bhorat et al., 2024b). Understanding the key economic contribution of coal is crucial for providing evidence-based social dialogue on the transition away from coal.

4.1 GDP and national economic contributions

According to Stats SA (2024), the mining industry contributed 8.2% to national gross value added (GVA) in 2022. In the same year, the Stats SA Mining Industry report reported that coal and lignite mining accounted for 21.9% of total mining income, which refers to industry income/turnover as reported in the survey. Most recently, the mining industry contributed an estimated 6 % to South Africa's nominal GDP in 2024 (DMPR, 2025; MCSA, 2025c). In 2024, coal contributed R134.6 billion to local sales, representing more than half (54.3%) of total local sales (MCSA, 2025c).

Although production volumes have remained relatively stable since 2012, price volatility continues to drive the value of coal sales, as shown in Figure 13. According to Agnolucci et. al. (2023), the decline in coal prices after 2022 signals a reshaping of global energy trade, indicating a structural change, rather than a cyclical decline in coal competitiveness. During 2021 – 2022, following the Russia-Ukraine supply disruption, elevated coal export prices temporarily boosted coal's share of GDP (Rossouw & Khutlang, 2023), as shown in Figure 14, where gross value added (GVA) peaks between 2021 and 2022. PwC's South Africa Mine Report confirmed record profitability among major coal producers in 2022, followed by a correction in 2023 as global markets stabilised (Rossouw & Khutlang, 2023).

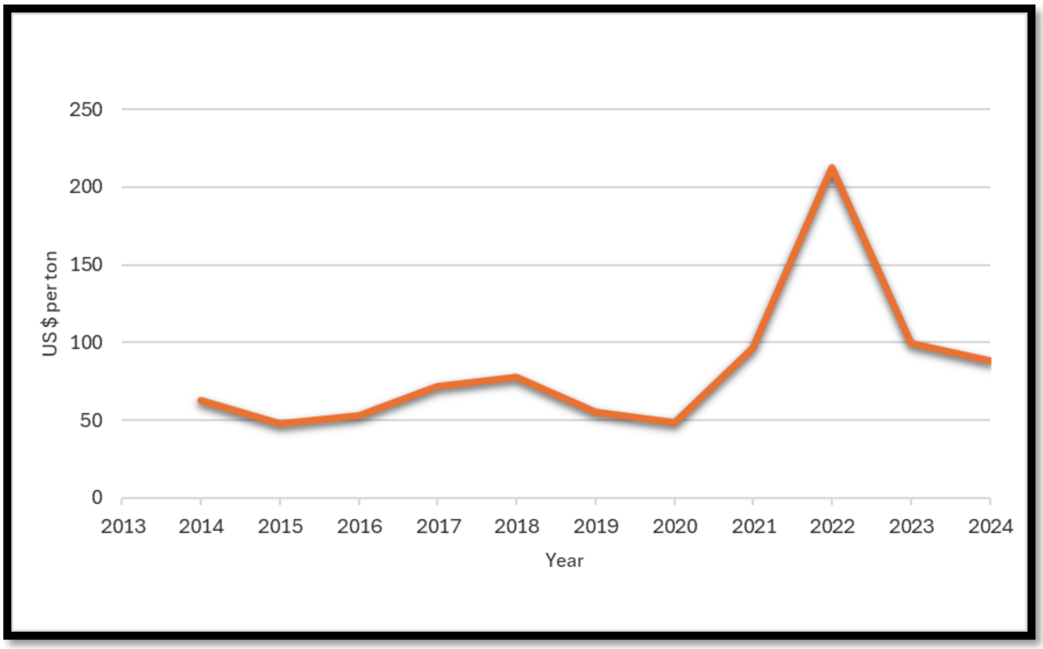

Figure 13: South African coal price trend in USD per ton, 2014 – 2024
Data Source: Energy Institute (Energy Institute, 2025)

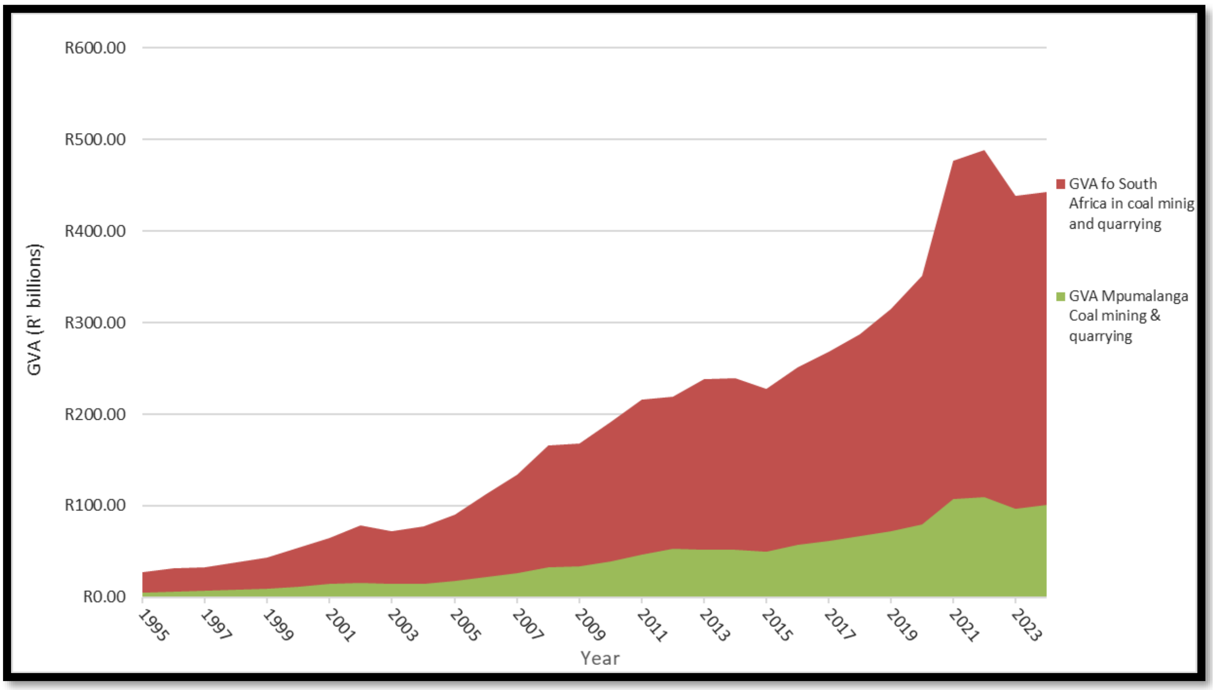

Figure 14: Gross value added (GVA) at basic prices (Mining & Quarrying)
Source: CSIR analysis based on Quantec (Easy data)(Quantec, 2025a)

The coal GVA represents the gross economic value generated by coal production. The data show a steady increase in GVA from mining and quarrying nationally, and similarly in Mpumalanga, with Mpumalanga's GVA closely mirroring the national trend (Figure 14). The slight decline after 2022 indicates a correction in coal value following the earlier peak.

4.2 Trade and local revenue

As mentioned previously, South Africa exports on average 30% of its high-quality coal to the global market (Thomas 2020, Eskom 2021). As shown in Figure 15, total sales and export sales remained relatively moderate between 2013 and 2020. This changed sharply from 2021 onwards, when global shortages increased European demand and led to higher export earnings. That year marked the highest export revenue in a decade, with exports contributing half of total sales.

According to the Minerals Council South Africa (MCSA, 2025a), export sales peaked at around R136 billion in 2022 before declining to an estimated R65 billion in 2024 (see Figure 15Figure 15), as global benchmark prices of coal fell from USD 276/t in 2022 (MCSA, 2024b) to USD 106/t in 2024 (MCSA, 2025a). In 2023, export volumes reached just over 73 Mt, with 86% of exports consisting of bituminous coal, mainly exported to India (33%), Mozambique (7%) and Taiwan (5%) as key destinations (DMRE, 2023).

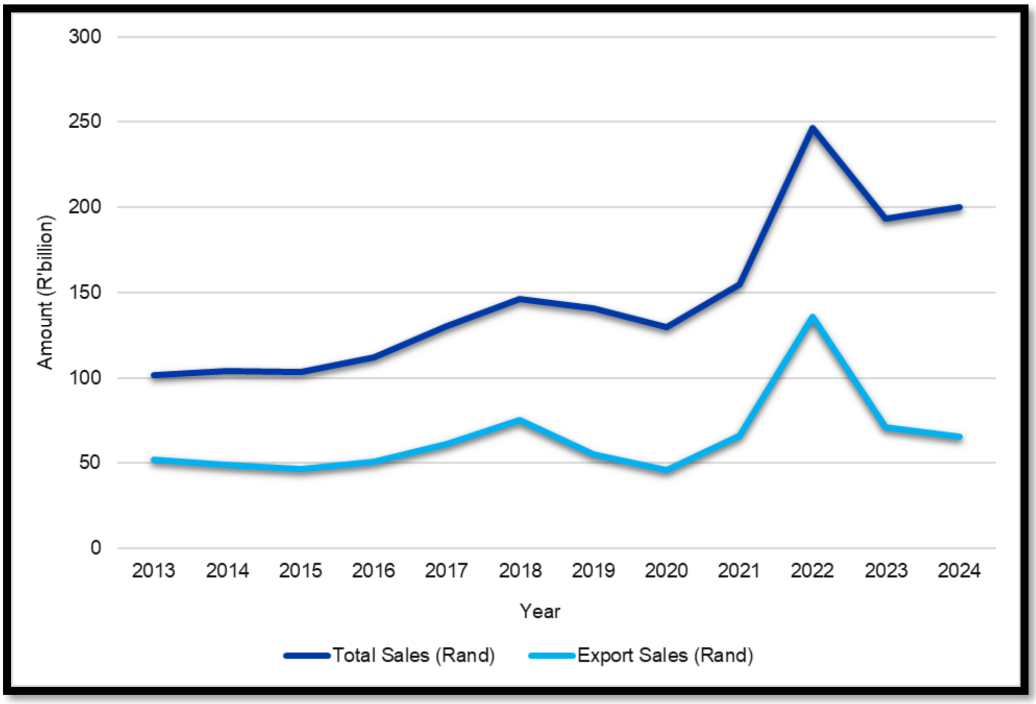

Figure 15: Total coal sales against coal export sales from 2013 to 2024
Data Source: Mineral Council of South Africa (MCSA) data

In 2024, South Africa's coal exports continued to be dominated by bituminous coal. Export volumes of this coal reached approximately 71 Mt (MCSA, 2025a), with bituminous coal accounting for about 90% of total coal exports (DEE, 2024). In contrast, anthracite exports were much smaller, at 0.83 Mt(DEE, 2024) (see Figure 16Figure 15). The month-to-month distribution reflects the continuous demand for coal from South Africa. It should be noted that the Minerals Council South Africa (MCSA) reports coal export volumes using both DMRE and SARS-based data, which show slight differences. The export volumes cited here use the SARS-based series reported by MCSA. Similarly, in this context, the export volumes cited by the Department of Electricity and Energy (DEE, 2024) are also based on SARS data.

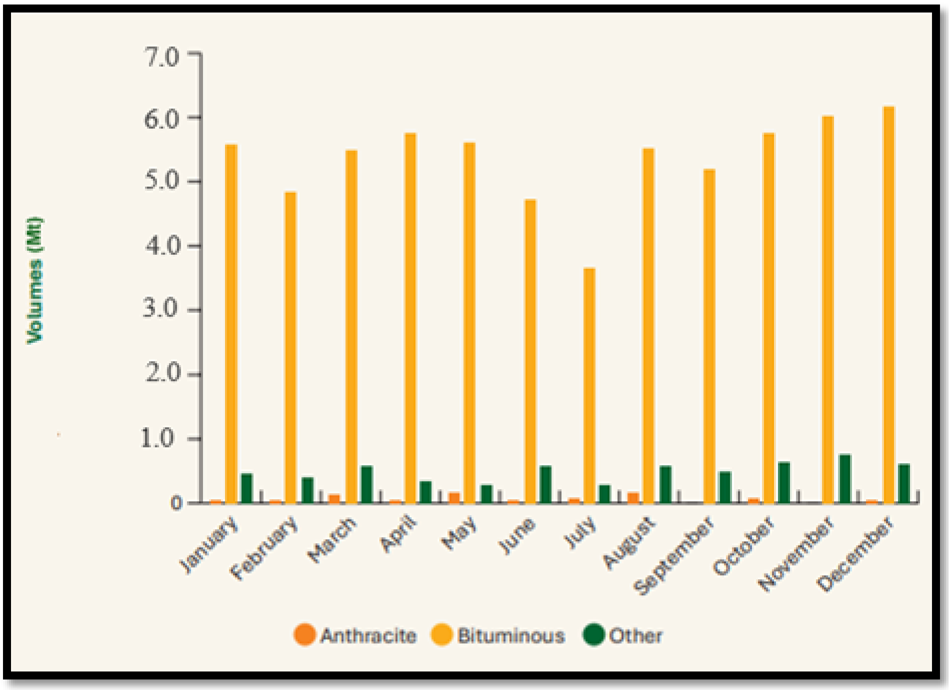

Figure 16: Coal Exports by volume in 2024
Adapted from the Department of Electricity and Energy, DEE (2024)

South Africa imported relatively small but significant volumes of coal to supplement domestic industrial metallurgical coal demand. In 2024, coking/metallurgical coal was the largest import at 1 Mt (53%), followed by bituminous coal at 0.9 Mt (38%) and anthracite at 0.2 Mt (9%), according to the Department of Electricity and Energy (DEE, 2024). These imports in 2024 were primarily sourced from Botswana (36%), Australia (22%) and Eswatini (15%) (DEE, 2024). Figure 17 Figure 17 shows a more irregular import pattern, with peaks in the middle and later months of the year. South Africa is a major coal exporter; however, it is evident that imported coal has value, likely for specific quality grades and particular industrial uses.

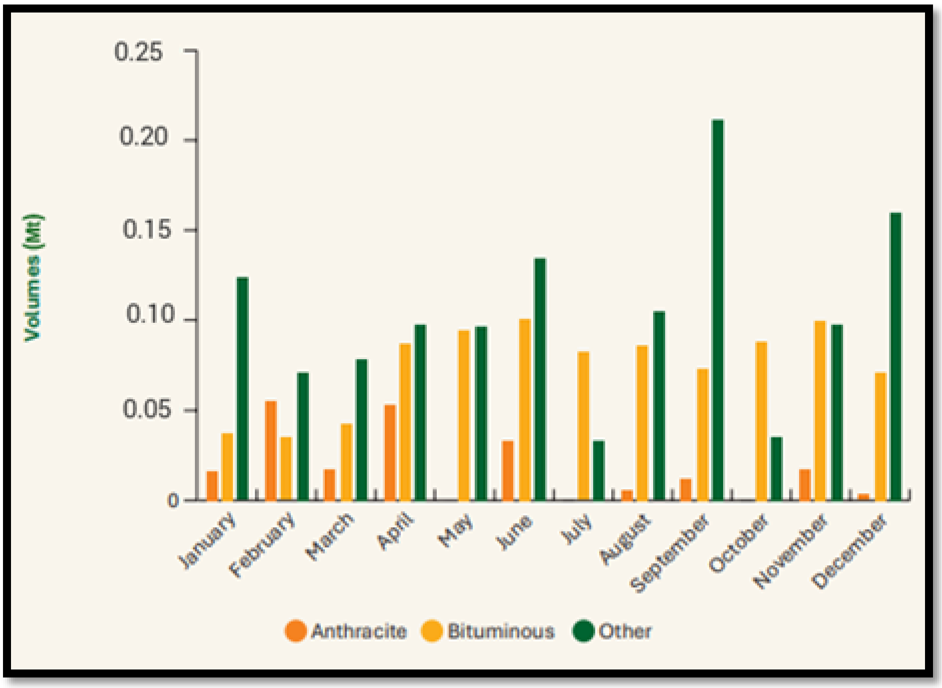

Figure 17: Coal imports by volume in 2024
Adapted from DEE (2024)

At the municipal level, coal stimulates local government finances across Mpumalanga. Property rates, service charges and business levies from collieries and associated industries provide 30 - 40% of own-source revenue in eMalahleni, Steve Tshwete and Govan Mbeki municipalities (Bhorat et al., 2024; Makgetla & Patel, 2021). Decreasing production and closures risk eroding this revenue base, worsening existing delivery challenges and exposing the municipalities to debt.

4.3 Employment

Coal mining directly employed approximately 98,425 people in 2024 (MCSA, 2025), about 22.6% of all mining jobs. It also supports another 38,000 in Eskom and Sasol operations (Bhorat et al., 2024; Stats SA, 2024). Between 2019 and 2022, the coal sector added approximately 4,258 net jobs, while other mineral subsectors declined. Broader labour market data from Quantec (2025), as shown in

Figure 18**Error! Reference source not found.**, estimate total coal-related employment, both formal and informal, at over 109,000 nationally, with approximately 94,000 workers in Mpumalanga. In terms of gender and age profile, the coal sector is dominated by men (about 84%), with an estimated 16% of coal sector workers being women. The coal-mining industry is youthful, with an average of 48% of employees aged between 15 and 34, and the largest age group, 25-34, comprising 35% of coal sector workers (Haroon Bhorat, 2024). This implies that reskilling and upskilling interventions must be youth-targeted and inclusive of women. Studies by Bhorat et. al. (2024) and Cole et. al. (2025) reveal that 43% of the workers are contractors who have lower education levels and weaker job protection, while an estimated 30% permanent employees and about 10% of contractors have higher-than-matric qualifications. Women, though a minority overall (about 16%), show higher rates of post-school qualifications (approximately 42% compared to 33% for men) (Cole et al., 2025).

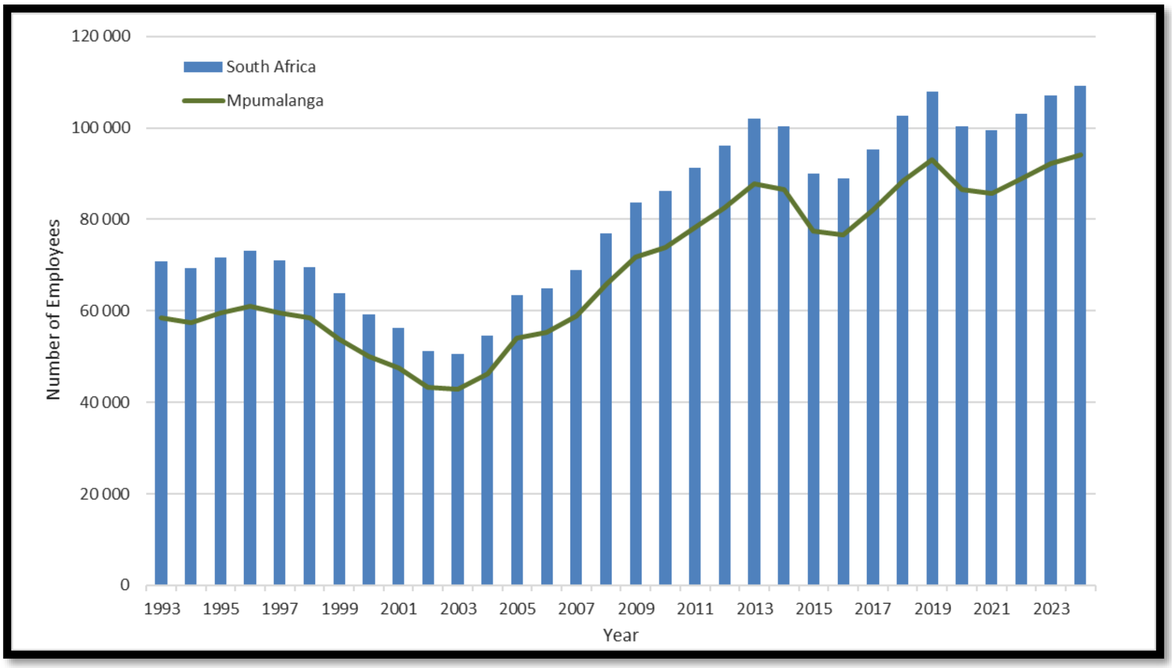

Figure 18: Number of employees in the coal sector (formal and informal), 1993 – 2024[28]
Source: CSIR analysis based on Quantec Easy data (Quantec, 2025b)

Across the value chain, the literature consistently shows that most job losses will occur in coal mining. This is the most labour-intensive stage of the value chain, and the first to contract as export markets decline when demand decreases, and domestic coal use falls (Jesse et al., 2018; Rademeyer, 2021; Strambo et al., 2024). Mining jobs are identified as the epicentre of labour vulnerability, especially in underground production, beneficiation, and surface operations. This is because they are geographically concentrated in one region with limited employment pathways. Even under the least-cost scenarios without aggressive climate policy, coal mining employment is projected to fall from roughly 77,000 in 2015 to between 21,000 – 41,000 by 2045, with accelerated decline under low-carbon pathways (Strambo, et al., 2019).

The next area of employment decline within the value chain is coal-fired power generation plants, where plant operations, maintenance, coal handling and ash-management roles will begin to diminish as the ageing plants ramp down and are decommissioned (Mirzania et al., 2023; Strambo et al., 2019). Transport-related jobs, such as coal truckers and freight rail workers, are also expected to decline due to falling export tonnages and reduced domestic coal haulage (Rademeyer, 2021; Strambo et al., 2024). Secondary impacts will affect employment in coal towns, such as retail, informal work (for example, spaza shops and domestic work), and other local services, as these rely on the coal economy and employees in the coal sector (Strambo et al., 2024).

[28] Informal employment refers to non-tax-registered activity and/or workers without formal employment arrangements; it does not include illegal mining activity.

The relationship between coal production and employment, shown in

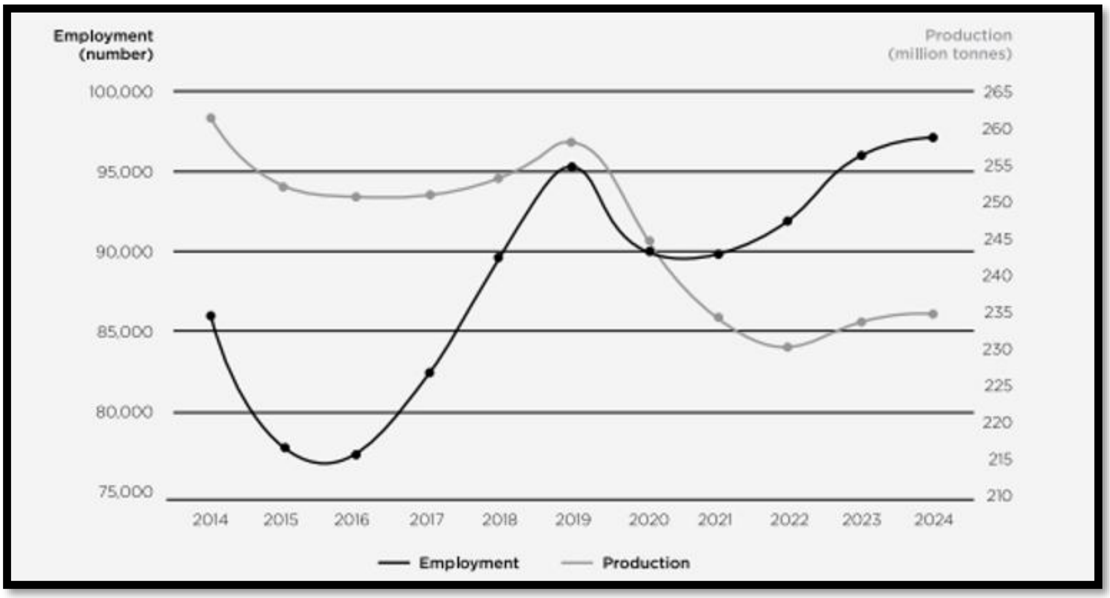

Figure 19, highlights the sector's structural sensitivity to both market and operational changes. Generally, higher production is associated with increased employment. Production in 2020 declined rapidly due to market effects during the Covid period. A divergence is observed after 2020, where employment rises despite stable or declining production, possibly reflecting worker retention, operational changes, or a lagged labour adjustment to production.

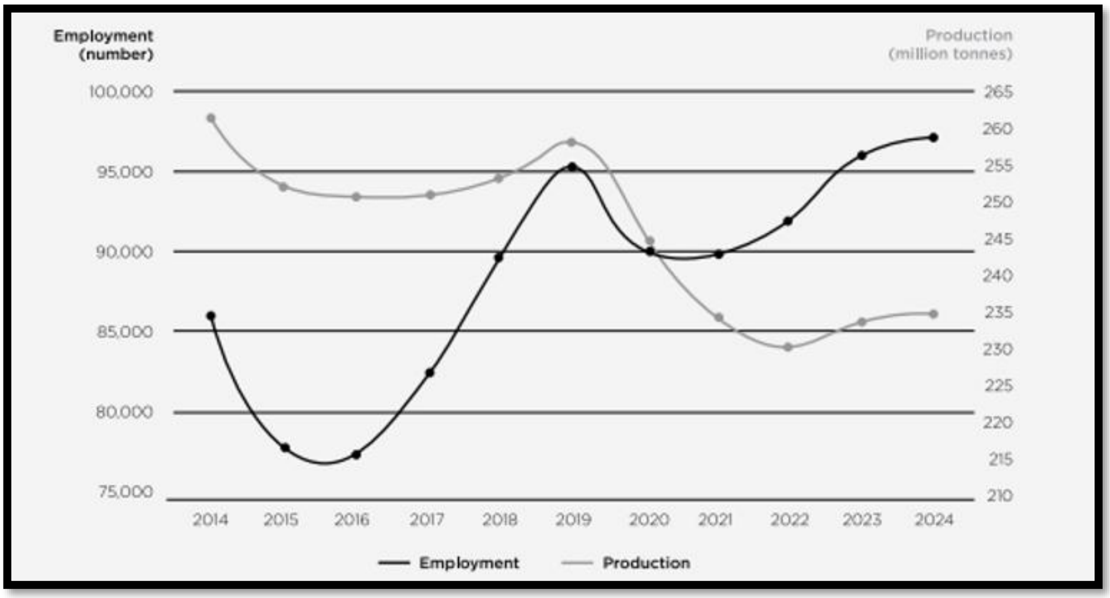

Figure 19: Coal industry employment and production, 2014 – 2024
Source: Mineral Council South Africa MCSA (2024)

Coal jobs generally offer better pay and more secure benefits than the average formal sector job in South Africa (Bhorat et al., 2024; TIPS, 2020a). Figure 20 forecasts coal employment to 2030, indicating that it remains relatively stable, while employment in electricity and petroleum products grows modestly. Coal employment closely follows the trend of GDP growth, as shown in Figure 21.Figure 21

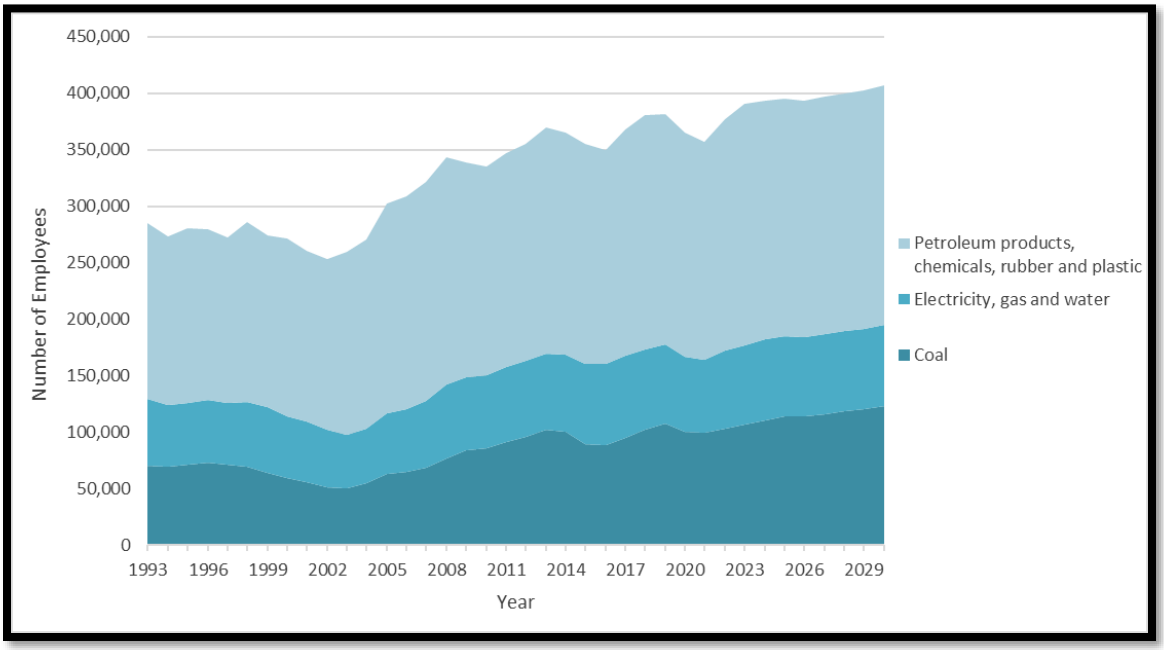

Figure 20: Industry employment forecast (1993 – 2030)
Source: CSIR analysis based on Quantec (Easy Data)

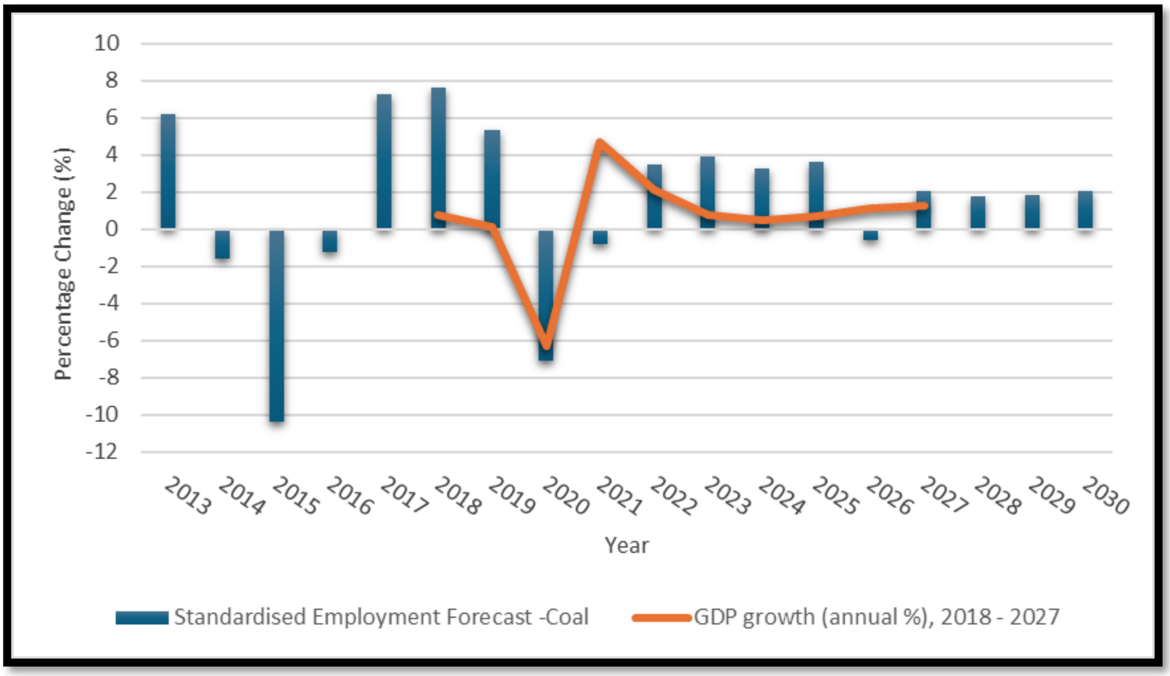

Figure 21: Forecast of standardised coal employment vs GDP growth
Source: analysis based on Quantec (Easy Data)

4.4 Implications for Social Dialogue

The coal value chain supports electricity generation, liquid fuel production, generates export revenue, and creates local employment. Therefore, it remains one of the main drivers of South

Africa's industrial and regional economies, contributing to GDP, trade, local revenue, and employment. The transition away from coal has implications for diverse stakeholders, including government revenue, job losses, asset and liability management, and the livelihoods of communities. Box 3 presents questions and pointers that stakeholders need to consider in social dialogue.

Box 3: Implications for the ongoing social dialogue considering the coal sector's economic contribution

Potential discussion questions for various stakeholders include:

Government:

- What fiscal policies are needed to offset the economic impacts of coal phase-down on government revenues?
- How can the government ensure that local governments receive sufficient financial support to maintain essential services during the transition?

Unions:

- How can workers' wages and benefits be protected during the transition?
- What measures can be taken to mitigate the economic impacts of job losses on workers and their families?

Industry:

- How can companies manage their assets and liabilities responsibly during the transition?
- What strategies can companies implement to minimise the economic impacts on their workers and communities?

Communities:

- How can communities diversify their economies to reduce reliance on coal mining?
- What investments are needed to create new economic opportunities and improve the quality of life in coal-dependent regions?

5 LABOUR UNION PERSPECTIVES ON THE JUST ENERGY TRANSITION

5.1 Overview of South Africa's labour union perspectives

Labour unions have been among the most influential actors in shaping South Africa's approach to the energy transition, particularly in relation to the coal sector. Major labour union federations include the Congress of South African Trade Unions (COSATU), with 1.8 million members (COSATU, 2024); the South African Federation of Trade Unions (SAFTU), with approximately 800,000 members (SAFTU, 2019); and the National Council of Trade Unions (NACTU), with 400,000 members (South African History Online, 2016), along with their affiliated unions: the National Union of Mineworkers (NUM), with about 312,000 members in 2012 (NUM, 2026); the National Union of Metalworkers of South Africa (NUMSA), with 364,144 members (NUMSA, 2021); and the Association of Mineworkers and Construction Union (AMCU), with 200,000 members as last recorded in 2021 (AMCU, 2021). Since the early 2010s, these trade unions have developed distinct yet overlapping positions on how the transition away from coal should proceed. Their perspectives reflect both acceptance of climate imperatives and a consistent emphasis on protecting jobs, regional economies, and public ownership within the energy system.

The earliest framing of a just transition in the South African labour movement emerged in 2011, when COSATU adopted its *Policy on Climate Change: A Just Transition to a Low-Carbon and Climate-Resilient Economy* (COSATU, 2011). This policy articulates the need for a state-led shift towards cleaner energy, but firmly underlines that such a transition must be worker-centred, equitable, and accompanied by skills development and social protection. COSATU's policy unequivocally stated that its purpose was to ensure the transition would prioritise the needs of working and poor people in the forthcoming social and economic changes, defining a just transition as one shaped by social dialogue and fairness rather than by market forces.

Building on this, NUMSA's position from 2012 onwards maintained support for decarbonisation but emphasised on ownership and the risks of market-driven transition pathways by rejecting what it calls the "capitalistic framing of the 'green economy'" (NUMSA, 2012). In his 2012 address at a New York conference, NUMSA president Cedric Gina affirmed that the concept of the green economy had been hijacked by capitalists for financial gain rather than for overall social justice or just transformation (NUMSA, 2012). NUMSA argued that a genuine energy transition is impossible within capitalist relations and that democratic control and social ownership of energy systems are prerequisites for achieving a truly just low-carbon future. The union's position combines climate realism with systemic critique, and, like COSATU, NUMSA asserts that only a worker-controlled, publicly owned energy transition could deliver both decarbonisation and social justice.

NUMSA's Central Committee resolutions and speeches from this period positioned the just transition as inseparable from the struggle for energy democracy and industrial transformation (NUMSA, 2012). The union argued that renewable-energy expansion should occur under public or social ownership rather than through Independent Power Producers (IPPs), a view that would later define its opposition to Eskom unbundling and privatisation (NUMSA, 2019a).

By 2018, as Eskom's wage offer and the future of coal entered public debate, NUMSA and NUM issued a joint statement calling for a *Just Transition that safeguards employment at coal-fired power plants*. The unions stated in a press release that "Eskom, in its own research commissioned by KPMG in 2017, found that at least 92,000 jobs would be lost if the five coal-fired power stations in Mpumalanga are closed to make way for IPPs" (NUMSA, 2018) . The unions sought guarantees that displaced workers would be retrained and absorbed into the renewable energy sector (NUM, NUMSA). In 2019, NUMSA reiterated that it was *"not against the transition from fossil fuels to renewables"* but opposed an uncoordinated or privately led process that would deepen inequality. It insisted that the restructuring of Eskom must retain public control and job security (NUMSA, 2019b). In addition to opposing a rushed transition by the unions, research by Just SA (2025) on Social and Labour Plans has also highlighted weaknesses in worker-protection mechanisms during mine downscaling and closure. Social and Labour Plans are recognised as important instruments, but concerns remain over weak implementation, limited oversight, weak worker consultation and poor follow-through (Just SA, 2025). A COSATU report on the just transition notes that at Optimum mine, workers were retrenched, workers and contractors were not paid on time, and the SLP was not implemented, which it says should not be repeated across the coal value chain (COSATU, 2022).

The Association of Mineworkers and Construction Union (AMCU) also raised similar concerns that the proposed coal phase-down could devastate mining regions if implemented without credible alternatives, livelihoods, and reskilling measures (Liedtke, 2021). By 2022, NUM had formalised its stance through a National Strategic Planning Session, declaring that it was *"not opposed to renewable energy"* but that Eskom must remain involved in its development (NUM, 2022). The union warned that coal plant closures in Mpumalanga should "never be unnecessarily rushed" and called for compensation from developed nations responsible for historic emissions, stating that South Africa cannot be expected to sacrifice its own economic development. NUM also stated that, given the country's abundant coal reserves, stopping coal usage would be reckless and irresponsible until the country is fully industrialised. NUM reiterated in 2023 that coal must remain part of the national energy mix until sufficient renewable capacity, localisation, and economic readiness are achieved (NUM, 2023). NUMSA also argued in 2023 that *"renewables alone will not solve the energy crisis,"* cautioning that over-reliance on IPPs and donor-driven finance could weaken domestic industry and employment (Parker, 2023).

As implementation talks for the *Just Energy Transition Investment Plan (JET-IP)* advanced, NUM again warned against accelerated coal phase-outs under externally funded transition frameworks. In its March 2025 media release, the union opposed foreign-conditioned finance packages that could undermine national sovereignty and reiterated that any transition must focus on job retention, industrial localisation, and community resilience (NUM, 2025).

These labour unions have clearly reaffirmed their position that South Africa's decarbonisation must be gradual, publicly led, and domestically financed.

5.2 Overview of international labour union perspectives

Many labour unions around the world express similar views regarding the coal phase-down in the transition to a low-carbon society. The perspectives of some of these labour unions from India, Germany, the Philippines, the USA and Canada are summarised below:

5.2.1 India

Labour unions in India acknowledge that an energy transition is inevitable as the country moves towards its 2070 net zero target, but they emphasise that the current transition remains top-down, poorly planned, and largely excludes workers. According to the global union, IndustriAll (2025) , unions highlight that while over 1.3 million renewable energy jobs have been created, most are temporary, low paid, and non-unionised, with harsh conditions that pose health hazards for solar installation workers. Some of these workers earn as little as USD 3.2 (~R 55) per day; the average salary of a solar technician is USD 6.5 to USD 11.4 per day (Glassdoor, 2025), while the minimum wage in India is estimated at USD 2 per day (ILO, 2024)). At the same time, coal unions warn of declining job security, with recruitment into permanent positions frozen, while contracting and outsourcing have expanded. This weakens collective bargaining and replaces decent jobs. Unions report that 300,000 permanent and 500,000 contract workers, along with over 1.4 million dependents, are exposed to abrupt redeployments, mine closures, and the absence of retraining pathways (IndustriAll, 2025; Spencer et al., 2018). Findings from the Transition Research Centre at the Indian Institute of Technology (IIT) Kanpur's Department of Humanities and Social Sciences show that union leaders do not deny the need for transition, but they demand inclusion "from the early stages" of policy design and criticise bodies such as the Jharkhand Just Transition Task Force for excluding labour representatives. The unions also stress gender impacts and the need for early regional economic diversification as well as structured reskilling programmes to ensure workers can move into alternative livelihoods (Sirur, 2024).

5.2.2 Germany

Germany's leading energy sector union, the Mining, Chemical and Energy Industrial Union (IGBCE), presents one of the most structured labour responses to coal phase-down globally. IGBCE positions itself as a defender of a "socially acceptable transition" and emphasises that climate goals must be aligned with worker protection, income stability and regional cohesion.

IGBCE's position, as reflected in government and company statements, is that coal phase-out is acceptable only if:

- older workers receive generous early-retirement and compensation packages,
- younger workers are guaranteed redeployment within the energy group or associated industries, and
- significant public regional development funding accompanies closures in lignite regions, to avoid "coal ghost towns" (Kiyar, 2022); (Just Transition Centre, 2019).

The union successfully negotiated collective agreements such as the RWE–IGBCE Coal Exit Agreement, which tops up allowances to maintain 80% of previous incomes (IGBCE, 2025).

Generally, the unions accept the political decision to exit coal but reject a market-only coal exit, arguing that abrupt closures without state planning would devastate mining regions. The German case in the Just Transition action report (Just Transition Centre, 2019) highlights that unions view long timelines and binding federal financing as non-negotiable prerequisites for any coal exit.

5.2.3 Philippines

In the Philippines, the labour federation, SENTRO (Sentro ng mga Nagkakaisa at Progresibong Manggagawa), advances one of the most explicit anti-privatisation just transition positions in the global south. SENTRO supports the adoption of renewable energy but states that the transition has been structurally undermined by the Electric Power Industry Reform Act (EPIRA) of 2001, which privatised the power sector and introduced a competitive wholesale electricity market (Chambers and Partners , 2025). According to the International Trade Union Federation, (ITUC, 2021), SENTRO argues that privatisation has led to higher tariffs, while limiting the ability of workers and communities to influence energy decisions. The union advocates a transition based on public utilities and community-owned renewables, emphasising "energy democracy" as a core principle.

5.2.4 United States of America and Canada

In the United States of America, the United Mine Workers of America (UMWA) acknowledges that coal is in decline but insists on federal guarantees for income, pensions, and community redevelopment before supporting any phase-down. Their 'Preserving Coal Country' plan calls for funding for Carbon Capture and Storage research and development, reclamation jobs, and large-scale industrial investment in coal regions (UMWA, 2021). In Canada, unions played a central role in establishing the federally mandated Task Force on Just Transition for Canadian Coal Power Workers and Communities. The report emphasises that unions demanded strong federal responsibility for mitigating the consequences of the 2030 coal exit. This included pension bridging, wage support, locally run transition centres, retraining and substantial community diversification funding. Unions did not oppose the phase-out but argued that climate policy must not shift adjustment costs onto workers and municipalities (Canada's Task Force on Just Transition for Canadian Coal Power Workers and Communities, 2018).

5.3 Implications for Social Dialogue

Labour unions play an important role in discussions shaping a just energy transition, focusing on job losses and opportunities for job creation. Understanding the position of labour unions helps address areas of tension, particularly the pace of the transition, what constitutes a "gradual" phase-down, and how to finance and design worker retraining. These topics require structured social dialogue. Box 4 outlines key questions to guide social dialogue with diverse stakeholders to address issues relating to transparency, representation of union members, opportunities for collaboration, and advocacy for community voices.

Box 4: Implications for the ongoing social dialogue considering the coal sectors economic contribution

Potential discussion questions for various stakeholders include: **<u>Government:</u>** • How can the government engage with labour unions in a meaningful and transparent way to address their concerns and priorities? • How can the government create a social compact that protects the rights and interests of workers during the transition? **<u>Unions:</u>** • How can unions effectively represent the interests of their members in the context of a rapidly changing energy landscape? • What new skills and strategies are needed to ensure that unions remain relevant and effective? **<u>Industry:</u>** • How can companies build trust and collaboration with labour unions to ensure a smooth and equitable transition for their workforce? • What proactive measures can companies take to support workers in finding new employment opportunities? **<u>Communities:</u>** • How can communities work with labour unions to advocate for their interests and ensure their voices are heard in the transition process? • What mechanisms can be established to foster collaboration and shared decision-making?

6 REVIEW OF POLICY FRAMEWORK

Section 6 reviews key national policies relevant to the coal sector's transition, which are summarised in **Error! Reference source not found.**. While national policy signals a managed transition, uneven implementation across provinces is a key constraint to the coherence of South Africa's transition, as elaborated in the policy discussion (Section 6.1.1).

Table 6: National policy instruments: Effectiveness, gaps, and implications

Policy	Description, Purpose and Application	Identified Gaps or Inconsistencies	Influence on Future Sector Development
Integrated Resource Plan (IRP 2019 and 2025)	A long-term strategy for determining the country's electricity generation mix to ensure a sustainable, cost-effective, and secure energy supply. Applies to: DEE for planning; Eskom and IPPs for implementation; NERSA for licensing and approvals.	While IRP 2019 set out clear decommissioning targets (10.6 GW by 2030 and approximately 35 GW by 2050), the updated IRP specifies the decommissioning of 8 GW by 2030. Beyond this, the document provides an indicative decommissioning schedule based largely on a 50-year plant life assumption rather than a fixed policy target. This suggests that Eskom may not be committing to the same retirement levels or timelines outlined in IRP 2019; instead, there appears to be a shift towards maintaining or even increasing coal capacity in the short-to-medium term[29]. Regarding clean coal technologies: High Efficiency- Low Emissions (HELE) and	An explicit decommissioning schedule for coal plants beyond 2030 is crucial for developing appropriate responses to mitigate the negative impacts associated with the decommissioning of coal plants.

[29] DEE (2025)

Policy	Description, Purpose and Application	Identified Gaps or Inconsistencies	Influence on Future Sector Development
		Carbon Capture, Utilisation, and Storage (CCUS) are referenced in the IRP 2019. The updated IRP 2025 mentions a "demonstration plant on clean coal technologies by 2030." However, the plan does not explicitly advance specific technological pathways (such as HELE or CCUS/CCS), nor does it allocate commercial-scale capacity or implementation mechanisms for these pathways within the generation build programme.	
South African Renewable Energy Masterplan (SAREM)	A roadmap to develop domestic manufacturing, assembly, and supply chains for solar PV, wind, batteries, inverters, cables, and related components. Applies to: Department of Trade, Industry and Competition; Department of Mineral and Petroleum Resources; local manufacturers; Renewable Energy Independent Power Producers; SOEs (Eskom/CSIR); and local suppliers responsible for delivering localisation, investment, and skills outcomes.	Localisation targets are undermined by limited manufacturing capacity and local content rules: South Africa does not yet have the factories, skills, or machinery to produce the volume of renewable energy components (solar panels, wind towers, batteries) required by the plan[33]. Divergent stakeholder interpretations of a just transition are weakening clear implementation pathways, and there is a disconnect between national planning and provincial or local planning tools, which increases implementation risk[33].	Supports new renewable energy industries and provides alternative jobs for coal regions; enables localisation of solar, wind, and battery supply chains.

Policy	Description, Purpose and Application	Identified Gaps or Inconsistencies	Influence on Future Sector Development
		Renewable energy auctions are not run regularly, and are often delayed, cancelled, or slowed[30,31].	
Presidential Climate Commission – Just Transition Framework (2022)	An advisory framework to guide a just transition (jobs, regions, social support) Applies to: all three spheres of government, state owned companies (such as Eskom) and agencies, business, labour, communities, and civil society organisations.	The framework is advisory rather than binding, relying on departmental uptake and external funding[32].	If financed through JET-IP, it can repurpose coal towns as clean energy hubs. However, weak implementation risks leaving social and labour commitments unfulfilled.
National Mine Closure Strategy 2021	National framework for mine closure, rehabilitation, and socio-economic transition. Applies to mining right holders, the Department of Mineral and Petroleum Resources (DMPR), environmental regulators under the National Environmental Management Act, and municipalities responsible for planning for post-mining impacts.	Weak enforcement capacity, poor coordination between closure plans, Social and Labour Plans, and municipal Integrated Development Plans, and unclear long-term liability after closure. Lacks coherence and fails to address or rectify the long-standing negative impacts and injustices caused by past mining activities [33], with one of the contributing factors relating to this is the under-pricing the costs of mining rehabilitation.	Forces mining companies to plan earlier for closure and increases the importance of post-coal economic diversification in mining regions.

[30] Kersten (2024)
[31] Molepo et.al (2025)
[32] PCC (2022)
[33] Stokholm Environment Institution

Policy	Description, Purpose and Application	Identified Gaps or Inconsistencies	Influence on Future Sector Development
Carbon Tax Act (Phase 1–2)	Its purpose is to price GHG emissions to support South Africa's NDC and is administered as an environmental levy. Applies to: industries and is enforced by SARS / National Treasury.	Low effective rates after allowances and exemptions for Eskom and heavy industry dilute the impact [34].	Incremental increases after 2026 could shift dispatch away from older, high-emitting coal plants. There will be limited effect until exemptions are reduced.
Air Quality Act (Minimum Emission Standards)	Sets legally enforceable emission limits and manages air quality priority areas. Applies to: emitters (Eskom, Sasol, industry), with enforcement by DFFE/NAQO.	Enforcement is inconsistent; numerous postponements have been granted. Municipalities lack technical capacity; Prioritises economy over health[35, 36, 37].	Stronger enforcement would increase retrofit costs and accelerate coal-plant retirement, while continued leniency prolongs health and climate costs.
Mineral and Petroleum Resources Development Act (MPRDA) & Social and Labour Plans (SLPs)	This policy makes mining rights conditional on social and worker development Social and Labour Plans set out how the company intends to share some of the benefits generated by mining. Applies to mining right holders	From an implementation perspective, Social and Labour Plans have been found to fail in enabling workers and communities to access, monitor and influence Social and Labour Plans monitoring; Social and Labour Plans are often poorly aligned with municipal Integrated Development Plans; and closure provisions under-funded [38, 39].	Aligning Social and Labour Plans with municipal plans and enforcing closure liabilities would help cushion employment and fiscal shocks during mine downsizing.
Financial Provisioning Regulations for Mine Closure (NEMA)	Ensures upfront provisioning for rehabilitation and post-closure liabilities (under NEMA).	Exemptions, deferred compliance, and financial provision shortfalls by mines may reduce the effectiveness of rehabilitation	Stricter enforcement increases the cost of late-life coal and encourages early repurposing or orderly closure.

34 National Treasury (2024)
35 CREA (2023)
36 DEA (ND)
37 Just Share (2024)
38 TIPS (2020)
39 Mineral and Petroleum Resources Development Act (2002)

Policy	Description, Purpose and Application	Identified Gaps or Inconsistencies	Influence on Future Sector Development
	Applies to holders of prospecting, mining, or production rights or permits, and is implemented by the Minister responsible for Mineral and Petroleum Resources (DMPR).	and post-closure provisioning requirements.	
National Water Act	Establishes integrated water resource management through legally defined Water Management Areas and mandates the Department of Water and Sanitation to regulate water allocation, licensing, and compliance[40]. Applies to coal mining through water-use licences, groundwater abstraction controls, pollution prevention, and discharge regulation[40].	Strong legislative framework, but weak and uneven implementation at provincial and municipal levels[41]. Fragmented coordination between water, mining, and energy authorities limits integrated governance; institutional capacity and financial constraints undermine effective catchment-scale management[42]. Groundwater monitoring and long-term protection are inconsistently applied, despite evidence of declining groundwater quantity and quality in coal regions[43].	Water scarcity and allocation constraints increasingly affect coal sector viability[40,42], and weak enforcement increases the risk of long-term water liabilities and community impacts post-closure[43]. Rising water-related operating costs add financial pressure to coal operations, particularly in Mpumalanga[44].
Just Energy Transition (JET) and the JET Investment Plan (JET-IP)	JET-IP is an investment blueprint to finance the grid, renewables and skills, Applies to: National Treasury/DMPR/Eskom, provinces; donors.	Disbursement is slow; project pipeline readiness is lagging in coal regions[45].	Rapid execution would attract further climate finance and generate new employment streams in existing coal areas.

[40] Republic of South Africa (1998)
[41] Mlalazi, N. et al. (2025)
[42] Mathetsa et al. (2019)
[43] Barnes & Vermeulen (2012)
[44] Stats SA (2024)
[45] Bhorat et al. (2024)

Policy	Description, Purpose and Application	Identified Gaps or Inconsistencies	Influence on Future Sector Development
Nationally Determined Contribution	South Africa strengthened its climate pledge under the Paris Agreement by lowering its 2030 emissions target. This serves as the external benchmark guiding all domestic mitigation policy. Applies to: national government as Party to the Paris Agreement	Full alignment across key instruments such as the IRP or sectoral carbon budgets remains incomplete.	Aligning the IRP, carbon tax, and Minimum Emission Standards with the NDC target would establish a coherent national emissions ceiling. Failure to integrate NDC objectives risks trade-exposure penalties and loss of access to climate finance.

6.1.1 Policy Discussion

Mpumalanga, which produces over 80% of South Africa's coal, is vulnerable to decarbonisation measures. The province's planning frameworks acknowledge health and environmental pressures but lack coordinated funding for transition infrastructure or municipal revenue replacement. This governance gap is also acute regarding water, despite robust national legislation such as the National Water Act and the National Environmental Management Act, where implementation challenges persist at provincial and municipal levels (Mlalazi et al., 2025). Parliamentary oversight visits in 2025 revealed under-resourced municipalities and insufficient enforcement of mine rehabilitation and Social and Labour Plan commitments. Weak enforcement extends to water-related obligations, including groundwater monitoring and post-mining remediation, despite evidence that coal mining significantly reduces groundwater quantity and quality (Barnes & Vermeulen, 2012; Mlalazi et al., 2025). Despite national transition goals, local governance remains constrained by dependence on coal rates and service income. In contrast, Limpopo promotes coal as a developmental asset as mentioned in the DMRE's (2023) investment statement. The Department emphasised the role of the Waterberg and Soutpansberg coalfields in energy security and industrial growth. This provincial framing is not yet fully aligned with national decarbonisation objectives, which may also affect investor sentiment.

South Africa's coal sector policy frameworks show only partial consistency. National strategies recognise the inevitability of coal decline, but implementation remains fragmented across departments. The IRP 2025 and the DEE prioritise electricity supply reliability and do not advance technological pathways for the coal fleet, such as carbon capture and other clean coal technologies. This ambiguity also extends to clean coal technologies. In theory, High Efficiency, Low Emissions (HELE) technologies can assist in lowering the emissions intensity of coal-fired electricity generation through improved efficiency, and Carbon Capture, Utilisation, and Storage (CCUS) can assist in capturing carbon dioxide emissions from coal-based electricity generation or industry before it is released into the environment. (IEA, 2020). As a result, it is clear that these technologies still form part of international discourse on lower emissions options for coal-based electricity generation and industry, especially where countries are seeking to balance emissions reduction with energy security and industry continuity. However, it is also clear that, although IRP 2025 refers to a demonstration plant being operationalised by 2030, it does not outline a clear commercial pathway, implementation mechanism, or clear role for HELE or CCUS in the future electricity mix in South Africa. In contrast, the PCC framework and the JET-IP emphasise social justice and climate alignment. This duality demonstrates the political economy mapped by Jakob and Steckel (2022), who highlight that policy outputs are shaped by competing interests among Eskom, mining corporations and labour unions, each exerting leverage over the pace of reform.

The various policies have been somewhat effective in maintaining the stability of the energy system and indicate only a gradual pace of transition. There is weak enforcement of policy and reliance on outdated assumptions, which will likely dilute the impact of these frameworks and policies. The absence of a legislated term for updating the IRP, low carbon-price stringency, and selective enforcement of emission standard compliance contribute to ongoing uncertainty. Meanwhile, instruments such as the Social and Labour Plans and financial-provisioning regulations remain under-implemented, undermining local transition preparedness.

Therefore, the gaps or inconsistencies in frameworks and regulations centre on governance rather than vision: overlapping mandates between the DEE, DFFE, and the National Treasury have slowed execution. Coordination through the Presidential Climate Commission has improved dialogue but lacks enforcement power. Provincial disparities also contribute to these inconsistencies, as Mpumalanga municipalities are exposed to mine closures, while in Limpopo, incentives for new coal investments persist without accounting for climate risk.

South Africa's current policy has not yet demonstrated a coherent transition to low-carbon energy systems. This lack of coherence also has implications for export competitiveness, such as the European Union's Carbon Border Adjustment Mechanism (CBAM), which may put pressure on carbon-intensive South African exports in the future. Without stronger institutional coordination and regulatory certainty, the country risks a disorderly decline in coal, characterised by stranded assets, fiscal stress, and social disruption. With deliberate alignment between national and provincial frameworks, these policies could enable a managed, job-creating transition.

6.2 Implications for Social Dialogue

The review of existing policy frameworks identifies enabling elements and gaps that directly influence the coal sector's transition trajectory. These gaps create uncertainty regarding closure timelines, investment decisions and worker protections. Structured dialogue is therefore essential to address coherence and consistency in policy, ensure regulatory frameworks consider workers' rights, promote environmental stewardship and social responsibility, and develop policies that support communities. Box 5 below highlights key questions to guide stakeholders in clarifying policy priorities and areas of alignment.

Box 5: Implications for the ongoing social dialogue considering the policy frameworks that impact the coal sector

Potential discussion questions for various stakeholders include:

Government:

- How can the government improve coherence, coordination, and implementation across existing policy and regulatory instruments to support a just and sustainable energy transition?
- What measures are needed to ensure that coal mining operations comply with environmental and social obligations?
- How should responsibilities for managing coal transition impacts be divided across national, provincial, and local government?
- What mechanisms are needed to ensure that commitments in Social and Labour Plans, mine closure processes, and local development planning are aligned, monitored, and enforced across the different spheres of government?

Unions:

- How can unions advocate for policies that protect workers' rights and promote a just transition?
- What role can unions play in shaping the regulatory framework for the energy sector?

Industry:

- How can companies collaborate with the government to strengthen the implementation and coordination of existing policies that encourage innovation and investment in clean energy technologies?
- What role can companies play in promoting responsible environmental stewardship and social responsibility?

Communities:

- How can communities participate in shaping policies that affect their livelihoods and environment?
- What mechanisms can be established to ensure that communities have a voice in decisions about the future of the energy sector?

7 CONCLUSION

South Africa's coal sector is at a structural crossroads: while it remains foundational to the energy economy, it faces significant structural and policy challenges in the context of decarbonisation. Across the value chain, from reserves to labour policy, evidence indicates a system characterised by incremental adjustment rather than a fully articulated implementation strategy. The nation's coal reserves remain a significant energy asset, yet they are caught between geological realities and policy uncertainty. The concentration of recoverable reserves in Mpumalanga and Limpopo presents both economic opportunity and vulnerability, anchoring regional livelihoods while tying provincial economies to a declining global commodity. Coal continues to dominate energy production, indicating that South Africa's energy system is technically over-supplied with coal but strategically under-prepared for transition.

Mining remains highly concentrated and profitable for a few corporations, while host regions experience uneven socio-economic outcomes. Control by a small number of producers keeps output stable but exposes the entire sector to corporate decisions rather than national policy. Logistical breakdowns, mainly within the rail freight system, have turned what was once a national strength into a bottleneck. The collapse of rail reliability and the shift to trucking demonstrate how prolonged underinvestment and operational constraints can turn physical infrastructure into a liability, restricting export capacity and undermining the efficiency of coal transportation. The declining throughput at Richards Bay reflects both infrastructure deterioration and global decarbonisation pressures.

Operational challenges, deteriorating plant performance, and poor-quality feed coal have turned coal-fired generation from a pillar of stability into a fiscal and environmental burden. The coal-to-liquid industry, centred on Sasol's Secunda complex, is a significant component of the coal value chain and also anchors the petrochemical value chain, but remains emissions-intensive and creates long-term path dependency within the energy and petrochemical system. Sasol's reliance on coal illustrates the country's dependence on a single corporate actor whose energy choices directly affect national climate performance.

The continued use of household coal for cooking and heating in poorer communities highlights the social divide in South Africa's energy transition. While industry strives to move toward cleaner fuels, these communities continue to rely on household coal, which is associated with documented health and environmental risks. Labour market studies (TIPS, DPRU) confirm the depth of regional dependence: over 80% of coal activity and employment are concentrated in western Mpumalanga, where property rates, service charges and business levies from collieries provide up to 40% of municipal revenue in the eMalahleni, Steve Tshwete and Govan Mbeki municipalities. Without deliberate diversification, these towns face heightened fiscal and employment risks as mines and plants close. These risks include loss of employment opportunities in the operation and maintenance of the plants, coal handling and coal ash management because of the aging power stations being shut down, as well as the reduction of employment opportunities in transporting (truck drivers and train workers) and secondary losses in retail, informal work (such as spaza shops and domestic work), and other local services that depend on the coal economy.

The policy environment reveals the fragility across the coal value chain. Despite multiple frameworks (IRP, NDC, Carbon Tax, JET-IP, MES, and SLPs), implementation varies across instruments and institutions, with enforcement capacity and political priorities influencing outcomes, shaped by short-term pressures to maintain stability or appease constituencies and other various interest groups. Instruments designed to safeguard social and environmental justice, such as Social and Labour Plans and the Financial Provisioning Regulations for Mine Closure, continue to suffer from inadequate monitoring and poor enforcement. This has resulted in persistent gaps in mine rehabilitation funding and delayed delivery of community obligations.

Institutional fragmentation exacerbates these challenges. The DEE, DFFE, National Treasury, and DMPR operate with overlapping mandates (particularly where energy planning, climate regulation, and carbon pricing all shape coal decommissioning, emissions reduction, and future electricity investment), while provincial planning often contradicts national objectives. For example, Limpopo continues to promote new coal investment as a provincial development strategy, while national frameworks commit to decarbonisation and Mpumalanga faces mine closures, illustrating a lack of full alignment between provincial and national planning priorities. Coordination through the Presidential Climate Commission has improved social dialogue but remains advisory, lacking legal authority to compel implementation or accountability. Meanwhile, labour unions have deepened their advocacy for a just and well-planned transition and continue to hold government and partners accountable for ensuring that climate policy does not reproduce unemployment and inequality. They advocate a just, state-led, worker-centred transition that prevents regional collapse and economic exclusion.

Overall, while the coal value chain delivers employment, revenue, and energy, it shows declining structural resilience due to infrastructure constraints, policy incoherence, and delayed transition planning. Multiple environmental and economic analyses indicate increasing pressure to reduce coal reliance over time. Without this shift, South Africa's path to sustainable development will continue to be obstructed by the very resource that once fuelled its growth.

The report serves as a technical analysis for planning, social dialogue, and consideration of different transition options and their implications. The immediate task, therefore, is to strengthen coordination and enforcement in those areas where risks are already most concentrated, such as in coal-dependent municipalities, in mine closure processes, as well as in worker support systems in these vulnerable municipalities. The medium-term task for South Africa is to manage the process of integrating energy planning, labour transition strategies, municipal planning and regional diversification in such a way that any form of coal phase-down does not outpace the capacity to manage the change. In the longer term, the key task will be to transition coal-dependent regions to a new economic structure by helping new forms of employment, investment, and municipal revenue emerge ahead of the decline in coal-related activities.

Evidence from this review indicates that transition timelines shaped primarily by external benchmarks may not adequately account for South Africa's structural dependence on coal for electricity generation, revenue, and employment. Sequencing decisions, such as extensions to compliance deadlines under the Minimum Emission Standards, illustrate the tension between environmental enforcement and the operational and fiscal constraints facing coal-dependent utilities and municipalities. Differentiated, context-sensitive transition pathways, reflecting national circumstances and consistent with the principle of common but differentiated responsibilities under international climate agreements, are supported by the evidence on the sector's fiscal and employment exposure presented in this report.

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